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Physical Therapy Practice

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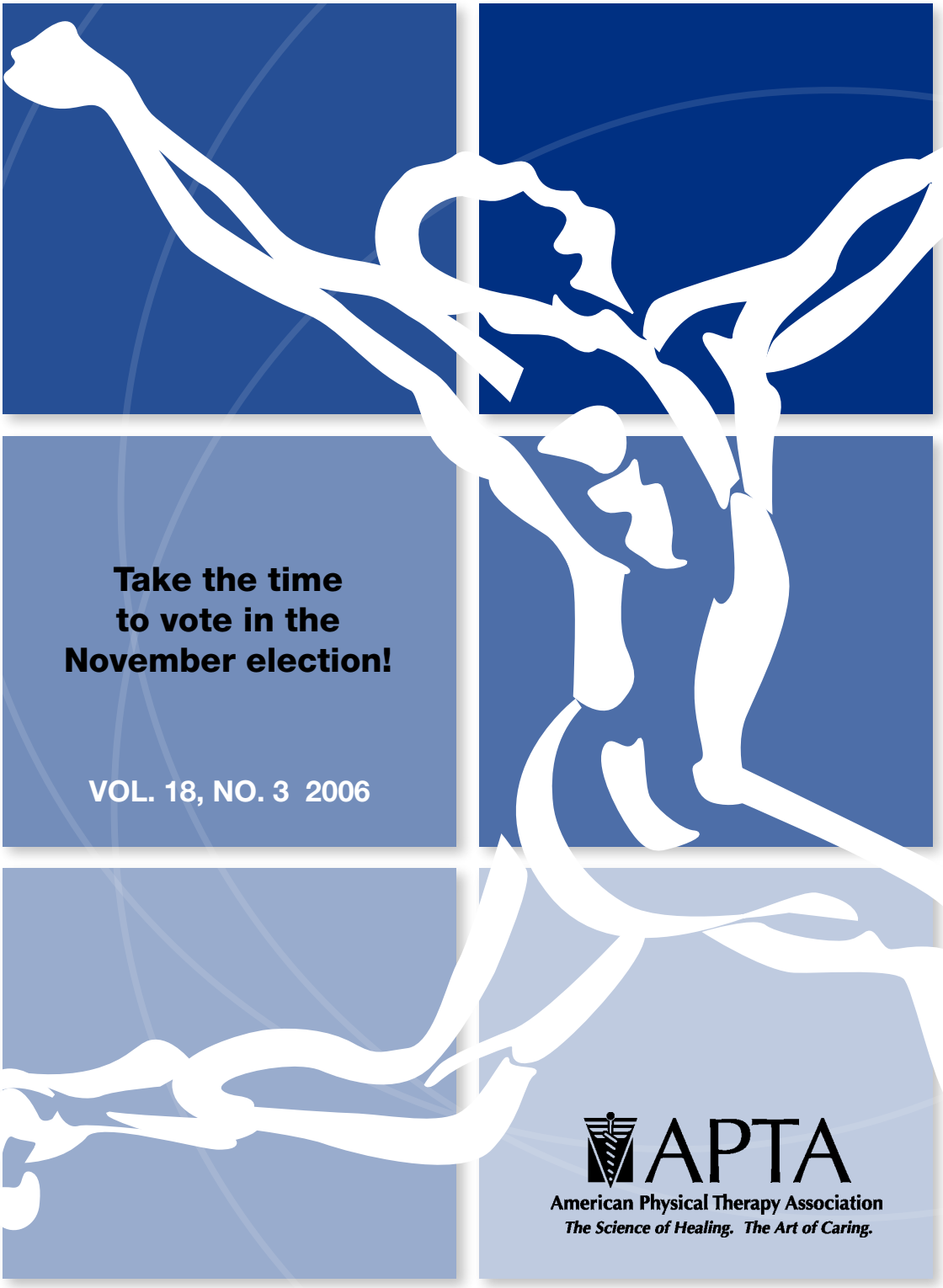

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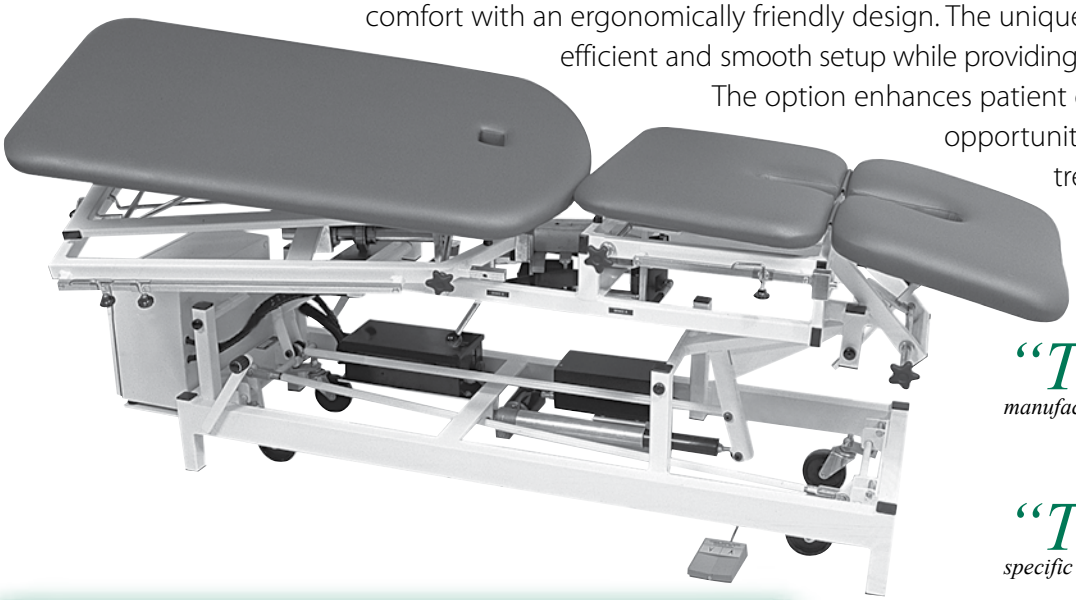

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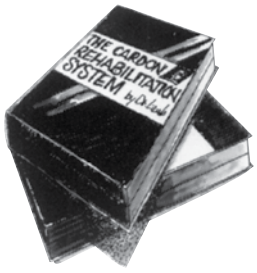

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Physical Therapy Practice

VOL. 18, NO. 3 2006

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- enhancement of clinical practice,
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Inside Out

As a health care provider we spend countless hours through formal education and clinical experiences to learn our craft so that we may do justice for our patients to provide the best care possible. We assume that the more we know, the higher the quality of care we will provide. But even with all of this training and preparation, there is still one critical element we may not truly appreciate. That is the role of being a patient ourselves.

Whether we encounter our own sense of mortality through a life-threatening disease or we undergo a 'routine' (if there is such a thing!) surgical procedure, one thing is guaranteed, a TRUE appreciation for being a patient can only come from being one yourself.

I have read many accounts by various health professionals (doctors, physical therapists, nurses, etc) who have been put in such a situation and the common theme from such an experience seems to be the difficulty of 'letting go' or fighting the fear of losing control. Empowering or putting one's health in another's hands is quite humbling.

After all, by our training we are supposed to be leading the way not following. I am sure if I ask each of you whether you are a compassionate therapist the response would be….yes. However, even supposedly compassionate physicians report an even greater degree of compassion for what the patient goes through, on all levels. Not just with therapy but dealing with the health care system and direct interaction with other providers and colleagues.

Can you really know what its like to have general anesthesia if you have never had it? Do we really know the psychological adjustments that occur when one becomes totally dependent on another for eating, bathing, etc?

How would you, or how have you, reacted when faced with the consequence of having surgery for a common orthopaedic problem or maybe something more complex such as chemotherapy? As therapists we can sometimes develop a slight complacency of feeling somewhat immune to the same problems our patients face because we work with such problems on a daily basis. We may feel that our service to patients allows us to accrue a certain amount of shielding from the injuries we treat. Ironically, the data may be showing otherwise for health care providers.[1,2]

When it's YOU things can become somewhat surreal and our judgment can be as misguided as the next person especially in cases where various and unproven treatment options exist. Would you be able to step aside and let others manage your care the way they are trained or would you become slightly neurotic about the care being provided? There can be a fine line between being a 'good' patient and a patient who needs to be defended against his or her own personal biases.

To my disadvantage I can only speak from my own minor accounts as a patient. Over 10 years ago, I had arthroscopic knee surgery. After having treated a number of patients prior to my own surgery I felt very familiar with the procedure, the course of rehabilitation, and the potential outcome. Little did I know what the process involved. First, there was the disability and the frustration of not being able to do what I wanted to do and also work without pain. After never having had an orthopaedic injury, I finally had to come to the realization that my body could not 'heal itself.' OK…now who should I see for an orthopaedic surgeon? I knew from our referrals which orthopaedic surgeons were doing the best work but was there any guarantee that the same doctor who gets good results on my patients is the best for me and my own problem? And of course, I would have to check to make sure that physician was listed as a provider in my health care plan!

Once in the exam room could I be a good patient and let the physician do his job? Or would I critique the doctor's orthopaedic exam skills against my own? Did he do everything right? How was his decision making process? Wait a minute, that clinical test wasn't that great or was it? Did he listen? I am not sure. Then there is the diagnostic testing process. Radiographic studies first. The doctor asks when did I tear my MCL…I do not remember ever tearing it! I never had any symptoms of MCL tear. Is he for real and as competent as I think?

What else will he find? Then we schedule the MRI within the week. Waiting is a pain. At the MRI appointment, I now see why people get claustrophobic! When do I get the results? Darn, back to the doctor's office to discuss the findings. There is more and more anticipation. I can only imagine how emotional it can be waiting for other health results such as a biopsy or blood work to determine disease.

Finally, a diagnosis….a tear of the lateral meniscus with an accompanying cyst that might be able to be excised from the inside out or requires a lateral excision along the IT band to remove. Not what I wanted to hear, but I realized just how important it is to have a diagnosis! Scheduling surgery was just as difficult for me as it is for my patients. Should I have the surgery before or after the holidays? How will I be able to get time off between teaching and clinical practice? Decisions, decisions, decisions.

Now comes surgery day. Following my preparation for outpatient surgery, I am rapidly rolled into the surgical suite. I feel like a turkey on Thanksgiving Day! Each member of the surgical team was masked and gowned. It was almost as if I was kidnapped by aliens. I am strapped to the table looking into a bright light and everyone is hovering over me. I am not in control and I have gone to the point of no return!

I wake up from surgery with my wife by my side and felt pretty good. I couldn't believe the surgery was over. My first unique result from surgery was being extremely hungry. How can this be? I thought everyone had the other outcome? Nausea, vomiting? Once home I develop an appreciation for pain medication and cryotherapy. Surgery wipes you out. Rest is important. Now off

to rehab a few days later. My next surprise was just how fast my VMO atrophied and how hard it was to get things moving again. I gain a new appreciation for modalities such as electrical stimulation and biofeedback and also a better perspective for the simpler introductory therapeutic exercises and just how challenging they can be. Crutch walking for a few days was definitely different being the patient versus the therapist. You mean I actually have to use these? Yes, they have a role too!

To conclude, my surgery and rehabilitation resulted in a great outcome. Where I once prided myself in never having broken a bone or been operated on, I have now joined the millions of other people who can say they have undergone surgery.

I can't help but wonder if making this type of experience a required course in PT school (just kidding). And students think they have it rough now! Imagine taking a course in 'Walking in their shoes 101' where you have to have surgery as part of the course!

In all seriousness, my own surgical experience and travels through the health care system taught me much I could not have learned without a first hand experience. I learned how important it is to have the right doctor, the role of insurance coverage, to ask questions, and have a good psychosocial support system. Furthermore to trust in medicine, and ultimately, let people do the job they are trained to do.

Ironically, as I write this editorial I view an article online that a 16-year-old teen who has cancer is arguing in court to have the right to refuse chemotherapy that his parents support in lieu of his desire to take an alternative approach.[3] He is providing hours of closed testimony so the judge can know what it's like to go through chemotherapy and why he does not want to relive it. Who really knows best? In the clinic, we are currently treating a staff member following major shoulder surgery. Jokingly all the patients with shoulder injuries want a 'crack at him' to make sure he understands what it is like to be on the 'inside looking out.' I think he gets it.

Words like compassion and empathy are easy to define but hard to apply. Health can be fleeting…Not only should we enjoy our own state of health, but we should truly gain an appreciation for what each patient has to go through when their health falters. Remember, even though we are immersed in treating patients, it is not all in a day's work. 'It's a big deal!!'

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president's message

Michael T. Cibulka, PT, DPT, OCS
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Summer 2006

It always seems like I am just getting back from a meeting of some sort. Today is no different, I just got back from Orlando where although being extremely hot, I was cooled by the company of many of my colleagues. The 'hot' issue, no pun intended, is reimbursement. Why not? Reimbursement for physical therapists has changed drastically over the last 10 or so years. Sadly reimbursement has been on a long spiraling downward trend that has devastated many a physical therapy practice, including my own. As a private practice physical therapist for the last 20 years, I recently accepted another job as an Assistant Professor at Maryville University in St. Louis, MO just to survive. By the time you receive this edition of *OP*, I may or may not even have my private practice. Yes I really do love my new teaching job. Would I have taken the job if my private practice was doing well? I can't answer that question, maybe yes maybe no. While some have suggested that competition from other physical therapists and chiropractors are the reasons for my financial demise, I do not agree. I usually see anywhere from 12 to 20 patients a day along with my PTA; you would think that amount of volume would be plenty to keep a practice afloat. Why am I struggling? The answer is clear to me, declining reimbursement rates. The first question I ask is, are we fairly valued, and the follow-up question is, if not, why not?

Excuse my indulgence while I provide a brief history of my background in private practice. I opened my private practice in 1986. Back then I started the practice with an athletic trainer friend of mine with the intent of having another physical therapist come in once we were established. We opened the practice next door to an orthopaedic surgeon, a smart move we all thought. Well the surgeon thought we were going to be in competition with him. He did not know our state practice act at all. In our first 2 months we received not one referral from him. With time and persistence, however, we educated him enough that he started sending a trickle of patients over. With hard work, a special care for our patients, and a commitment to excellence we slowly gained his nearly complete confidence. Four months later, we were seeing 15 to 20 patients a month from him. With fee-for-service, we were able to bill so that in our first year we made a profit, albeit small. With persistence, we continued to see more of his patients along with a number of other referring sources. We eventually built up a nice practice. After 7 years, we moved from our small 1,800 square foot office to a 4,000 square foot and then to an 8,000 square foot office. Business was booming! We hired more physical therapists and staff. We gave full health care insurance to each employee and also to their entire family as well. All of our employees were provided with nice retirement plans and received great benefits (concert and sports tickets). As a result of all of the hard work, we rewarded everyone fairly at the end of the year with good, no great bonuses. The system appeared to work and our average daily bill for therapy was somewhere between only $40 and $60. During this time, stories started to appear that some therapists were billing fee for service rates of $300 to $400 per day of service. I knew that fee for service was fine if everyone played fair; however, it soon seemed that some were taking advantage of the system. Mammon became the driving motivation in some physical therapist's practice. Stories like this bothered many PTs for the wise knew that if this sort of practice continued our destiny would likely change and change for the worse it did. When the change finally did come, it was significant, the advent of Health Care Maintenance Organizations. At first we did not quite understand how change would occur. The move started slowly, one insurance company changed to part PPO part HMO, then like a virulent outbreak one insurance company after another insurance company developed only HMOs. They knew this strategy was a great way to diminish health care cost. Now 10 years or so removed, I still do not like the financial aspects of the HMO, but I must say that HMOs taught us how to be much more efficient and focus our efforts. No longer did we have the luxury of doing this or that. We had what was considered best practice for the patient, which I have no doubt helped create evidence-based practice. Was learning evidence-based practice worth getting financially trampled? The irony of it all is tragic.

Today the average amount I am allowed to collect is around $40 per patient (or more accurate, per diem, an old word with a nefarious meaning). This paltry sum of money hardly seems fair for the 30 to 45 minutes of my time, after a BSPT, MHS, and DPT degrees, an OCS and 28 years of experience. Each of these professional pursuits was not cheap in terms of time or money!

Funny, just recently I got a bill from my plumber. The bill included $45 for just walking in the door and another $85 an hour, with 1-hour minimum increments. And that was not counting supplies! What is happening here? I am not trying to pick on plumbers but I know that I have had to undergo much more formal education to become a professional; I pay a significant malpractice fee, pay significant rent, must take continuing education, and pay the bank for my loan on equipment, along with much, much more. What is even more disheartening is that now I get many more patients with multiple diagnosis. For example, left shoulder strain, right total knee replacement, and low back pain in one package and I get the same price for all 3 diagnoses. Since most of my patients only get 20 visits per year it seems that more and more people are saving up their problems because they can't afford

losing any visits or the high co-pays. Thus I have patients that are being seen for 3 diagnoses and I am getting paid the same as for just 1 diagnosis. Now I ask you what other business works this way? I would love to go to somewhere or anywhere and be able to get a 'three-fer.' The only time I see this is the day before July 4th. You know they mark the fireworks up around 600% or so. How can this be right? This increase in patients with multiple diagnoses seems to go parallel with the increase in co-pays; at first, most were around $5, then $15, then $20, now I have many with $40 co-pays. Are we getting reimbursed fairly? If not, how can we work to make the system fair and ensure it stays fair?

My PT practice is a mere skeleton of itself financially. Structurally it's still the same space with 4,000 square feet, 4 Kin/Coms, and the many other accoutrements needed to run a busy practice. Now I know many would argue that this sort of PT practice is not needed anymore and is obsolete. Get the patient in, evaluate them, set them up on a home program, and let them go. That's what insurance companies expect and want. Is this best practice? In some cases I agree with this philosophy while in others I strongly can and do not. Consider the patient with a massive rotator cuff repair. Would this abbreviated method of practice be the best for getting a good outcome in this type of patient? Suppose this patient was actually a relative or spouse? Would you be in favor of such 'drive-thru' type service? I would argue no way. In a rotator cuff repair, getting back full or nearly full passive range of motion in the first few weeks is imperative. Doing unsupervised exercise at home is never a replacement for occasional and needed follow ups that can assess whether passive range of motion is improving. If my patient comes back in 2 weeks after a home program and they have not gained any passive range of motion, I already know he or she has major challenges ahead. Gaining passive range early is one of the most important Rubicons that a patient must cross to achieve a successful outcome after rotator cuff repair. Without gaining full or nearly full passive range of motion early, the chance of a successful outcome, in my experience is sharply diminished. Frozen shoulder here we come. Manipulating a patient following a recent rotator cuff repair, does not sound good to me. So how do we insure that we get range back early? By scrimping on a few therapy visits when the cost of rotator cuff surgery is high in both costs to the patient in dollars and cost in lost work wages, pain, lifestyle changes, and future outcome? Treatment should always be based on the cost/benefit to the patient. Well I find scrimping on a few dollars for therapy just incredulous and furthermore just plain ignorant and short sighted. How are these poorly managed rotator cuff repairs going to do in the future? Who doesn't think these patients will have many more associated problems in the future because of their poor early rehabilitation outcome? I have seen these kinds of patients later, the cost to health care and society are huge not to mention the patients continued frustration of not being able to use the upper extremity without pain or dysfunction. How many think that a poor outcome like this will not exponentially raise health care costs? Who will pay for this cost? How myopic is this approach?! We really do need some changes! I still think we need more studies on what happens to patients with rotator cuff repair who don't have therapy compared to those who have supervised physical therapy. Regardless something has to change.

Now it's no wonder why my practice is shrinking. No one REALLY wants to pay for health care, and can you blame the payor? Perhaps part of the problem is that for years we considered health care an entitlement or something we expect to receive as part of employment. I am as guilty as the next person for propagating this belief, for when I opened my practice I gave health care insurance to not only my employees but to their entire family without question. As premium costs soared, my thinking on this gift was forced to change. The philosophy of an entitlement is not new to most Americans. In health care, this entitlement was changing drastically; however, it has been slow to take hold. The idea that the cost of health care should be the responsibility of someone other than the patient represents a pure façade and is quite ludicrous. Medicine, willingly or unwillingly, has for years lured us into being passive participants of our health care and allowed us to believe that it is the physician's job and not our task to take care of our own body. Big 'Pharma' continues to promote this idea by suggesting that a little prescribed pill is all you need for many of your problems. The commercials on *Viagra* or *Cialis* are one case in point. In the commercial a man is watching TV, a big football game, and his wife walks by giving him a wink. Yea right, that happens to me all the time. And you know what happens next…! Now I don't know about you, but a little pill, although it may be helpful, is not really the answer to this or any couple's love life. Its hard work, commitment, dedication to one another that keeps most couples physically, spiritually, and emotionally together. Not just a little pill. The answer to health care is not about taking a pill after smoking for 40 years, not taking a pill after living with 50 or more extra pounds, not taking a pill for blood pressure when we don't eat right or exercise right. It's all about taking individual responsibility for our own health early and consistently throughout life.

I believe taking responsibility would do more than anything to help reduce health care cost. I also believe that this would enable physical therapists to assume a role critical in health care prevention. Instead of someone else paying the bill we should gladly pay to live a longer and a better life. We must change the mentality of what health care is. In order to do this, patients must be educated about their body. A hip that has full range of symmetrical motion, with normal muscle length and strength around it is like having clean teeth and gums. Physical therapists should be proactive in examining the musculoskeletal system throughout life, just like a dentist should examine the mouth throughout life. Being the expert I should advise clients when I start seeing things becoming abnormal. For example when left hip internal rotation exceeds right hip internal rotation by more than 15°, regardless of symptoms or not there is reason for concern or intervention.[1] We must become the experts of the body's movement system in health, not just in disease! We must educate those who don't understand our role and we must get paid fairly for doing this.

So, what is the point I am trying to make? The point is that something is really wrong with what health care is all about, how most people perceive health care, and how we finance health care in America today. Many still do not know that health care is an individual's responsibility. Today, health care is just big business like any other; all of us fools who went into this field to help people are now just plain pawns or maybe we are just

suckers for the rich therapist who as businessmen just sneer and laugh at us for being so naïve! Outcomes are now financial success and not whether the patient is better off or not! New catchwords like 'passive income' have become important to physicians who must now supplement their income because insurance companies have become more parsimonious with their payments. Passive income in physical therapy you say? It's a metaphor for money made on the 'backs' of someone else, who you ask? Well the answer for some is just to look in the mirror if you work for a physician. Moreover insurance companies can not keep raising premiums and co pays, while not paying health care professionals a fair wage, and expect health care to run smoothly. We have already lost many excellent health care professionals who have become distraught with the system and left. Somebody, something, or someone has to bring about a change. But what can we do? I am not sure; I would like your thoughts and ideas. We, the Section leadership, are going to be doing our Section strategic planning in October and surely would appreciate your thoughts on this matter. Maybe you don't agree with me, maybe you do, whatever, let me know so we can plan the future. Let us do what we can to help ensure the destiny of our members on this issue or on any other issue. What is most important for you? To make money or for our patients to be achieving a just outcome, I surely hope both. Why not?

On another issue I would like to congratulate the founder of the Orthopaedic Section and our first President Dr. Stanley V. Paris for his wonderful Mary McMillan Lecture at Annual Conference in Orlando this year. As I am sure everyone knows the Mary McMillan lectureship is the highest award given to an APTA member. Dr. Paris gave an inspiring and moving lecture that detailed the history of manipulation and the obstacles he faced and overcame. Congratulations again Stanley. Also, a number of Orthopaedic Section members received awards. You will find the complete list of awardees on page 45. Finally, we say goodbye to Dr. Steven Levine, PT, DPT the Speaker of APTA's House of Delegates and our APTA liaison for the last 2 years. Steve you were super, your ability to cut through recondite ideas and bring back to the table simple, laconic and yet cogent responses will not be forgotten! Our heartfelt thanks go out to you for giving up your precious time to help us and guide our way. As we welcome back Steve McDavitt in his new role as APTA liaison to the Orthopaedic Section, we look forward to reacquainting ourselves with Steve. Knowing Steve things will be stimulating.

I leave you with a favorite axiom of mine. A man's character is his destiny, what is your character?

Orthopaedically yours,
Michael T. Cibulka, PT, DPT, MHS, OCS

REFERENCE

1. Cibulka MT. Determination and significance of femoral neck anteversion. *Phys Ther.* 2004;84: 550-558.

Boston University
Sargent College of Health and Rehabilitation Sciences
Clinical Director Position
Boston University Physical Therapy Centers
Department of Physical Therapy and Athletic Training

Nominations and applications are invited for the position of Clinical Director of Boston University Physical Therapy Centers (BUPTCs). Currently, the BUPTCs include three entrepreneurial units focusing on orthopedic physical therapy, sports medicine and neurological physical therapy. The BUPTCs fall under the umbrella of the Department of Physical Therapy and Athletic Training and are part of the academic mission of the college. Professional programs within the Department include a Doctor of Physical Therapy (DPT) and a BS degree in Athletic Training. The Department also offers a ScD in Rehabilitation Sciences. The BUPTCs serve as practice-based models of excellence and provide education and scholarly activities for students and faculty. The diverse clinical staff and academic faculty (about 22 full-time) benefit from a rewarding interdisciplinary teaching, clinical and research environment within Sargent College. The BUPTCs collaborate with other clinical programs offered at Sargent College, such as the Athletic Enhancement Center, the Nutrition and Fitness Center and the Speech, Language and Hearing Center. Major research resources within the Department include five active fully equipped research laboratories for the study of human movement. Exciting research collaborations exist with a rich array of Boston medical centers and area universities.

This will be a full-time 12 month position. Salary is commensurate with qualifications and level of experience. Position is effective immediately.

Qualifications:

Licensed physical therapist; experience in managing a physical therapy clinic at a senior level; DPT- or other doctoral degree; expertise in clinical education regarding professional and post-professional students; advanced knowledge of evidence based practice; orthopaedic clinical specialty certification is desirable. Candidates will be evaluated on strengths in the following: distinguished record of clinical care, teaching, and scholarship; professional vision consistent with emerging and future health care practice patterns.

Responsibilities:

- Advise/support Administrative/Academic Director of the BUPTC in developing, through strategic planning, actions that will lead to the successful operation of clinical and non-clinical services, including: type and scope of services, visibility/recognition of the BUPTC and monitoring budget;
- Lead implementation of strategic and operational initiatives (e.g., development of clinical residencies and first rate clinical education site for professional and post-professional students, and new programs consistent with the mission of Sargent College);
- Supervise professional and support staff, foster staff development, and conduct staff/committee meetings;
- Market programs to local health care providers, third party payers and other relevant parties;
- Ensure adherence to state, federal and third party payer regulations, determine and initiate appropriate documents related to services, fees, etc;
- Act as official liaison to Boston University community regarding all of the organization's programs;
- Provide clinical services in the BUPTC located at the Ryan Center for Rehabilitation and Sports Medicine;
- Teach within the Department of Physical Therapy and Athletic Training.

Nominations of applications (letter of intent, curriculum vitae) should be directed to:

Robert C. Wagenaar, PhD
Sargent College of Health and Rehabilitation Sciences, 635 Commonwealth Avenue, Boston University,
Boston, MA 02215; Phone: 617-353-2720; Fax: 617-353-9463; e-mail: wagenaar@bu.edu

For more information on Boston University, Sargent College of Health and Rehabilitation Sciences, and the Department of Physical Therapy and Athletic Training, visit the Department's home page at **http://www.web.bu.edu/SARGENT/PT**

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Clinical Instability of the Lumbar Spine: Diagnosis and Intervention

Scott Biely, PT, DPT, OCS, MTC
Susan S. Smith, PT, PhD
Sheri P. Silfies, PT, PhD

Lumbar stabilization or 'core' stabilization exercises are currently popular interventions for patients with mechanical low back pain (MLBP). Stabilization exercises have typically been prescribed for patients with '*spinal instability*.' But can we actually identify patients with spinal instability, and are these patients likely to benefit from stabilization exercises?

The incidence of spinal instability is difficult to determine partially because of the lack of an accepted operational definition. Estimates of the percentage of patients with low back pain arising because of spinal instability range from 13% to 30% of the total population of patients with MLBP.[1,2]

Specific classification systems may assist in identifying patients with MLBP attributed to spinal instability. Classification allows interventions to be designed for, and directed toward, specific subgroups as opposed to an entire population of patients. Delitto et al[3] introduced a classification system using patient symptoms and physical examination findings, now known as the Treatment-Based Classification (TBC). This system assists with clinical decision-making and provides information about specific interventions for each classification. One subgroup in the TBC system is the 'stabilization' category (previously known as the 'immobilization' category). Patients placed into this subgroup are hypothesized to have spinal instability and are treated with specific stabilization exercises. However, actually classifying a patient into this subgroup may not be a simple process. Givens et al[4] studied examiner agreement in assigning patients to different subgroups and found differences in the number of patients assigned to the stabilization subgroup by different examiners. Perhaps the characteristics of patients manifesting spinal instability are either poorly identified or poorly understood.

The purposes of this article are to suggest an operational definition of *clinical instability* and to examine the literature for the current best evidence for identifying those patients who would best respond to stabilization exercises as the primary intervention. In addition, exercises that have been reported effective in managing patients with clinical instability of the lumbar spine will be presented and discussed.

SEGMENTAL INSTABILITY VERSUS CLINICAL INSTABILITY

Early attempts to define *spinal instability* were based on spinal pathology associated with excessive movement at the intervertebral or *segmental* level.[5] *Segmental instability* was proposed to exist because of failure of the passive restraints (ie, the intervertebral disc, ligaments, and facet joint capsules) that function to limit segment motion. This original, narrow concept of spinal instability was broadened when Panjabi[6] hypothesized that the neuromuscular system might also play an important role in controlling segmental motion. He published a model of a spinal stabilization system represented by 3 major subsystems. These subsystems consist of the passive, or osteoligamentous subsystem, the active, or musculotendinous subsystem, and the neural control subsystem. Spinal stability within this model depends on the proper functioning and interaction of all 3 subsystems (see Figure 1). Within this model, Panjabi defined segmental instability "as a significant decrease in the capacity of the stabilizing system of the spine to maintain the intervertebral neutral zones within the physiological limits so that there is no neurological dysfunction, no major deformity, and no incapacitating pain."[7] The neutral zone to which he referred is defined as a portion of the total physiologic range of intervertebral motion. The total physiologic range consists of a neutral zone and an elastic zone (see Figure 2). Neutral zone motion, defined in biomechanical terms, is the zone of movement surrounding the neutral position of the segment, a zone in which movement occurs with little resistance. The elastic zone starts at the end of the neutral zone and stops at the end of physiologic range. Motion within the elastic zone occurs with considerable internal resistance. Panjabi's definition focused upon changes in the neutral zone. He considered *segmental instability* to be an abnormal movement of one vertebra on another secondary to an increase in the size of the neutral zone.[7]

Clinical instability, on the other hand, might be defined as the observable signs and the symptoms of patients hypothesized to have a disruption of the spinal stabilization system. Thus one interpretation of Panjabi's model might be that *clinical instability* is dysfunction in one or more of the stabilizing subsystems leading to an increase in the size of the neutral zone. The increase in the neutral zone causes, or contributes, to segmental instability and results in MLBP.

POTENTIAL CAUSES OR CONTRIBUTIONS TO CLINICAL INSTABILITY

Despite the general clinical acceptance of Panjabi's theory and definitions, other operational definitions of spinal instability remain in the current literature. Often, these definitions are based upon dysfunction in one particular stabilizing subsystem.

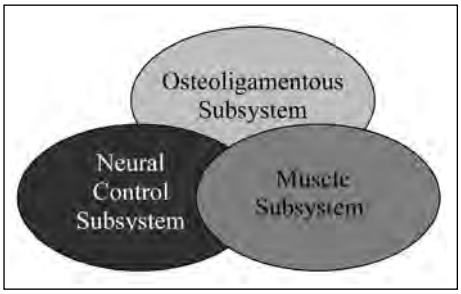

Figure 1. The 3 subsystems of the stabilizing system of the lumbar spine.

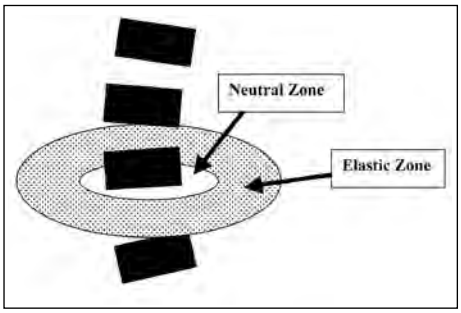

Figure 2. Intervertebral movement: neutral zone and elastic zone.

Passive subsystem

Injury to the passive subsystem, which comprises the osseous and ligamentous structures that support the spine, still remains the most commonly associated underlying pathology. Indicators of dysfunction in the passive subsystem include excessive translation or angulation on flexion-extension radiographs,[5] the presence of spondylolisthesis[8] or traction spurs[9] on radiographs, the presence of high intensity zones in magnetic resonance (MR) images of intervertebral discs,[10] gapping of greater than 1 mm in facet joints during twist CT scans,[1] and positive low pressure discography corresponding to levels of moderate to severe disc degeneration determined by MR images.[11,12] Along with the use of medical imaging to detect segmental hypermobility or instability, passive intervertebral or accessory movement testing has also been widely used.[13] Limitations to these traditional medical tests, in part secondary to the wide variability of segmental motion in asymptomatic individuals[14] and measurement errors associated with both static imaging[15] and manual assessment[16] techniques, have hindered this approach to identifying the stabilization subgroup of the MLBP population.

Active subsystem

Researchers have demonstrated that activation of specific trunk muscles significantly reduces the size of the neutral zone and segmental range of motion in all directions.[17,18] These findings support the crucial role of the active subsystem in providing stabilizing forces to the spine. Without the trunk musculature, the lumbar spine is unstable even at low loads.[18] Indicators of dysfunction in the active subsystem among patients with MLBP include decreased cross sectional area of the lumbar multifidus[19] or the transverse abdominus[20] determined by ultrasound scanning, reduced contraction of the lumbar multifidus determined by palpation,[21] reduced contraction of the transverse abdominus determined by a pressure feedback device,[21] and increased muscle fatigue measured by electromyography (EMG).[22]

Neural control subsystem

A current focus of low back pain research has been the role of dysfunction in the neural control subsystem in patients with recurrent and chronic MLBP. Indicators of dysfunction in this subsystem include changes in muscle onset timing[23] and changes in patterns of muscle recruitment[11,24] determined by EMG, changes in muscle activation and spinal stiffness determined by biomechanical modeling,[24,25] and changes in kinematic patterns of spinal movement determined by visual observation or instrumented motion analysis.[26,27]

Despite the many potential contributors to clinical instability, the most commonly associated pathology is altered intervertebral disc and ligamentous support of the spinal segment. However, not all patients with this passive subsystem damage demonstrate the signs and report the symptoms associated with clinical instability. In particular, segmental instability, when defined solely by passive subsystem failure and excessive segmental movement, has been criticized as an inadequate indicator of clinical instability.[13] In our opinion, clinical instability exists when changes within subsystems result in alteration of segmental motion or erroneous feedback for which the spinal stabilization system as a whole cannot adequately compensate. Thus, in this case, *clinical instability* is really a multi-subsystem dysfunction. Some patients seem to develop strategies to '**cope**' with the altered segmental movement and other patients do not.[11] The '**non-copers**' may then develop signs and symptoms of *clinical instability*. A similar situation exists in patients with ACL laxity where functional instability is not correlated with the degree of laxity, but rather with decreased quadriceps strength and delayed muscle timing.[28]

CLINICAL INSTABILITY

With the lack of a universally accepted operational definition studying clinical instability has been difficult. However, if clinical instability were defined as the clinical signs and symptoms created by dysfunction of one or more of the stabilizing subsystems of the spine, then literature addressing, or systematically investigating, the signs and symptoms of spinal instability could be of collective value in identifying characteristics of this subgroup of patients with MLBP. Much of the earlier literature and approach to this subgroup of patients was based on observations and expert opinion.[13] More recently however, researchers have investigated clinical signs and symptoms in patients diagnosed with segmental instability or in patients who responded positively to stabilization exercise training.[8,29,30] The following sections report the evidence regarding the clinical signs and symptoms of this subgroup and recommendations regarding intervention.

History and Symptoms of Clinical Instability

Table 1 contains a summary of the *symptoms* of clinical instability reported by several authors. The sources include observation and expert opinion,[13] consensus opinion obtained from a Delphi study,[31] questionnaires given to patients diagnosed with segmental instability,[1] a cross sectional study,[29] and a prospective cohort study.[30] Symptoms consistently noted by most authors included patient reports of the back 'giving out,' catching or locking, pain with transitional activities or sustained postures, and recurrent or chronic pain.

Physical Examination and Signs of Clinical Instability

Table 2 summarizes the *signs* of clinical instability obtained from the physical examination. No single sign of clinical instability was listed by all authors. However, several signs were listed by more than one author. These signs included segmental hinging during range of motion (ROM) testing, shaking, catching, or juddering during ROM testing, aberrant movement including changing lateral shift, Gower's sign (thigh climbing to return from a flexed to an upright position), hypermobility during spring testing (posterior-to-anterior (PA) glide), pain during spring testing, and increased muscle guarding or muscle spasm.

A Clinical Prediction Rule

The current best research evidence for identifying characteristics of patients with MLBP who responded favorably to trunk stabilization exercises was obtained through a prospective cohort study.[30] These characteristics were condensed into a clinical prediction rule (CPR) for patients likely to respond to stabilization exercises. The CPR for stabilization, like the one completed for spinal manipulation,[32] provides preliminary evidence and is a stepping stone toward randomized clinical trials.

The CPR is designed to assist clinicians in making better decisions regarding matching patients with the most appropriate intervention. The steps in creating a clinical prediction rule are to: (1) identify factors that may be predictive of a certain condition, (2)

Table 1. Summary of Evidence Related to *Symptoms, History, and Demographics* of Patients Diagnosed with Spinal Instability

Symptoms, History, and Demographics	Paris*	Cook et al**	O'Sullivan ***	Hicks et al+	Fritz et al^
Giving way or back giving out, feeling of instability	x	x	x		
Need to frequently crack or pop the back to reduced symptoms	x	x			
Frequent bouts or episodes of symptoms (recurrence, not first episode)		x	x		
History of painful catching or locking during trunk motions	x	x	x		
Pain during transitional activities	x	x	x		
Greater pain returning to erect position from flexion		x	x		
Pain increased with sudden, trivial, or mild movements	x	x			
Difficulty with unsupported sitting and better with supported backrest		x			
Worse with sustained postures or a decreased likelihood of reported static position that is not painful	x	x	x		
Condition is progressively worsening		x			
Long-term, chronic disorder	x	x	x	x	
Temporary relief with back brace or corset		x			
Frequent episodes of muscle spasm		x			
Fear and decreased willingness to move, high FABQ score		x		x	
Age less than 40 years old				x	x

* [13] Paris – personal observation and expert opinion
** [31] Cook et al – consensus opinion from a Delphi study involving fellows of the AAOMPT and certified orthopaedic specialists who identified spine dysfunction as their primary specialty
*** [40] O'Sullivan – questionnaires completed by patients diagnosed with segmental instability based on radiologic and clinical findings
\+ [30] Hicks et al – prospective cohort study looking at patients who responded to stabilization exercises
^ [29] Fritz et al – cross sectional study looking at subjects with positive flexion-extension radiographs

examine study participants for the presence of these factors, (3) administer an intervention and determine which study participants meet a certain reference standard of change following the intervention, and (4) analyze the data to determine which factors were predictive of the change.[33]

Hicks et al[34] used tests and measures of clinical instability that they had found to have acceptable interrater reliability as potential predictive factors. These consisted of standard measures of hip and trunk ROM and muscle performance tests, as well as special tests related to observing trunk movement, testing lumbar segmental mobility, and the ability of the spinal musculature to stabilize the spine (prone instability test).[30] In addition, demographic information and self-report variables were recorded. Fifty-four subjects with nonradicular MLBP were evaluated. These patients had a primary complaint of MLBP with or without leg pain and the following characteristics: sex (23 men; 31 women), mean age (42 years), average symptom duration (41 days), prior history of LBP (70.4%), and history of more than 3 episodes (59%). Patients with prior spinal surgery, signs of nerve root compression or pain attributed to current pregnancy, spinal fracture, infection, or tumor were excluded. The intervention was an 8-week program of specific stabilization exercises with specified progression criteria. Successful intervention was defined as a minimum of a 50% improvement on the Oswestry Disability Questionnaire. Factors significantly associated with success were determined using chi square or independent *t* tests and accuracy statistics (see Box 1). Operational definitions of the variables that compose this CPR are located in the Appendix.[30]

The presence of at least 3 of the 4 tests predictive of *success* resulted in a 67% chance that patients would experience a significant improvement after performing 8 weeks of stabilization exercises. When at least 3 of these 4 variables listed under *some improvement* were positive, patients had a 97% chance of experiencing clinically significant improvement on the Oswestry Disability Questionnaire.[30]

CPRs are criticized because frequently no control groups are used. In these studies, changes may have occurred solely due to the passage of time. Therefore, CPRs should not be used independently to select one intervention over another.[35] However, in this case, no higher levels of evidence currently exist regarding the clinical characteristics of those patients with MLBP who respond positively to stabilization exercises. In addition, the findings presented by Hicks et al[30] are consistent with the other levels of evidence (see Tables 1 and 2). Thus, using this rule to predict which patients might benefit from stabilization exercises is currently appropriate.[35]

STABILIZATION EXERCISES

Stabilization exercises have been used successfully to treat patients with segmental instability,[8] clinical instability,[30] and chronic pain.[36] Although the details of the exercise programs vary among studies, the principles and theoretical underpinning of stabilization exercises remain the same. This exercise approach was developed based on the theory of spinal dysfunction proposed by Panjabi[6] and on an anatomical and biomechanical model of trunk muscle function proposed by Bergmark.[37] Bergmark hypothesized that 2 main muscle systems, a global system and a local system, control movement, and stability in the spine. The global system consists of the phasic or primary movers of the spine such as the rectus abdominus, external oblique, and portions of the iliocostalis lumborum. These muscles move the trunk but have no direct attachment to the lumbar spine. The local system includes the tonic, postural, or

Table 2. Summary of Evidence Related to *Signs* from Physical Examination of Patients Diagnosed with Spinal Instability

Signs from Physical Examination	Paris*	Cook et al**	O'Sullivan ***	Hicks et al+	Fritz et al^
Observed patterns or poor coordination during trunk motion testing:					
Segmental hinging, pivoting with movement		x	x	x	
Excessive motion at one or two segments		x			
Perceived poor proprioceptive function		x			
Juddering, catching, shaking	x	x		x	
Changing lateral shift	x	x			
Gower's sign		x	x	x	
Decreased willingness/ apprehension during movement (includes painful arc)		x		x	
Reversal of lumbopelvic rhythm				x	
Observed or Noted:					
Muscle guarding or spasms	x	x			
Poor posture and postural deviations that include lateral shift and changes in lordosis		x	x		
Frequent catching, clicking, clunking, and popping heard during movement		x			
Step off palpated in standing that disappears in prone lying	x				
Absence of neurologic signs			x		
Inability to control neutral spine position during functional movements or transitions (e.g. sit to stand)			x		
Provocation or Change of Symptoms by:					
Sustained position or posture		x			
Prone instability tests				x	
Spring test (PA provocation test)	x	x			
Negative neural provocation tests			x		
Reduced pain with deep abdominal muscle activation			x		
Muscle Performance/Activation:					
Decreased strength and endurance of local muscles at level of segmental instability		x			
Inability to activate or co-contract lumbar multifidus			x		
Inability to activate transverse abdominus using an abdominal draw-in maneuver			x		
Segmental Mobility Assessment:					
Hypermobility during posterior-anterior (PA) spring test	x	x			x
Hypomobile segments adjacent to hypermobile segments		x			
Lack of hypomobility during intervertebral motion testing				x	x
Amount of Mobility:					
Lumbar flexion greater than 53 degrees					x
Total trunk extension greater than 26 degrees					x
SLR greater than 91 degrees				x	
Beighton scale greater than 2					x

* [13] Paris – personal observation and expert opinion
** [31] Cook et al – consensus opinion from a Delphi study involving fellows of the AAOMPT and certified orthopaedic specialists who identified spine dysfunction as their primary specialty
*** [40] O'Sullivan – questionnaires completed by patients diagnosed with segmental instability based on radiologic and clinical findings
\+ [30] Hicks et al – prospective cohort study looking at patients who responded to stabilization exercises
^ [29] Fritz et al – cross sectional study looking at subjects with positive flexion-extension radiographs

stabilizing muscles of the spine such as the psoas major, quadratus lumborum, lumbar portion of the lumbar iliocostalis lumborum, lumbar multifidus, internal oblique, and the transverse abdominis. These muscles are shorter in length and closer to the axes of rotation. They also have direct attachments to the vertebrae and can therefore provide stability.[37] Panjabi's and Bergmark's theories were then combined with research on spinal stability and control[25,38] and motor learning theory[39] to develop the basis for a progressive model of intervention (eg, core stabilization or dynamic lumbar stabilization).

Stabilization exercises emphasize use of specific *local stabilizing muscles* (transverse abdominus, internal oblique, and lumbar multifidus) to restore active control and stability to the trunk.[40] A widely used program that emphasizes training of these stabilizing muscles using isometric co-contractions and a progression based upon a motor learning paradigm can be found in Twomey and Taylor's *Physical Therapy of the Low Back*[1] or Richardson and colleagues *Therapeutic Exercise for Lumbopelvic Stabilization: A Motor Control Approach for Treatment and*

Box 1. Best Evidence for Identifying Patients Likely to Respond to Stabilization Exercises[30]	
Clinical Prediction Rule for **Success** with Stabilization Exercises • 67% chance of significant improvement with 3 of 4 criteria.	• positive prone instability test • presence of aberrant movements • average straight leg raise greater than 91 degrees • age less than 40 years
Clinical Prediction Rule for **Some Improvement** with Stabilization Exercises • 97% chance of some improvement with 3 of 4 criteria.	• positive prone instability test • presence of aberrant movements • evidence of hypermobility with lumbar spring testing • Fear Avoidance Beliefs physical activity subscale score less than or equal to 9

Prevention of Low Back Pain.[21] The reader is referred to these texts for additional discussion and detail on this approach. In general, approach is a progression through 3 stages of exercises. The first stage involves isolated, conscious activation of the local muscles. The second stage involves co-contraction of local muscles while superimposing extremity movements. The third stage involves an integration of local muscle system activation with daily activities.[40]

Stage 1

Stage 1 training emphasizes the patient's conscious awareness of neutral lumbar position and appropriate local muscle activation (see Box 2).[40] Patients with recurrent or chronic MLBP may have difficulty moving their pelvis independently from the thoracic spine and hips. Initial training involves teaching independent pelvic motion. After patients are able to isolate pelvic motion, they learn to move the pelvis to create a neutral position of their lumbar spine. The actual neutral position may vary depending on the individual patient and underlying pathology. For example, a patient with hyperextension of the lumbar spine needs to move into a slight posterior pelvic tilt while a patient with flattening of the lower lumbar spine needs to create a slight anterior tilt.[40]

Activation of the local stabilizing muscles, the transverse abdominus, and lumbar multifidus, with the spine in the neutral position is the next goal. The patient learns to perform an abdominal drawing in maneuver (ADIM) to activate the transverse abdominus and then learns to co-contract the lumbar multifidus. The therapist provides feedback by palpating the appropriate muscles or by using a pressure feedback device or ultrasound imaging. The patient practices at least 10 to 15 minutes daily. When the co-contraction can be held for 60 seconds, the patient can progress to Stage 2.[40]

Stage 2

In the second stage, patients learn to maintain the co-contraction of the transverse abdominus and lumbar multifidus with other movement patterns and activities (see Box 3).[40] Further training of the transverse abdominus can be addressed by performing the ADIM in conjunction with heel slides, leg lifts, bridging, standing, and walking.[30] The quadratus lumborum, another important stabilizer of the lumbar spine, can be strengthened with the horizontal side support exercise (see Figure 3). This exercise targets the quadratus lumborum and the abdominal obliques without introducing a large compressive load to the lumbar spine.[38] Further strengthening of the erector spinae and lumbar multifidus can be achieved through performance of arm lifts, leg lifts, and opposite arm and leg lifts in quadruped.[30]

When designing exercise programs for patients with low back pain, endurance of trunk muscles may be a more important consideration than strengthening. Therefore, exercises should be performed daily and emphasize low loads and high repetitions.[38] In addition, this stage should include some form of aerobic training.

Finally, patients should identify pain provoking movements and activities and practice these with local muscle co-contraction. Component movement training may be used for more complicated activities.[40] For example, if a patient has pain with rising from sitting, the patient should attempt to maintain the neutral position of the lumbar spine and the local muscle co-contraction while sitting, while shifting weight anteriorly, and while extending the hips and knees. Practice of local muscle co-contraction dur-

Box 2. Stage One Stabilization Exercises	
Activity	**Key Points**
Neutral lumbar position	• create independent movement of the pelvis • then find and maintain a neutral position of the lumbar spine
Diaphragmatic breathing	• proper breathing technique without the use of accessory respiratory muscles
Activation of transverse abdominus	• abdominal drawing-in maneuver (ADIM) • first in quadruped then prone • monitor with palpation or a pressure feedback device • patient lies prone on pressure feedback device pumped to 70 mmHg; patient should be able to lower pressure 6-10 mmHg and hold for 10 seconds
Co-contraction of lumbar multifidus with transverse abdominus	• reinforce the lumbar multifidus contraction • monitor with palpation; feel a "deep development of tension in the multifidus" • no tension felt under the fingers indicates that the patient cannot activate the multifidus; rapid development of tension indicates that the patient is substituting with the erector spinae
Maintain co-contraction	• maintain co-contraction of local muscles for longer periods of time and with activities • progress to Stage 2 when contraction held for 60 seconds

ing functional activities should begin to decrease pain levels and improve function with daily activities. When patients are able to maintain local muscle co-contraction while performing transitional movements and activities of daily living, they can progress to Stage 3.

Stage 3

Stage 3 training attempts to bring local muscle co-contraction to a subconscious level (see Box 4).[40] Training typically involves exercises that include an element of mental distraction. The patient attempts to maintain local muscle co-contraction while performing an exercise that involves a dynamic challenge. For example, a patient may stand on a balance board while attempting to catch a ball. A patient may balance on foam rollers in the quadruped position while attempting to grasp an object in front of him (see Figure 4). A patient may lie supine over an exercise ball while pulling on elastic tubing. The goal of Stage 3 training is to integrate local muscle co-contraction into work and recreational activities and should be adapted to the patient's functional needs and goals.[40]

CONCLUSIONS

Although no universally accepted definition of *spinal instability* exists, using our definition of *clinical instability* allows consensus across a number of studies that can be collectively used to identify characteristics of individuals with MLBP who respond well to stabilization exercises. Using these characteristics appears to improve the ability to identify these patients and achieve clinically significant improvements in patient outcomes. Of course, further work is needed to validate these recommendations, including performing randomized controlled clinical trials. A more accurate understanding of these characteristics will improve not only the classification of patients with MLBP but will also enhance outcomes by matching interventions with the appropriate patients.

Box 3. Stage 2 Stabilization Exercises

Activity	Key Points
Unloaded trunk ROM exercises	• lumbar spine flexion and extension in quadruped
Hip flexibility exercises	• adequate hip flexibility decreases stresses on the lumbar spine and allows the patient to more easily maintain the neutral position
Aerobic exercise	• aerobic exercise performed to enhance endurance
ADIM maneuver performed with:	
supine heel slides	• supine with hips and knees flexed • slide one heel out and back and then repeat on opposite side • progression –both heels simultaneously
supine leg lifts	• supine with hips and knees flexed • extend one leg so the foot is just above the table surface • repeat on opposite side • progressions- opposite arm with leg movements; starting with feet off table
supine bridging	• supine with hips and knees flexed • perform bridging first with both legs • progression - one leg (note: pelvis must remain level)
sitting, standing, walking	• perform and maintain ADIM
standing row exercises	• perform ADIM while performing a rowing or scapular retraction exercise with tubing
Lumbar multifidus emphasis: unilateral arm lifts in quadruped	• lifts one arm and then the other while in quadruped • pelvis and lumbar spine must remain stationary and level for all tasks • progression—single leg lifts; simultaneous opposite arm and leg lifts
ADIM with side support exercise: knees flexed	• side lying propped on one elbow with hips straight and knees flexed • perform ADIM and then raise pelvis off table so trunk is straight • progression side lying propped on one elbow with hips and knees extended
Functional activities: practice pain provoking activities while maintaining local muscle co-contraction	• pain provoking activity broken down into components • each component practiced while patient maintains local muscle co-contraction • progress to Stage 3 when can maintain local muscle co-contraction during activity

Box 4. Stage 3 Stabilization Exercises

Activity	Key Points
Distracting exercises	• maintain local muscle co-contraction while performing other activities that distract from concentration on local muscle co-activation
Maintain local muscle co-contraction with simulated work and recreational activities	• maintain local muscle co-contraction while performing work or recreational activities

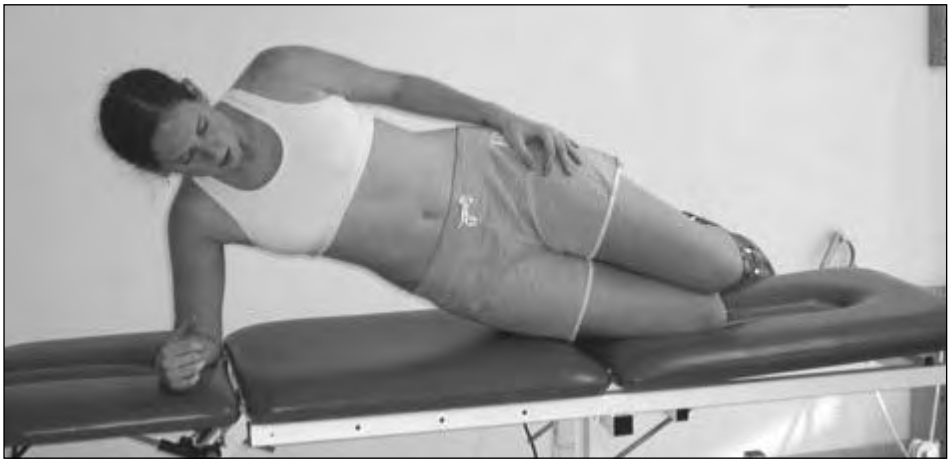

Figure 3. Horizontal side support exercise with abdominal draw-in maneuver.

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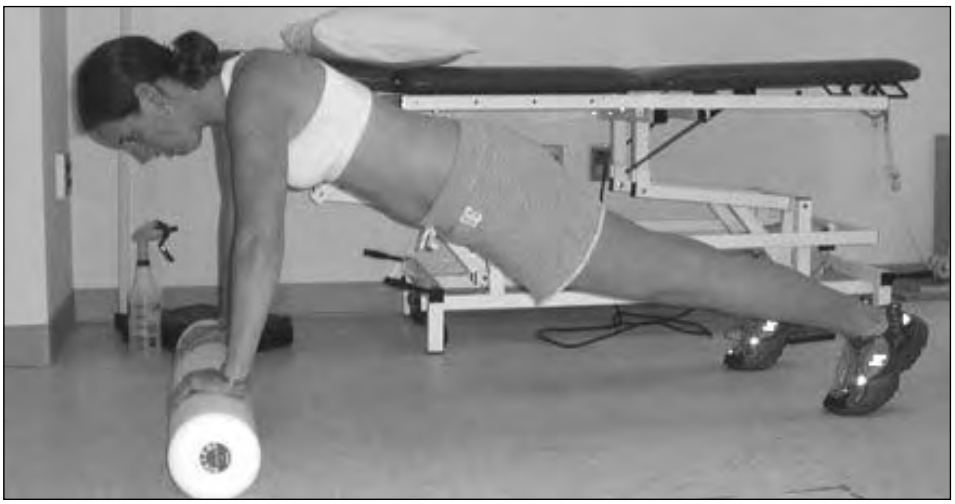

Figure 4. Use of a foam roller to introduce further dynamic challenge to exercises.

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Appendix

Operational Definitions of Signs of Patients Diagnosed with Spinal Instability (Hicks et al30)

1. Aberrant movement
   - positive if at least one of the following movement abnormalities present:
     1. painful arc in flexion
     2. painful arc with return from flexion
     3. instability catch
     4. Gower's sign or thigh climbing
     5. reversal of expected lumbopelvic rhythm
2. Prone instability test
   - performed with the subject lying prone over the end of a table so the feet rest on the floor
   - spring testing performed on all lumbar vertebrae
   - spring testing repeated with the subject lifting his/her feet off the floor
   - positive when pain provoked with the first part of the test but not the second
3. Hypermobility during posterior-anterior (PA) spring test
   - all lumbar vertebrae tested and rated as either hypermobile or not hypermobile
   - positive for hypermobility if at least one lumbar vertebra was rated to be hypermobile
4. Beighton Ligamentous Laxity scale
   - measures ligamentous laxity throughout the body
   - nine point maximum score consisting of the following:
     1. R or L knee hyperextension > 10 degrees
     2. R or L elbow hyperextension > 10 degrees
     3. R or L fifth finger hyperextension > 90 degrees
     4. R or L thumb abduction to contact forearm
     5. able to place palms flat on floor during trunk flexion with knees extended positive if score greater than 2

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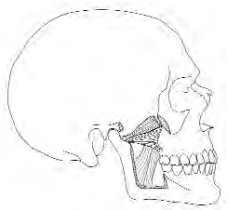

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Use of an Accelerated ACL Rehabilitation Program for Patients with ACL Reconstruction Using an Anterior Tibialis Allograft: A Case Report

Jill Coccaro, MSPT
Mary Ann Wilmarth, PT, DPT, OCS, CertMDT, MTC

ABSTRACT

Objectives: To describe a physical therapy rehabilitation program unique to individuals' status-post anterior cruciate ligament (ACL) reconstruction with an anterior tibialis allograft addressing associated impairments of lower extremity and functional limitations. **Background:** A complete rupture of the ACL is one of the most common knee injuries secondary to sport related trauma. It has been well documented that this injury occurs most often in females and young adults (ages 15-25). The annual incidence rate of ACL rupture has been on the rise in comparison to previous decades. It has been reported as 1 injury for every 3,500 people, accounting for nearly 100,000 new ACL ruptures per year in the United States. Beynnon and Johnson hypothesize that this estimate is low because last year more than 100,000 ACL reconstructions were performed in the United States. It can be postulated that the increased rate of injury reflects population growth and increased participation in both competitive and leisure athletics by varied groups of people regardless of age or gender. It has been determined that the yearly number of ACL reconstructions performed have increased linearly throughout the last decade which may be linked to factors such as population growth, injury savvy patients seeking elective surgery, and athletes desires to swiftly return to sports.

Key Words: anterior cruciate ligament, ACL, rehabilitation, ACL protocols, knee injuries

INTRODUCTION

Traditionally, orthopaedic surgeons have performed ACL reconstructions with either grafts harvested from the patient's hamstring or patellar tendon.[1] Medical advances have also enabled grafts to be harvested from cadaver hamstring and patellar tendons.[2] In light of these changes the surgical trend has evolved toward the emphasis on the use of allografts for ACL reconstruction. From a clinical standpoint using an allograft is advantageous as it increases graft availability and eliminates autograft site morbidity.[2,3]

Renowned orthopaedic surgeons, such as Caborn and Selby, introduced using the anterior tibialis allograft for ACL reconstruction in the late 1990s. Currently, a small number of research studies exist regarding the use of this graft for ACL reconstruction. The pioneers in the field who have used this allograft have suggested that it is a beneficial option to patients since surgically the technique is less complicated and invasive than harvesting an autograft of a hamstring or patellar tendon. As a result surgical time is decreased, autograft site morbidity is eliminated, and possible graft pools are increased.[2,3]

From a rehabilitation perspective these surgical advances are advantageous to patients with ACL reconstruction using an anterior tibialis allograft. They are able to progress through rehabilitation programs more rapidly and efficiently due to a number of factors.

Physicians have suggested that patients can initially bear full weight as tolerated on the affected extremity with a hinged knee brace locked in extension with or without the use of bilateral axillary crutches for ambulation.[2,3] Previously, with the traditional autograft reconstruction using hamstring or patellar tendons physicians required stricter weight-bearing restrictions initially postsurgically to allow for additional healing of the autograft site. These changes have been monumental as it has been reported that due to early weight-bearing patients have reduced swelling and knee extensor lag, in addition to improving proprioceptive awareness and motor control with gait.[1] Table 1 is based on an extensive literature review of ACL rehabilitation protocols for patients with allografts. Table 1 compares 3 protocols, 2 of which were described by Rothman[4] and Beyonon and Benjamin[5] as 'accelerated' or completed within 16 to 20 weeks and the third which was described as 'nonaccelerated' or completed within 24 weeks.

CASE DESCRIPTION

In this case report, 4 subjects ranging in age from 18 to 45 years including 1 male and 3 females were referred to physical therapy following surgical repair to their ACL using an anterior tibialis allograft. The patients followed the rehabilitation program developed by facility physical therapists and physicians specific to this type of graft to address postsurgical impairments of the lower extremity as well as functional limitations. The patients all responded well to the rehabilitation program as initial impairments resolved as each patient's strength and ROM returned to normal as compared to the noninvolved extremity. Subsequently predetermined rehabilitation goals were attained and normal functional outcomes based on the 2000 IKDC Knee Examination form were met.

METHODS

Subjects

During a 3-month time frame, 4 subjects between the ages of 18 and 45 years of age received orthopedic surgery for ACL reconstruction with an anterior tibialis allograft at Foundry Sports Medicine and subsequently participated in physical therapy at this location. It is important to note for this case report that each patient was without concurrent meniscal pathology. The case report was approved by the institutions administrative panel and all subjects signed an informed consent form for their participation.

Anterior Tibialis Allograft Selection

An anterior tibialis allograft was selected for each patient in consultation with their respective orthopaedic surgeons. The individual patients were good candidates for ACL reconstruction because they were categorized by their physician as being moderately active. Hence, they all planned to return to rigorous work or specific sport-related activities.

The surgeons opted to use an anterior tibialis allograft because it has been proven

Table 1. Comparison of Evidence for Accelerated and Nonaccelerated ACL Rehabilitation Protocols

	Rothman[4]	Beyonon[5]	Beyonon[5]
	Accelerated	Accelerated	Nonaccelerated
Week			
1	ROM 0-90	ROM 0-70	TDWB w/ crutches
2	ROM 0-105	Full WBAT no crutches	ROM 0-70
3	ROM 0-125	Partial leg extension 45-90	PWB with crutches
4	Ambulation with unlocked brace	Full knee ROM	Partial leg extension 45-90 and ROM 0-90
8	Deep water jogging	Squats 0-90 with weight	Partial squat 45-90 with body weight
12	Jogging with brace	Sport specific drills with brace	Jogging with brace

to provide excellent tensile strength. One biomechanical study evaluated the tensile strength in Newtons (N) of the ACL hamstring and patellar autografts and the anterior tibialis allograft. Based on this study the ultimate load to failure ratio of the anterior tibilias graft was the strongest with a tensile strength of 3,412 N in comparison to the tensile strength of the Hamstring autograft at 2,421 N or Patellar autograft 2,900 N.[6]

The anterior tibialis allograft surgery is considered less invasive in comparison to using either hamstring or patellar tendon autografts. In contrast, ACL reconstruction using autograft hamstring or patellar tendons can be considered a more invasive procedure as the graft used is extracted directly from the patient's hamstring or patellar tendon. Using this type of graft in effect creates a secondary surgical site which patients must recover from, thus increasing postsurgical soft tissue swelling and pain. In addition, the extensor or flexor mechanism of the knee is altered which can contribute to changes in knee stability and range of motion.

It should be noted that no matter what graft is chosen they each have both benefits and risks. In terms of using an allograft there is always the concern of the possibility of disease transmission from the graft donor to the patient. Proper screening and sterilization of these types of grafts is critical to prevent the latter. In addition, it is possible for the patient to reject the graft due to an immunogenic response. Although disease transmission and immunogenic rejection are possible, they are both very rare and multiple randomized clinical studies report outstanding benefits and outcomes when using allografts.[7]

Surgical Technique

The ACL reconstructions were performed arthroscopically by an orthopaedic surgeon with an assistant. First the anterior tibialis tendon allograft is prepared by the surgeon after being thawed. The graft is inspected for any gross defects and then measurements of the graft length are taken. The graft is then clamped to a board in which 10 pounds of pressure are applied for 10 to 15 minutes to remove any kinks. Under arthoscopic guide both a tibial tunnel and femoral tunnel are created in the tibia and femur. The surgeon will then slide the graft through the tibial tunnel to the femoral tunnel. The graft is fixated with an Endobutton on the femoral side and bioabsorbable interference screw on the tibial side. At the completion of the surgery, graft site placement is assessed for impingement through arthroscopic guide in addition to flexing the knee to approximately 100°. The portal sites are then sutured where the arthoscopic guide was placed. Finally, the anterior-posterior joint laxity is assessed using the Lachman's Test. The completed surgery takes approximately 60 to 90 minutes and patients are discharged home later that day once they are medically stable.[3]

APTA Guide Classification

In accordance with the APTA *Guide to Physical Therapist Practice*, each patient's diagnosis are classified within the guidelines for Musculoskeletal I: impaired joint mobility, motor function muscle performance and ROM associated with bony or soft tissue surgery.

Patient History

Patient 1 is an 18-year-old female student athlete at a local university who tore her right ACL while playing in a collegiate level soccer game in September 2005. Patient 1 had previously torn her left ACL twice in high-school while playing soccer. Otherwise her past medical history was not significant.

Patient 2 is a 32-year-old female graduate student at a local university who tore her right ACL during a Judo competition in June 2005. Patient 2 had previously strained her ® ACL without a tear in February 2004 when sparring. Patient 2's past medical history was otherwise unremarkable.

Patient 3 is a 40-year-old female who tore her ACL in July when jumping on an outdoor trampoline. Patient 3's past medical history prior to this injury was unremarkable.

Patient 4 is a 45-year-old male who tore his ACL in August when playing in a recreational volleyball game. Patient 4's past medical history was unremarkable prior to this injury.

Physical Therapy Examination

Initially, physical therapy examinations were performed 3 days postoperatively by a licensed physical therapist to determine postsurgical impairments including: knee range of motion (ROM) using a universal goniometer for knee flexion (0-135) and extension (0), pain level using the Visual Analog Scale (VAS) (0-10), girth measurements for soft tissue swelling using a standard tape measure along joint line and 1 inch inferior and superior, and patellar mobility compared to uninvolved extremity. Table 2 describes each patient's initial physical therapy examination findings.

Evaluation, Diagnosis, and Prognosis

Each patient's presentation was considered to be typical after an ACL reconstruction with an allograft. Each patient presented with increased pain and soft tissue effusion, decreased knee ROM and patellar mobility which all contributed to their impaired mobility. Each patient's prognosis was good to meet rehabilitation goals and return to functional baselines within 16 to 20 weeks. Each patient's plan of care suggested participation in physical therapy intervention 2 to 3 times weekly for a minimum of 16 weeks.

Intervention

A postoperative ACL rehabilitation program was administered to each patient under the direction of a licensed physical therapist. Specific therapeutic exercises, manual technique,s and modalities were administered at predetermined time frames (acute, subacute, and advanced) based on the patient's stage of graft healing. Each patient's respective orthopaedic surgeon selected postsurgical weight bearing and brace pre-

Table 2. Initial Physical Therapy Examination Findings.

PT Initial Exam	ROM flexion	ROM extension	VAS	Patellar mobility[13]	Knee girth Joint Line	Knee girth 3 in. superior
Patient	0-135	0	0:10	0:6	R: L inch.	R: L inch
Patient 1	45	-3	7	2	40: 39	41.3: 40
Patient 2	28	-5	8	2	37.9: 37.1	41.1: 40.5
Patient 3	50	-3	4	2	36: 35	40: 39
Patient 4	75	-9	4	2	38: 40	40.5: 43

cautions. The therapeutic exercises selected for the program were based on previous ACL studies, which determined the amount of strain placed on the graft with various open and closed chain exercises and the recommendations of facility physical therapists and physicians. The manual therapeutic techniques administered were selected based on a literature review and the suggestions of facility physical therapists and physicians.8 The modalities administered were selected based on previous ACL rehabilitation literature, physical therapists, and physicians.

The ACL reconstruction rehabilitation program which patients in this case report underwent was designed specifically with the anterior tibialis allograft in mind. The rehabilitation program can be broken down into 3 primary phases: (1) the acute phase, (2) subacute phase, and (3) advanced phase. In the acute phase (weeks 1-3) of rehabilitation the focus is on decreasing postoperative soft tissue swelling, controlling pain, improving quadriceps control, and knee range of motion. Patients were progressed into the subacute phase (week 4-11) once they demonstrated good quadriceps control, minimal pain and swelling, and normal gait patterns. Once patients had participated in physical therapy for 12 weeks they were re-examined and if they demonstrated 5-/5 knee strength or greater, full knee ROM compared to the noninvolved extremity and the ability to perform a single leg hop test without pain they were progressed to the final advanced stage of rehabilitation. Table 3 illustrates the Foundry Sports Medicine accelerated rehabilitation protocol for ACL reconstruction with an anterior tibialis allograft.

The rehabilitation program consisted of bracing, weight-bearing precautions, modalities, therapeutic exercise, manual techniques, patient education, and home exercise instruction at designated timeframes based on each patient's postsurgical objective findings in conjunction with specific graft healing parameters.

Bracing: Initially postsurgically a hinged knee brace locked in extension was provided to patients to prevent knee extension deficits. Based on each patient's individual surgeon braces were removed completely once the patient was able to perform a straight leg raise or unlocked to 90° of flexion for 3 to 4 weeks.

Weight-bearing: Patients were able to weight bear as tolerated immediately postsurgically with the assistance of bilateral axillary crutches. Patients were weaned to one crutch on the unaffected extremity or without crutches as soon as they were able to completely weight-bear without a significant increase of pain defined as 2 or more grades from initial VAS score or ambulate with a bilateral heel to toe gait with a comparable stance time.

Modalities

Cryotherapy: Immediately postsurgically in the operating room each patient was given a knee Cryocuff by Aircast for icing at home. Patients were instructed to ice minimally 3 times per day for 10 to 15 minutes. During each physical therapy visit patients received 15 minutes of cryotherapy in conjunction with high-voltage stimulation or quad-polar interferential stimulation during the acute and subacute phases of rehabilitation.

Electrotherapy

During the acute stages of rehabilitation patients received neuromuscular electrical stimulation (NMES) using the Empi PPV 300 to the Vastus Medialis Oblique and Vastus Lateralis when performing quadsets for 10 to 15 minutes at the NMES PPR1 setting to 10 seconds on, 5 seconds off parameters to increase quadriceps recruitment. Figure 1 illustrates use of the NMES while the patient performs a straight leg raises.

At the completion of each physical therapy visit during the acute stage of therapy patients received high-volt galvanic stimulation using the Empi 300 on the High volt PPR 1 setting for 15 minutes with ice and leg elevation to decrease soft tissue swelling. Figure 2 illustrates the use of high volt galvanic stimulation for edema control.

Once patients progressed to the subacute phase they received quad-polar interferential stimulation to the knee for 15 minutes with an icepack for 15 minutes at 80-150.

Ultrasound: 3 patients received ultrasound to the popliteal fossa to decrease hamstring pain and soft tissue swelling for 5 minutes set at 50 percent pulsed, 1.3 w/cm^2, 3MHz.

Therapeutic exercises: Patients were instructed to perform specified exercises at predetermined intervals by a licensed physical therapist. Cumulatively exercises helped to increase strength, neuromuscular control, range of motion, flexibility, proprioceptive awareness, and cardiovascular endurance. For the purpose of this report the exercises were grouped into the following categories.

Table exercises

Quad sets (QS), Straight leg raise (SLR), Side-Lying Abduction (s/l abd), Prone hip extension, Short Arc Quads (SAQ), Heel raises, Toe raises.

Stretches

Hamstring stretch, Quadriceps stretch, Calf stretch.

Gait training: Patients were progressed from ambulating with bilateral axillary crutches to 1 axillary crutch on the uninvolved side to no crutches using a heel-toe gait pattern.

Cardiovascular

Machines: Bike, Elliptical, Treadmill. Patients used cardiovascular equipment for 5 to 15 minutes each per session based on progression in rehabilitation program.

Figure 1. NMES for quadriceps recruitment during exercise.

Table 3. Foundry Sports Medicine Accelerated Rehabilitation Protocol for ACL Reconstruction with an Anterior Tibialis Allograft

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
ROM	0-90	0-90	0-120	full												
QS	•	•	•	•	•	•	•	•								
Heel slide	•	•	•	•	•	•	•	•								
Prone hang	•	•	•	•	•	•	•	•								
SLR	•	•	•	•	•	•	•	•	•	•	•	•				
s/l abd	•	•	•	•	•	•	•	•	•	•	•	•				
hipext	•	•	•	•	•	•	•	•	•	•	•	•				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SAQ			•	•	•	•	•	•	•	•	•					
LAQ						•	•	•	•	•	•	•				
Heel raise		•	•	•	•	•										
Toe raise		•	•	•	•	•										
HS stretch		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Quad stretch		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Gait training	•	•	•	•												
SLS activity	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Rockerboard			•	•	•	•	•	•	•	•	•	•	•	•	•	•
Bike	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Elliptical				•	•	•	•	•	•	•	•	•	•	•	•	•
Tmill walk			•	•	•	•	•	•	•	•	•	•	•	•	•	•
Tmill jog												•	•	•	•	•
Matrix* ab		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Matrix ad		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Matrix calf							•	•	•	•	•	•	•	•	•	•
Matrix leg press		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Matrix HS		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
MatrixKnee ext								•	•	•	•	•	•	•	•	•
Smith press								•	•	•	•	•	•	•	•	•

*Matrix nautilus equipment

Matrix nautilus machines: Patients initially started at 2 sets of 10 and progressed to 3 sets of 10 on each nautilus machine based on individual progression in rehabilitation program (Hip Abduction, Hip Adduction, Calf press, Leg press, Hamstring Press, Quadriceps Extension, Smith press).

Standing exercises

Wall slides, Step-ups, Side steps, Step downs.

Proprioceptive exercises

Single leg stance-on floor eyes open and closed.

Rocker board –anterior/posterior, medial lateral (see Figure 3).

Airex foam -single leg stance, single leg stance with ball toss.

Agility training and Plyometrics

Agility ladder, Agility drills-skipping, karaoke, Plyometric jumping, Treadmill inclined sprinting.

Manual techniques

Soft tissue mobilization- 2 subjects received soft tissue mobilization in the form of effleurage in a caudal to cranial direction to medial and lateral hamstring tendons to decrease complaints of popliteal fossa pain and improve knee extension and hamstring flexibility.

Patellar mobilization- 4 subjects received patellar mobilization in the cranial and caudal directions to increase patellar mobility to 3/6 utilizing the Freddy M. Kaltenborn technique on the 0/6 scale mobility scale.[9]

OUTCOMES

Each patient's knee range of motion increased to normal ranges of knee flexion (125-135°) by weeks 4 and 5 compared to the opposing noninvolved extremities base-

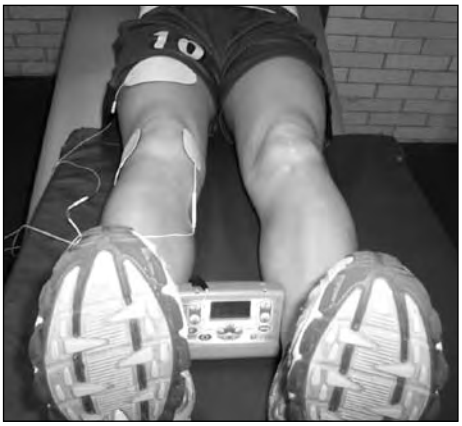

Figure 2. High-volt galvanic stimulation for edema control.

line ROM ranging from 125 to 135° of flexion. In addition, each patient's strength increased in both knee extensors to greater than or equal to 5-/5 and hamstrings to 5/5 by 3 months. Each patient received KT 2000 ligamentous testing which determined normal ranges of integrity for all patients (less than or equal to 3mm translation of involved vs. non-involved extremity) with the exception of one subject. Pain levels on the visual analog scale had returned to normal ranges (0-2/10) and soft tissue swelling had returned to normal girth in comparison to opposite lower extremity. Functional outcomes of each patient were assessed using the 2000 IKDC Knee Examination form section #7 which resulted in normal grades for all patients. Physical therapy intervention ranged from 23-43 visits until each individual patient's initial impairments and disabilities had resolved.

ANALYSIS OF PATIENT FUNCTIONAL OUTCOMES

Patient 1 was able to run and sprint on land and on the treadmill. She had begun soccer dribbling upon discharge and will participate in competitive soccer this summer.

Patient 2 was also able to run on land and on the treadmill. She had returned to practicing Judo through sparring upon her discharge.

Patient 3 was able to return to snowboarding this past winter successfully without any increased pain or subsequent injury.

Patient 4 has been able to return to all activities of daily living (ADL) and has joined a health gym to further his physical fitness.

Figure 3. Rocker board proprioceptive exercise.

PHYSICAL THERAPY RE-EXAMINATION

Patients were again re-examined at 3 months postoperatively for the same measures in addition to manual muscle testing of knee flexors and extensors and KT-2000 knee ligament testing for anterior-posterior ligamentous laxity. Table 4 summarizes each patient's re-examination findings at 12 weeks postoperatively. Figure 4 depicts an example of KT 2000 ligamentous testing.

DISCUSSION

An accelerated ACL rehabilitation program for patients with tibialis anterior allografts was used successfully to progress patients thorough the postsurgical rehabilitation process after ACL reconstruction. In this case report, 4 subjects ranging in age from 18 to 45 years old including 1 male and 3 females had surgical repair to their ACL using an anterior tibialis allograft. Physical therapists and physicians at Foundry Sports Medicine and Fitness collaboratively developed a rehabilitation program specific to this type of graft to address postsurgical impairments of the lower extremity as well as functional limitations. The patients all responded well to the rehabilitation program within a 3 month timeframe as initial impairments and functional limitations had resolved. Upon re-examination at 12 weeks each patient's ROM, ligamentous integrity, and patellar mobility had returned to normal compared to the noninvolved extremity. In addition, each patient's strength with Manual Muscle Test had either returned to normal or near normal as compared to the noninvolved extremity. Ultimately each patient was able to meet their predetermined rehabilitation goals and returned to their functional baseline which was determined by scores of 85% or better on the 2000 IKDC Knee Examination form.

From a clinical perspective this group of patients was able to meet rehabilitation milestones sooner than patients with autografts of the hamstring and patellar tendons. Patients therefore regained knee flexion ROM faster due to decreased overall precautions with knee ROM rehabilitation parameters. For example, in the acute phase rehabilitation with an allograft the goal for knee flexion ROM is 0 to 90 in week 1. In comparison, to the facility hamstring autograft parameter for ROM is 0-90° by week 2 or 3.

Initial impairments such as soft tissue pain and swelling appear to be reduced with allograft ACL reconstruction. These factors allow for an overall improved tolerance to therapeutic exercises. Secondly, decreased knee swelling enables the patient to increase their quadriceps contractibility more rapidly.

Patients with allografts seem to progress to full weight-bearing without crutches sooner than patients with autografts. This occurs primarily because of the surgeon's precaution with weight-bearing to allow for graft site healing and the subsequent increased pain patients with autografts experience at the graft site, therefore relying on the crutches more.

In summary the unique factors of this program making it accelerated include early weight-bearing with less restrictive precautions for bracing, more aggressive knee ROM milestones for week 1, swifter progression from closed to open chain exercises, and early proprioceptive therapeutic exercise and transition to higher level exercises like running and agility training.

This case report highlights the necessity for randomized clinical research comparing other similar sports medicine rehabilitation

Figure 4. Example of KT 2000 Ligamentous Testing.

Table 4. Week 12 Physical Therapy Re-examination Results

12 Weeks	ROM	MMT flexors	MMT extensors	Pain	KT 2000	2000 IKDC
Patient 1	0-135	5/5	5/5	0	5mm	> 85%
Patient 2	0-135	5/5	5/5	0	2mm	> 85%
Patient 3	0-135	5-/5	5-/5	0	3mm	> 85%
Patient 4	0-123	5-/5	5-/5	0	2mm	> 85%

ACL rehabilitation programs for patients with or without allografts to the protocol used in this case report to further explore the notion of an accelerated rehabilitation program. The extensive literature review performed for this case report uncovered only one study that compared one accelerated program to a nonaccelerated program for patients with patellar tendon autografts. In addition, a study comparing rehabilitation programs for other allograft materials such as hamstring or patellar tendons to the anterior tibialis graft would be beneficial to understand what differences, if any, exist between the two in terms of the postsurgical rehabilitation process.

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Flexor Hallucis Longus Tendinitis Among Dancers

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INTRODUCTION

Dancers make up a unique population of athletes. They are predisposed to many overuse injuries due to the high demands they require of their bodies. The foot and ankle are at risk for a great number of injuries because of the repetitive nature of the dance movements they perform.[1,2] Many of these dance movements alternate between extreme plantar flexion and dorsiflexion. Dancers rely on the flexor hallucis longus (FHL) for dynamic stability of the foot during these movements. As a result, FHL tendinitis is a common injury at the foot and ankle.

Flexor hallucis longus tendinitis can often be a very painful and disabling condition, and may be detrimental to a dancer's career. It is important for those involved in the treatment of dancers to have a thorough understanding of this problem and the different treatment options available to facilitate a timely recovery. Prolonged time off from dancing is not a realistic option for dancers, who have no true off-season. Additionally, any time off due to injury means the dancer is losing the opportunity to perform or audition, resulting in a financial loss. Therefore, the clinician must choose the appropriate interventions to get them back to dancing as soon as possible.

The purpose of this paper is to provide a review of the anatomy and function of the FHL, and to discuss the etiology, diagnosis, and various treatment approaches along with outcomes of FHL tendinitis in dancers. We will also describe a case report of a dancer who was diagnosed with FHL tendinitis.

ANATOMY AND FUNCTION

Originating at the interosseous membrane and the distal two-thirds of the posterior fibula, the FHL runs posterior to the medial malleolus and deep to the medial retinaculum within the tarsal tunnel.[1,3-6] The tendon is lined with a synovial sheath and passes through a fibro-osseous tunnel between the medial and lateral tubercles of the talus and beneath the sustentaculum tali. The FHL tendon then courses the plantar surface of the foot, where it crosses dorsal to the flexor digitorum longus tendon at the knot of Henry.[2,5] The tendon continues between the two sesamoid bones of the first metatarsophalangeal (MTP) joint, and inserts at the base of the distal phalanx of the great toe.[5]

Dancers rely heavily on the FHL to enhance the dynamic stability of the foot. The FHL functions as a primary supinator of the subtalar joint by exerting an upward pull on the sustentaculum tali, creating a rigid foot. This occurs by locking the midtarsal joints, thus enhancing stability at the medial longitudinal arch.[7] The increased stability of the medial longitudinal arch allows an increased amount of plantar flexion of the first metatarsal which is required to attain the aesthetically desired arch of a ballet dancer's foot.[7] Additionally, the action of the FHL in such a manner eccentrically controls pronation at the subtalar joint.[6-8]

The FHL also functions as a primary active plantar flexor of the first MTP and interphalangeal (IP) joints of the great toe, and restrains passive dorsiflexion at the first MTP joint.[5] Additionally, the FHL is a secondary plantar flexor of the ankle. During plantar flexion when the dancer is *en pointe* (Table 1, Figure 1A), the FHL tendon becomes compressed within the fibro-osseous tunnel as the muscle contracts. In contrast, ankle dorsiflexion, such as in *demi-plié* (Table 1), causes the FHL to be stretched between the talar tubercles and sustentaculum tali.[9]

ETIOLOGY AND INCIDENCE

The FHL tendon is considered by some to be the Achilles tendon of the foot due to its substantial role in jumping and completing push-off during the final stance phase of gait.[10,11] Although rare in the general population, ballet dancers place increased amounts of stress and high demands on the FHL, predisposing them to tendinitis caused by overuse.[10] Due to the high incidence among this population, FHL tendinitis is commonly referred to as "dancer's tendinitis."[1-3]

Repetitive movements involving excessive plantar flexion of the ankle, such as going from *demi-plié* to *pointe* or jumping, can lead to irritation and inflammation of the FHL tendon.[4,12] The pain associated with jumping is a result of the large eccentric load on landing. Depending on the type of dance style, the dancer may be dancing barefoot or in ballet slippers, which provides no shock absorption. The FHL tendon, therefore must take up the shock and control the return of the foot to the floor when the dancer lands.[9]

Although irritation can occur at the knot of Henry and between the sesamoids of the great toe, the most commonly irritated site is deep to the flexor retinaculum, where the tendon lies within the fibro-osseous tunnel.[2,4] Repeated irritation of the tendon's sheath can cause hypertrophy of the tendon within this tunnel. Thickening or fibrosis can impede the normal gliding of the tendon, thus creating pain and movement limitations.[13] Weakness of the tendon and muscle results, secondary to increased pain and decreased use. Adhesions and the development of calcific nodules may follow.[11,14,15]

The FHL may also become irritated when the ankle and great toe are repeatedly dorsiflexed, such as in *grand plié* (Table 1). In this position the tendon becomes stretched and the muscle belly is pulled down into the fibro-osseous tunnel. When this action is repeated, it leads to irritation at the musculotendinous junction and results in pain and inflammation.[11,14]

Another mechanism by which FHL tendinitis may develop is via poor mechanics and technique. Osseous or soft tissue limitations can lead to decreased external rotation at the hip. Some dancers compensate for this by forcing the *turnout* (Table 1) from their feet. In doing so, the dancer uses the friction from the floor to hold their feet in excessive *turnout* resulting in hyperpronation at the subtalar joint. The FHL endures an increased strain as it attempts to eccentrically control this motion, and predisposes the dancer to the development of tendinitis.[12,14]

DIAGNOSING FLEXOR HALLUCIS LONGUS TENDINITIS

Clinical Examination

Symptoms of FHL tendinitis in the dancer include pain located posterior and inferior to the medial malleolus made worse by jumping, *demi-relevé* (Table 1, Figure 1B),

Table 1. Ballet Terminology

First Position:	In standing, heels together, knees extended, hips externally rotated
Second Position:	In standing, knees extended, hips externally rotated and abducted with feet apart.
Third Position:	In standing, knees extended, hips externally rotated with the heel of the front foot contacting the back foot at the medial arch.
Fifth Position:	In standing, knees extended, hips externally rotated with the heel of the front foot contacting the first hallux of the back foot.
Turnout:	Amount of external rotation the dancer has at their hips, knees, and ankles.
Barre:	Exercises holding onto a bar with one hand for support. These exercises make up the beginning part of ballet class and are where the dancer acquires the fundamental training.
Centre:	Dance movements in the middle of the floor without the use of the barre.
Demi-Plié:	Small bending of the knees with the heels remaining on the ground and knees remaining over the toes.
Grand Plié:	Large bending of the knees with the heels coming up off the floor and knees remaining in line over the toes.
Tendu:	Pointing the foot while keeping contact on floor with the toe of the gesture leg. The hips are externally rotated and the knees are extended. The hip of the gesture leg is in slight flexion with tendu forward, and abduction with slight flexion with tendu side.
En Pointe:	Position of the foot with the ankle at full plantarflexion. The dancer wears a special type of shoe enabling her to go up onto the tips of her toes.
Demi-Relevé:	Lifting the heels off the ground onto the balls of the feet.

dancing *en pointe, demi-plié, grand plié,* and pointing the foot. Crepitus and triggering of the first toe may occur, depending on the severity of the tendinitis.[4] With triggering of the first toe, the dancer reports an inability to relax the toe from a dorsiflexed position after performing a *demi-relevé*. Triggering may also involve an inability to relax the toe after full plantar flexion of the ankle when pointing the foot, resulting in a feeling of the first toe being stuck.[1,2,4,5,9] Other signs and symptoms may include swelling inferior to the medial malleolus, dorsiflexion range of motion (ROM) limitations of the great toe, and pain with resisted plantar flexion of the first toe.

The *FHL stretch test* is a useful diagnostic tool in examining the dancer with complaints at the medial ankle or foot.[5] For this test, the ankle is placed in a dorsiflexed position with the first metatarsal stabilized. The first MTP joint is then dorsiflexed. With a positive test there will be complaints of discomfort or pain with palpation of the FHL tendon when in this position, and/or a decrease in dorsiflexion at the first MTP joint to less than 20°.[5]

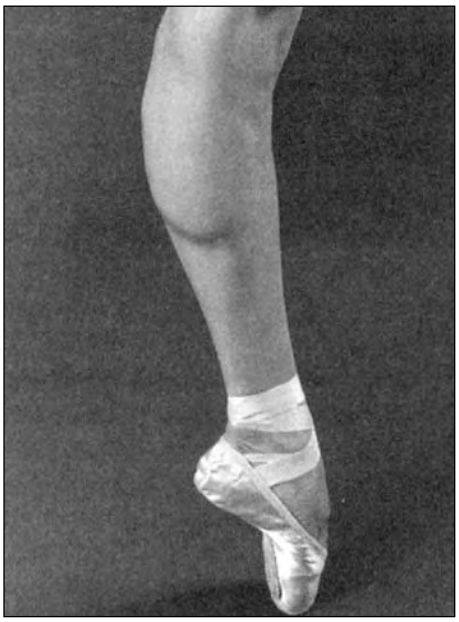

Figure 1A. Dancer standing en pointe in a pointe shoe. Ankle at full plantarflexion.

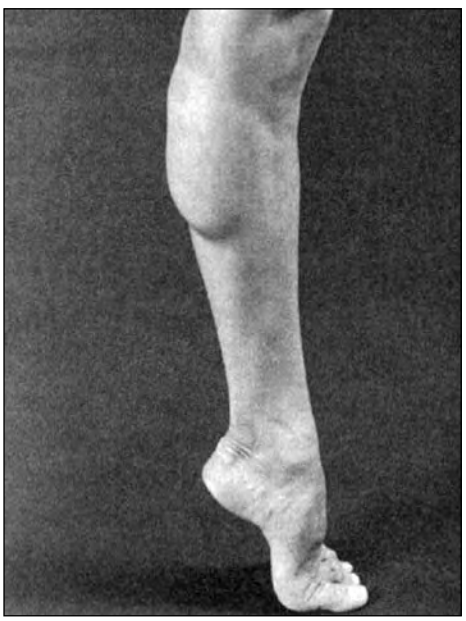

Figure 1B. Dancer's foot in demi-relevé. Ankle is plantar flexed, MTP joints are dorsiflexed to 90°, and IP joints are extended.

Identification of dance movements that create pain will be helpful in determining the cause of the pain. In addition, symptoms may be further provoked with inversion and eversion of the ankle.[16] With ankle inversion, the size of the tarsal tunnel may decrease, causing further compression or irritation to the FHL tendon. Conversely, during eversion of the ankle, tension results causing increased pressure to be placed upon the structures within the tunnel, which leads to further aggravation of the symptoms. Poor mechanics with dance technique, including increased pronation, sickling (adduction of the foot), or winging (abduction of the foot) may decrease the size of the tunnel as well.

The objective findings from a thorough examination are usually sufficient to make an accurate diagnosis. Therefore, invasive diagnostic procedures, such as anesthetic injection, are unnecessary to confirm presence of FHL tendinitis.[1]

Differential Diagnosis

Several dysfunctions at the foot and ankle are associated with symptoms of pain inferior to the medial malleolus. Often FHL tendinitis is misdiagnosed initially, which becomes a significant obstacle in recovery and further delays the dancer's return to activity. A thorough evaluation and a detailed

patient history are essential in accurately diagnosing tendinitis of the FHL, since many of the symptoms are present in a variety of these conditions. Differential diagnosis can include hallux rigidis, posterior impingement syndrome such as a symptomatic os trigonum, achilles tendinitis, posterior tibialis tendinitis, and plantar fasciitis.[1,3,5,8-10,17]

Hallux rigidis

Decreased dorsiflexion ROM of the first MTP joint with the ankle dorsiflexed (positive *FHL stretch test*) mimics a hallux rigidis, and is frequently termed a 'pseudo' hallux rigidis.[1,5] However, if first MTP joint dorsiflexion ROM is greater than 60° when the ankle is plantar flexed then hallux rigidis is ruled out. This increased motion occurs because the FHL muscle belly retracts proximally, away from the tunnel, allowing for full excursion of the tendon and full first MTP dorsiflexion ROM.

Posterior impingement syndrome

Assessment of the dancer's response to forceful passive ankle plantar flexion is a useful way to rule out other diagnoses.[1,9] With FHL tendinitis, the dancer will have no complaints of pain with forceful passive plantar flexion. However, if posterior impingement of the ankle is present, or a symptomatic os trigonum exists, this maneuver will elicit pain at the posterior aspect of the ankle.[9,10]

Achilles and posterior tibialis tendinitis

Other types of tendinitis can be found around the ankle joint, and it is important to be able to distinguish them from each other in order to select the appropriate interventions. Achilles tendinitis can present with pain during resisted ankle plantar flexion, located at the posterior aspect of the ankle and going no further down the foot than the insertion of the tendon on the posterior calcaneus. Ankle dorsiflexion may also yield pain when in *demi-plié* due to the stretch placed upon the tendon in this position. In contrast, FHL tendinitis will cause pain deeper than the Achilles tendon and with resisted plantar flexion of the great toe rather than the ankle.[10]

The other type of tendinitis common at the medial aspect of the foot and ankle is posterior tibialis tendinitis. Similar to FHL tendinitis, irritation of the posterior tibialis tendon can also be caused by overuse from faulty technique, such as forcing *turnout* and the resulting pronation at the subtalar joint.[9] Pain with resisted muscle contraction or with manual muscle testing (MMT) of the FHL and posterior tibialis muscles will help differentiate between the two to identify the source of the symptoms.

Plantar fasciitis

Dancers may be incorrectly diagnosed with plantar fasciitis, when they actually have FHL tendinitis. Plantar fasciitis is a common problem for dancers, so being able to correctly differentiate between the two is important. When plantar fasciitis is the source of pain, there will be complaints of foot pain upon rising from bed in the morning, and pain with palpation at the calcaneal origin of the plantar fascia.[17] Patients may present with a positive *FHL stretch test*. However, if the FHL is the source, pain can be reproduced with palpation, but will be medial and deep to the plantar fascia. This area of tenderness is located at the knot of Henry.[5,17]

Differential diagnosis can be a challenging task, but with careful attention to detail and the use of appropriate diagnostic examinations, the clinician will likely be able to reach the correct diagnosis. This will allow appropriate treatment interventions to be applied in an efficient manner so the dancer may resume their activity in the shortest amount of time possible.

TREATMENT OF FLEXOR HALLUCIS LONGUS TENDINITIS

Conservative Treatment

Conservative treatment of FHL tendinitis involves appropriate physical therapy interventions to decrease irritation of the tendon. Nonsteroidal anti-inflammatory medications along with ice and activity modification are commonly the first steps taken to decrease inflammation.[10] Modalities such as ultrasound and electrical stimulation help to gate pain and promote healing.[1,11,14] Deep tissue massage is performed to release trigger points in the muscle and to facilitate realignment of the tendon fibers.[10,12] Heat may be used to relax the muscle belly prior to massage. Wearing supportive shoes and/or orthotics for non-dance activities to maintain proper alignment can assist in minimizing unnecessary stress on the FHL.[4,11] Restoration of normal joint mobility, muscle strength, and endurance are implemented once the inflammation has subsided.

Modification of activity and correction of faulty mechanics are of utmost importance in order to promote healing and to prevent the dancer from continuing to place increased stress upon the FHL tendon. Initially, activity modifications include avoidance of *grand plié* in all positions. Movements *en pointe* or wearing pointe shoes, *demi-relevé*, and jumping are discontinued.[4,12,13] *Turnout* is decreased in order to minimize the chances of overpronating.

In terms of mechanics, the dancer is trained to *turnout* from the hips through initiation of the external rotator muscles, and to avoid forced *turnout* and pronation at the foot.[4,11] This can be achieved with the use of rotation discs which provide no resistance or friction with rotation, thus minimizing torque at the hips, knees, and ankles. The rotation discs force the deep external rotators of the hip to activate, thereby improving lower extremity alignment. During these activities, the dancer is educated and reminded to maintain a subtalar neutral position. When appropriate, jumping technique is assessed, ensuring that the dancer is not landing with the feet pronated.[4] Additionally, core stability is addressed and can be improved with the use of Pilates training, a swiss ball, or a variety of other therapeutic exercises focused on initiation and strengthening of the core muscles.[12] Finally, taping to support the medial arch is a useful form of biofeedback to remind the dancer to avoid hyperpronation and maintain the subtalar neutral position.

Treatment also includes addressing any existing foot and ankle muscle weakness. Muscle strengthening of the ankle may include resisted dorsiflexion and plantar flexion with Theraband. The FHL can be isolated by wrapping Theraband around the first and second toe and performing resisted plantar flexion of the great toe. Strengthening exercises also include towel curls with the toes while the heel is elevated, and picking up marbles with the toes.[12] It is crucial these exercises be performed in subtalar neutral; therefore dancers must know how to maintain this position. Proprioceptive awareness and stabilization issues are addressed by use of the BAPS board, mini trampoline, and steamboat exercises with Theraband. Steamboat exercises involve single leg stance on the affected extremity while the unaffected limb performs rapid and short flexion, extension, abduction, or adduction movements of the hip with resistive Theraband. The quick movements off-set the dancer's balance,

challenging stability, and balance of the affected limb.

As symptoms begin to resolve, slow progression back to dancing activities may occur. With progression, Theraband may not be sufficient to prepare the dancer for their normal dancing activities. The therapist must be creative in designing appropriate therapeutic exercises that are similar to dance movements. The dancer will likely be more inclined to adhere to their rehabilitation regime if the activities are functional to them. A gradual increase in activity begins with resuming dance activities at the *barre*, beginning with *grand plié* in *second position* (Table 1). If there is no increase in symptoms, then the dancer may return to *grand plié* in the other positions. Since increased awareness and strengthening of the external rotators of the hip occurred early in physical therapy, the dancer should ease back into dancing with the amount of *turnout* their body is able to achieve from their hips. Therefore, dancers initially return to *third position* before resuming *fifth position* (Table 1). Jumping should be resumed cautiously at the *barre* before returning to jumps at *centre floor* (Table 1). The Pilates Reformer is an effective tool to assist dancers with transitioning back to *demi-relevé* and jumps in a gravity reduced position with adjustable resistance. Dancing *en pointe* is the last activity the dancer will resume due to the demands it places on the FHL. Again, *pointe* work should be initiated at the *barre* and performed minimally. Gradual progression with correct form is key in avoiding recurrence of the tendinitis.

Surgical Treatment

Surgical treatment of FHL tendinitis becomes the option if conservative measures have been attempted and failed. Surgery is a last resort as it means a significant delay in the dancer's training will occur. However, it may enable the dancer to recover from the tendinitis and resume activity at a faster rate than with conservative treatment alone.[4,10] The most common surgical procedure involves release of the FHL tendon from the medial retinaculum and synovial sheath. An incision is made along the medial retinaculum and carried distally to release the tendon until normal tendon gliding is observed.[4] Debridement of existing nodules from the tendon also occurs as they may affect tendon gliding and be the cause of triggering of the great toe. Compression dressings are applied over the surgical area and worn for approximately one week. During this time, the dancer must refrain from bathing the surgical area.[1] In addition, the dancer may be immobilized in a splint or a cast for several weeks following the surgery.[4,5,13]

Weightbearing restrictions following surgery vary throughout the literature. In a study by Hamilton et al,[1] 31 professional dancers and six amateur dancers underwent surgery and were instructed to allow weightbearing as tolerated with crutches postoperatively. In a similar study by Kolettis et al,[4] 13 patients underwent an operative release which included seven professional dancers and six student dancers. Following surgery, weightbearing was restricted for four to six days and then progressed as tolerated. In a case study reported by Cowell et al,[13] a student dancer underwent bilateral operative release and was placed in bilateral short leg casts with restriction of weightbearing for 3 weeks.

Rehabilitation after surgery

After clearance from the physician, range of motion, strengthening, stretching, endurance, stability exercises, and return to activity are addressed in physical therapy. Guidelines for rehabilitation following surgery are identical to that of conservative treatment, after weightbearing restrictions are lifted. Throughout rehabilitation, the physical therapist must be aware of scarring that may develop following surgery; therefore, scar tissue and soft tissue mobilization techniques are employed as a preventative measure.[3,13] Additionally, an isolated stretch of the FHL must be performed in order to improve muscle length. This is achieved with dorsiflexion of the ankle and first MTP joint, and extension of the first IP joint.[5]

Swimming is an excellent option after the wound has healed. It is encouraged by Hamilton et al[3] as an effective means of keeping the dancer active with a decreased amount of weightbearing. Additionally, water *barre* while in the pool will allow the dancer to return to activities that are part of dance class. Water *barre* is the performance of movements done at the *barre* in ballet class, but with reduced weightbearing due to the buoyancy of the water.

As with conservative measures, the dancer's technique must be addressed, including *turnout* and proper landing techniques with jumping, to prevent future irritation. In addition, proper footwear is recommended as well as the use of orthotics, if necessary.[4] As the dancer demonstrates improvements and increased tolerance to activity throughout the rehabilitation process, *barre* and *centre* work are gradually introduced.[4] Once the patient is pain-free and properly conditioned, the *en pointe* position may be resumed.

OUTCOMES

A literature review reveals limited data on conservative outcomes in treatment of FHL tendinitis. According to Norris,[11] in severe cases full recovery may take up to a year with conservative treatment and often result in unfavorable outcomes. Michelson and Dunn[5] report 46% of patients had successful outcomes with conservative treatment. Sammarco and Cooper[18] reported a 13% success rate with conservative treatment. It is important to note, however, that 71% of the FHL cases among the dancers in the study by Sammarco and Cooper had partial longitudinal tears of the tendon, limiting the chances for success with conservative treatment.

Surgery is often the recommended course of action with severe tendinitis, and the outcomes discussed in the literature demonstrate high success rates.[11] Michelson and Dunn[5] report 23 of 81 subjects underwent surgery for severe FHL tendinitis when conservative treatment failed. Outcomes were excellent, with 100% of these patients noting significant improvements in symptoms. Dancers are usually able to return to full activity within three to seven months after surgery with proper rehabilitation.[4,10,12] In a study by Kolettis et al,[4] all thirteen dancers returned to dancing within a mean of five months, and eleven reached a level of full participation. Hamilton et al[1] reported 29 of the 31 professional dancers returned to full activity within 25 weeks. Only two of the amateur dancers returned to full activity while the remaining four discontinued their dance careers due to surgical outcome.

Since the majority of the cases reported in the literature discuss successful surgical outcomes, the authors wonder whether the literature bias toward surgical intervention may be due to under-reporting of successful conservatively managed cases. As a result, an accurate representation of the success rate of conservative treatment may not be available. Many cases have been successfully managed conservatively at the dance organization with which the authors were associated. Conservative treatment may likely be preferred by dancers, thus it is very important for the

physical therapist to understand the appropriate ways to intervene to ensure the best chance for success.

CASE STUDY

A 17-year-old female dancer presented to the dance organization's injury clinic with complaints of bilateral ankle and calf pain beginning 2 weeks prior. No history of trauma was reported. She had recently moved to New York City to attend a preprofessional modern dance school. As a result, the amount of walking she was doing significantly increased. In addition, she began taking 13 classes per week (19.5 hours of dancing), an increase of 4.5 hours per week in her training. These classes consisted of ballet, pointe, Horton, and jazz techniques.

Her symptoms included diffuse tenderness at the posterior ankle, medial to the Achilles tendon, with the left ankle more painful than the right. She noticed increased pain with movements involving ankle dorsiflexion, such as landing from a jump or performing a *demi-plié*. Additionally, she also experienced pain with *demi-relevé* and dancing *en pointe*. Pain was noted during initiation of jumps when pushing off the floor with her toes. Full ankle range of motion was available and no strength deficits were observed. However, increased pain was elicited with resistance to great toe plantar flexion and with a stretch to the FHL tendon. No history of prior injuries was noted.

Technique assessment included examination of her foot and ankle position during common dance movements. It was observed that when she stood in *first position* (Table 1) she had a tendency to force her *turnout* at her feet, resulting in increased pronation at the subtalar joint and resultant over-activation of the FHL. In addition, upon landing after a jump, the foot was further forced into hyperpronation in an attempt to increase *turnout*. We hypothesized that this increase in muscle use with inadequate rest for healing to occur, led to the tendinitis. The dancer's technique when pointing the foot was then evaluated while performing a *tendu* (Table 1) to the front and side from *first position*. She demonstrated an increased amount of ankle plantar flexion which caused compression at the posterior ankle joint. Ideally, when pointing the foot, movement should occur from not only the ankle joint, but also the forefoot and midfoot. The dancer's technique was corrected using verbal and tactile cues to activate increased midfoot and forefoot motion, decreasing the amount of forced ankle plantar flexion. She was advised to imagine bringing the heel forward when trying to externally rotate the leg to achieve the desired aesthetics during *tendu*.

Initial treatment consisted of modalities to decrease pain and inflammation, including moist heat and bipolar electrical stimulation to the posterior legs over the gastrocnemius and FHL muscles, pulsed ultrasound at the posteromedial ankle, and ice massage at the end of treatment. Soft-tissue massage of the gastrocnemius and FHL muscle bellies was performed to improve circulation, decrease tone, and assist with reducing trigger points. The dancer then performed doming exercises to target the intrinsic muscles of the foot. Doming exercises consist of placing the foot flat on the floor and adducting the toes while plantar flexing the MTP joints and extending the IP joints at the same time.[8] With doming exercises, the subtalar joint remains neutral, and the dancer thinks of lifting the longitudinal and transverse arches of the foot. Toe flexion exercises were performed with resistive Theraband around the first and second toes to strengthen the FHL and improve the mechanics of her technique with pointing the foot. Additionally, the second, third, and fourth toes were isolated with the Theraband to strengthen the flexor digitorum longus.

The dancer was given a home exercise program consisting of doming exercises, Theraband strengthening, and stretches of the FHL. Comfortable shoes with a supportive arch were recommended for everyday use to decrease stress on the FHL. Modifications to class were made including restriction of dancing *en pointe* and jumping. *Demi-relevé* was only to be performed bilaterally within 50% to 75% of the full range, and *demi-plié* and *grand plié* ROM was also decreased. She was instructed to return to the clinic the next day for follow-up.

The following visit she presented with decreased pain bilaterally, localized inferior and posterior to the medial malleolus, along the FHL. She reported she had been wearing comfortable, supportive shoes and had followed the recommended restrictions and modifications. Treatment was continued as stated initially with further evaluation of the dancer's *turnout* technique using rotation discs. She was instructed to stand on the discs beginning in parallel and then *turnout* into either *first position* from the hips. The dancer then performed the same movements off the discs to determine if she was using the correct muscles. Focus was on eliminating hyperpronation while in a *turned out* position to reduce stress on the FHL tendon. Following treatment, the dancer was advised to continue the HEP and follow technique modifications. She avoided jumping and dancing *en pointe* for 2 weeks, and was then able to return to full dance activity symptom-free. Six weeks after her initial presentation at the clinic, the dancer remains symptom-free and is participating in all dance activities without modifications.

CONCLUSIONS

A limited amount of research exists about common injuries among dancers. Due to the repetitive nature of dancing, the FHL is subject to tendinitis from overuse. The actions of jumping, dancing *en pointe*, *demi-relevé*, *demi-plié,* and *grand plié* all force the FHL tendon to repeatedly be stressed. Additionally, improper technique in an effort to increase *turnout* places an eccentric strain upon the FHL. These factors predispose the dancer to developing a painful and irritating tendinitis. The treatment approach varies in the literature and ranges from conservative physical therapy management to surgical treatment followed by rehabilitation. Additionally, the outcomes vary according to the literature. However, despite the method of treatment, the dancer can often return to full activity with the resolution of symptoms.

As physical therapists, we have a responsibility to ensure our patients receive the best quality of care possible. Dancers make up a very unique population of individuals with specific needs. When a dancer is injured it is often not enough to apply the same interventions one might use when treating the general population. Creative strategies are necessary to meet the demands required by the dancer in order to return to full activity as soon as possible. Further research and continuing education regarding treatment and outcomes, both conservative and surgical, is necessary to identify the most appropriate forms of treatment that will allow a successful return to full function

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Instrument Assisted Soft Tissue Mobilization Utilizing Graston Technique®: A Physical Therapist's Perspective

Justine DeLuccio, MSPT, OCS, FAAOMPT, CKTP

INTRODUCTION

The purpose of this article is to describe instrument assisted soft tissue mobilization (IASTM) using Graston Technique (GT) in a manual therapy construct. This intervention was selected because it fulfills the following criteria: (1) matches the skill set of a physical therapist, (2) has practical clinical value, (3) is efficacious, (4) follows a clinical decision making paradigm, (5) is patient centered across the life span, and (6) enhances treatment outcomes.

Soft tissue mobilization (STM) is a recognized intervention used to ameliorate pain, functional limitations, and impairments associated with somatic dysfunction. *Graston Instrument Assisted STM (GISTM) is a specialized technique whereby the clinician uses stainless steel instruments to contact the tissue instead of the hands*. An emollient is placed on the skin prior to application of the technique. Rubber gloves are used by some clinicians to improve their grip on the instruments, but their use is not mandatory. GT follows the same principles and rationales as conventional digital STM. Because the magnitude of tissue deformation is greater with the Instruments, indications, precautions, and contraindications vary slightly in certain patient populations because of the possibility of bruising that may occur in muscles due to its highly vascularized make up. GT can be applied over the tendon, muscle, ligament, fascia, and scars and can be used to treat their associated nonsurgical and surgical conditions of these tissues. Entrapment neuropathies, edema, and lymphedema are also effectively treated. Treatment is guided and dosages are determined by the stages of tissue healing and repair, reactivity levels, patient tolerance, and posttreatment responses. GT can be administered statically, dynamically, and during functional movement patterns with or without resistance.

Six stainless steel instruments with convex or concave curvilinear edges are the hallmark of Graston Technique (Figures 1 and 2). The patented combination of shapes and edges allow the instruments to mold over body contours. The Instrument's varied treatment edges provide the clinician with the ability to control and monitor the appropriate treatment dosage by allowing them to alter the depth of penetration and respond to a patients comfort level by changing to a different treatment edge that is perceived as more comfortable by the patient. GT Instrument design also allows for ease of treatment by minimizing the potential of repetitive stress to the clinician's hands.

CERTIFIED GT PROVIDER

The GT Instruments can be purchased after successfully participating in the GT sponsored Basic, or Module 1 (M1) course. The primary objective of M1 is to assure an understanding of the Graston Technique and how it is integrated into the full spectrum of physical rehabilitation. Clinicians can only be certified as GT Providers after successfully completing and demonstrating compulsory skills in the Advanced Training, Module II (M2).

GT VS. CONVENTIONAL STM

The shape of the Instruments allows magnification of tissue texture abnormalities through the Instrument into the clinician's hands as it glides along the targeted tissue much like a stethoscope magnifies sound. When a tissue texture abnormality is encountered, both the clinician and patient experience and detect palpable sensations such as grit, ridges, or nodules. Often audible sounds are heard when the adhesion is of significant magnitude. Descriptions of the lesions can and should be documented with descriptors including, but not limited to: focal, diffuse, compressible, soft, and rigid. These findings can be also be recorded on a body diagram and updated as the tissue texture abnormalities are abolished. If digital STM is applied over the same region, these lesions are often missed during palpation with the unaided hand. In contrast to digital STM, GT Instruments detect restrictions and/or adhesions that the unaided hand is less accurate in detecting.

Figure 1. Graston Technique® Instruments

Figure 2. GT treatment s/p lateral meniscus transplant, osteochondral autograft lateral femoral condyle.

Once a lesion is detected and patient tolerance is assessed, the GT Instruments are used to 'break up' cross-links, fibrosis, or restrictions or adhesions by splaying fibers and in some cases augmenting the inflammatory process so that healing can occur. It is theorized that GISTM provides the trained clinician with Instruments that can achieve this expected treatment outcome by their effectiveness in controlling the amount of microtrauma in an area of diffuse scar and or soft tissue fibrosis. Since the metal surfaces of the instruments do not compress the tissue in the same manner as do the fat pads of the fingers, deeper restrictions can be accessed and treated affording the patient more comfort during the intervention. The treatment effect is more substantial because the Instruments have the potential to break up larger amounts of dysfunctional tissue in one session than can the unaided hand. Most importantly, functional changes and pain reduction take place immediately postintervention or in a shorter amount of time. The immediacy of the changes provides the clinician with pre and posttreatment variables that can be documented the same session.

CURRENT RESEARCH

Through research conducted on rat tendons, morphological and functional changes resulting from Instrument Assisted STM suggests that the controlled micro trauma induced through the Graston Technique protocol may promote healing by increased fibroblast recruitment.[1] As has been hypoth-

esized with transverse friction massage, it is theorized that the controlled micro trauma induced through GT also initiates the inflammatory cascade to start the healing process. Results from a recent unpublished study on animal ligaments reveals that ligaments treated with Instrument-Assisted Cross Fiber Massage (IACFM) were found to be 31% stronger ($p < 0.01$) and 34% stiffer ($p < 0.001$) than untreated ligaments indicating that IACFM is a beneficial intervention for providing mechanical stimulation to repairing ligaments to accelerate and re-gain ligament strength.[2] Following treatment with GT, adaptive stress is paramount during the reparative process to promote proper tissue healing and alignment. Stretching and ROM activities are of equal importance and used to increase and maintain movement gained during the GT intervention.

Recent research explaining inflammation at the molecular level and the histopathology underlying tendon disorders reveals degenerative changes vs. the previously assumed presence of inflammation or inflammatory cells which are not present upon examination.[3-6] These findings explain why somatic pain associated with injury, repetitive stress or the like often prove recalcitrant to pharmacological and manual therapy treatment. This new information provides the groundwork for changing contemporary models of care and how it affects clinical management of various conditions. GT is a reasonable choice based on recent histological findings. It is being determined through research that GT enhances the adaptive potential of CT structure. More importantly, it is a least invasive alternative and more practical than pharmacological management in certain cases based on current clinical management guidelines.

GT'S EFFECT ON MOVEMENT IMPAIRMENTS AND PAIN BEHAVIORS

Because most changes in movement and pain are immediate my ability to identify and treat movement impairments and associated pain behaviors has improved since incorporating GT into my daily patient care regimen. I have always critically analyzed the elusive nature of the CT system, especially muscles and fascia due to their multidimensional nature. Take for example the helix configuration of the levator scapulae which changes shape and form based on the position of the head and scapula. Using GT, I am better able to conceptualize this system and where lesions might be found because I can see changes that might include improved ROM or the amelioration of pain simultaneously during treatment. Because treatment effects are usually immediately observable, GT has afforded me the opportunity to identify trends in pain behaviors that are caused by CT dysfunction in regions I would not have addressed during digital STM because I was not aware that region, remotely distant to the region of perceived CT pain, was the target tissue. I am hypothesizing that CT restrictions or adhesions in the muscle and fascial system produce tension points capable of causing stress and subsequent over use symptoms including pain and movement loss above or below the area of restriction. This hypothesis might be elucidated further by the work of Thomas Myers who describes the interconnectedness of the linkages of the muscular and fascial systems and offers clinical insights as to how any alterations in the balance of this system may make contributions to pains and dysfunctions consistent with somatic dysfunction.[7]

RECIDIVISM AND SOMATIC PAIN

As clinicians we can generalize that a majority of our patients achieve favorable outcomes. We can also generalize that we have discharged patient's who only achieved partial restoration of function, still had pain, or participated in a longer episode of care than projected. Recidivism is another variable of somatic pain and dysfunction that affects long-term favorable treatment outcomes. Like most clinicians, I am always asking questions and critically appraising my success and failures. Time and clinic tenure enhance effectiveness but sometimes we are still left with limited treatment successes. I have always questioned why in certain cases my interventions did not resolve or completely ameliorate somatic dysfunction related to connective tissue. It was not until I implemented GT that I realized my hands were the confounding variable limiting my treatment effectiveness when addressing certain CT dysfunctions. In some scenarios I was not identifying the correct tissues or did not use my hands effectively enough to produce a meaningful treatment outcome. There are also times in a clinician's tenure when a patient's pain cannot be reproduced by any test or movement rendering them unable to identify the connective tissue lesion. GT can be used diagnostically to identify lesions because of the Instruments' inherent ability to tease out lesions when a muscle is 'scanned' or examined better than the unaided hand. Once the lesion is localized a patient's usual response is "That's it! That *IS* my pain." While routinely implementing GT, I have found and continue to find the pieces of the treatment puzzle that I have been searching for.

Due to the immediate changes that occur in movements and pain while implementing GT, documentation that reflects efficacy of care can be used more easily. I have become more effective in changing and implementing interventions due to these immediate changes. Prior to starting any treatment, my patients and I have a dialoged about their response to the last treatment, their current functional status, and symptom behavior. When they don't have an objective measurable variable to offer I ask them "What do we still need to get better?" When movements or functional activities are provocative they are used as pretreatment and posttreatment measures during GT. Although subjective, the patient can quantify the percentage of change in pain. Range of motion can be documented pre- and posttreatment and qualitative variables about the change in the functional task can be documented as evidence of change. This immediate change enhances patient satisfaction and increases compliance with their self management efforts. As they see the changes, they become more active in their care reporting and quantifying change without prompting. This team effort by the patient and clinician enhances the ability to document changes in function and impairments.

THE CURRENT EVOLUTION OF GT

GT was developed and evaluated in clinical trials at Ball Memorial Hospital and Ball State University in Muncie, Indiana. The GT is part of the curriculum at 4 colleges/universities. Research is ongoing and includes current projects at Texas Back Institute, New York Chiropractic College and St. Vincent's Hospital in Indianapolis. GT has been visible in the literature.[8-34] GT is now present in the work force and used currently by 4 major companies for the care of their injured employees. More than 40 major professional amateur sports organizations currently utilize GT. GT is evolving as an effective intervention in many settings.

CONCLUSION

GT is a technique that meets my clinical expectations. It has plausible explanations for its effects and has predictable outcomes. GT makes practical clinical sense to me. Effects can be documented and it actively involves the patient. The pt can be an active partici-

pant in the treatment based on how they localize the lesion, by position or activity etc…they become more active in the treatment. The GT has the potential to enhance the effectiveness of other interventions such as muscle energy techniques (MET), high velocity low amplitude thrust techniques (HVLAT), and mobilization due to its effect on CT. I currently use GT on at least 95% of my patients; however, I have not abandoned any prior treatment interventions and I still apply digital STM. GT is not the answer to all clinical shortcomings such as recidivism, and partial recovery rather the technique represents part of the solution for treating tissue dysfunction. The effectiveness of GT is enhanced by a clinician's skills. This treatment approach has the potential to decrease recidivism, improve patient compliance and produce more favorable outcomes in a shorter episode of care. I recommend and urge clinicians to learn more about this technique because it contributes to our clinical knowledge and supports clinical practice.

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inthespotlight

Christopher M. Powers, PT, PhD
Coordinated by Christopher Hughes, PT, PhD, OCS

Christopher M. Powers is an Associate Professor in the Department of Biokinesiology & Physical Therapy, and Co-Director of the MBRL at USC. He also has joint appointments in the Departments of Radiology and Orthopaedic Surgery within the Keck School of Medicine. His primary teaching responsibilities include the areas of biomechanics and the mechanics of human gait. He received a Bachelors degree in Physical Education from the University of California, Santa Barbara in 1984; his Masters degree in Physical Therapy from Columbia University in 1987; and a PhD in Biokinesiology in 1996 from USC. Dr. Powers did his post-doctoral training at the Orthopaedic Biomechanics Laboratory, University of California, Irvine.

Dr. Powers studies the biomechanical aspects of human movement. More specifically, his research and publications are concerned with the kinematic, kinetic, and muscular actions associated with human movement, the pathomechanics of orthopaedic disabilities, and issues related to rehabilitation of the musculoskeletal system. He has published over 70 peer-reviewed articles and 100 abstracts and has received several research awards from the American Physical Therapy Association, including the Rose Excellence in Research Award from the Orthopaedic Section, the Eugene Michels New Investigator Award, and the Dorothy Briggs Scientific Inquiry Award.

Dr. Powers is a Fellow of the American College of Sports Medicine and a member of the American Physical Therapy Association (Orthopaedic and Research Sections), American Society for Biomechanics, American Society for Testing and Measures, and the North American Society for Gait and Clinical Movement Analysis. In addition, Dr. Powers serves on several editorial boards including the *Journal of Applied Biomechanics*, *Journal of Orthopaedic and Sports Physical Therapy, Physical Therapy, Foot & Ankle International, and the Journal of Athletic Training.* He currently serves as Vice President of the California Chapter and Section on Research of the American Physical Therapy Association, and is Chair of the Research Subcommittee of ASTM F-13.

INTERVIEW QUESTIONS

Dr. Powers thank you for agreeing to take time to be interviewed for *OP*.

1. Much of your current research has focused on the biomechanics and pathomechanics of the patellofemoral joint. Briefly, what new findings have you found to be most enlightening in your research?

Historically, excessive lateral tracking of the patella has been hypothesized to be contributory to the development of patellofemoral pain. Given as such, conservative approaches to treating this disorder have focused on the patella (ie, correcting or altering patellar tracking through treatments such as patellar taping/bracing, vastus medialis oblique strengthening, stretching, etc.). However, recent research from our lab has suggested that the patellofemoral joint may be influenced by the segmental interactions of the lower extremity. In particular, abnormal motions of the femur in the frontal and transverse planes during function activities may have an effect on patellofemoral joint dysfunction. We have quantified this phenomenon using dynamic MRI, and are currently performing motion analysis studies to further evaluate the causes of these abnormal femoral motions. In the end, our research may provide justification for interventions aimed at controlling femoral motion (ie, strengthening the hip abductors and external rotators) in this population.

2. You are a strong proponent of evidence-based practice. What advice can you give to practicing clinicians regarding the implementation of the use of evidence to support clinical decision-making?

Keeping abreast of the emerging research that supports our practice and guides clinical decision making is critical. On-line databases such as the Cochrane Library and Hooked on Evidence have helped tremendously in providing easy access to research articles and systematic reviews. In addition, clinicians have to be open to alternative treatment approaches and new ways of thinking based on emerging evidence. In other words, practice patterns have to be flexible as our science grows.

3. What new technologies have had an impact on your ability to conduct research?

Recent advances in magnetic resonance imaging have had a significant impact on our research agenda. Apart from high speed imaging techniques to quantify joint motion during movement, the development of high resolution scanning protocols are allowing us to create subject specific 3-dimensional representations of joint structure as well as the ability to quantify changes in articular cartilage (ie, volume and thickness) before the onset of macroscopic arthritic changes. Such technology provides the ability to take a detailed look inside the joint to better understand mechanisms of injury. In addition, we hope to use the combination of imaging-based musculoskeletal modeling to quantify the short-term and long-term affects of various interventions.

4. Congratulations on being a 2006 Lucy Blair Award recipient. How has service impacted your career and what advice can you offer the readership?

Being involved in the association has been one of the most rewarding aspects of my career. There is no better way to meet

people, cultivate networking opportunities, and establish collaborative relationships than to get involved in your professional organization. Whether it be at the state, national, or section level, there is so much to be gained by participating. All you have to do is step up and volunteer for something and let it go from there!

5. Any thoughts on what has been or will be one of the most significant factors in moving the profession toward realization of Vision 2020?

This is a difficult question since each of the 6 pillars of Vision 2020 (autonomous practice, direct access, doctor of physical therapy, evidence-based practice, practitioner of choice, and professionalism) are critical to our future. However, I would argue that our future is directly tied to our ability to provide a sound scientific foundation to justify our existence as a profession (ie, evidence-based practice).

6. Any advice to beginning researchers looking to move into academia?

The key to success for a beginning researcher is to develop a solid mentoring network and research collaborations. One of the biggest mistakes I see new researchers make is to take faculty positions that are too teaching intensive or do not provide the time and/or resources required for scholarly activity.

Thank you Chris for taking the time to share your views with the readers of *OP*.

It is our goal to interview someone who is having an impact on the profession of orthopaedic physical therapy practice, education, or research in each issue of OP. Please send us your suggestion and we will consider "shining the spotlight" on your recommendation.

lettertoeditor

Received May 8, 2006

Dear Editor,

I read with interest the article titled, "The Art of Treating Chronic Pain" by Carolyn McManus which appeared in the Orthopaedic Physical Therapy Practice Vol. 18, No. 1, 2006. The article is very informative and well written. However, I feel that the author should have used the word managing instead of treating. Since the advent of very potent pain and anti-inflammatory medications and some pain related surgical procedures managing pain became the standard in the medical community. Unfortunately, this module perpetuates treating symptoms of pain inflammation and spasms rather than the underlying cause.

Most non diseased muscular skeletal chronic pain is due to chronic dysfunction. Therefore, as therapists we must focus on correcting the dysfunction rather than simply managing the pain. As therapists we are uniquely trained to do bio-mechanical analysis, identify the dysfunction, and develop treatment programs that will correct it with the expectation that it will resolve the symptoms. Pain management should be reserved for chronic pain related to disease process.

Sincerely,
Joseph Weisberg, PT, PhD
Dean
School of Health Sciences
Touro College

editorresponse

Dear Editor,

I appreciate my colleague's thoughtful comments, however, as a clinician, I am comfortable with the term "treat" and believe that pain management is appropriate for chronic pain associated with musculoskeletal problems.

In an ideal world, a biomechanical analysis would result in an assessment and treatment program that would relieve all pain symptoms. If only physical therapists were always so successful. The people with chronic pain who I treat have complex presentations, often with years of pain symptoms, multiple previous courses of physical therapy, and various trials of medication and other treatment strategies.

In addition, pain perception is not solely a consequence of musculoskeletal dysfunction. It also engages spinal and supraspinal pathways. Researchers in pain imaging neuroscience conclude that the "brain and spinal cord can modulate and also create pain perception." Physical therapists enhance their care of any patient in pain by understanding and appreciating the complexities of pain perception.

The dualistic model of either treat the musculoskeletal dysfunction or offer pain management strategies is not necessary. These treatment approaches complement each other. A skilled clinician can draw effectively from both models to meet the needs of each patient. I find it very rewarding when people with chronic pain are offered the strategies I described in my article and are able to decrease pain and improve function.

Sincerely,
Carolyn McManus, PT, MS, MA
Outpatient Rehabilitation Services
Swedish Medical Center
Seattle, WA

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bookreviews

Coordinated by Michael J. Wooden, PT, MS, OCS

Konin JG, Wiksten DL, Isear JA, Brader H. *Special Tests for Orthopedic Examination.* 3rd ed. 2006. SLACK Inc, Thorofare, NJ. 374 pp, illus.

This is the third edition of *Special Tests for Orthopedic Examination,* a handy guide designed for portability and quick reference. The text presents examination procedures intended to assist the health care professional in confirming, ruling out, and monitoring specific musculoskeletal conditions. The authors have made a point to update this newest edition, including an additional test not previously covered, as well as discarding those not frequently used, based on reader feedback from earlier editions. Additionally, the authors make an effort to follow with the trend of evidence-based medicine, as they include references after each test presented. Another new feature of the text is colored arrows overlaid onto the black-and-white photos to demonstrate movement direction of both the patient and practitioner. The new spiral binding allows for the book to lay flat, for easier reference on the field or in the clinic.

The book is divided into 12 easily referenced sections, divided by body part, and demarcated with colored tabs on the page edges. Joints covered include: TMJ, cervical spine, shoulder, elbow, wrist and hand, thoracic spine, lumbar spine, sacral spine, hip, knee, ankle and foot. The final section, entitled "contemporary special tests," is a collection of new special tests proposed by the editors. Although these tests have not been critically reviewed or studied, the editors have found them empirically useful in their own practices.

The description of each test is comprehensive, with photos included with the majority of the procedures. The pictures are clear and allow for easy reproduction of the test by the reader. Test positioning, action of the practitioner, signs of a positive finding, and special considerations and comments are identified for each assessment. Additionally, the authors are thorough in their inclusion of references for each exam.

In their discussion of references in the introduction of the test, the authors are quick to point out that they are in no way attempting to summarize, nor comment critically on the references they provide. Rather, feeling that making judgments regarding validity of the tests is beyond the scope of the book, the authors leave it up to the reader to review the references provided and form their own opinion regarding the appropriateness of use in their individual practices.

Overall, this is an excellent pocket reference for the physical therapist, athletic trainer, occupational therapist, physicians' assistant, and physician working in orthopedics and sports medicine. It is concise, evidence-based, thorough, and easy to use. I would highly recommend it to any student or practitioner in the orthopaedic setting.

Amanda M Blackmon, DPT

Cushner FD, Scott WN, and Scuderi GR. *Surgical Techniques for the Knee.* New York, NY: Thieme Medical Publishers, Inc.; 2005. 274 pp, illus.

According to the authors, this book was written to provide an accurate and simple approach to injuries and maladies of the knee. Chapters are written by surgeons and educators who specialize in particular procedures. All of the chapters are organized in the same format. Initially, the chapter reflects patient presentation and symptoms, indications, and contraindications for surgery and special considerations. The surgical position, procedure, and instruments required are discussed followed by postoperative care (including rehab) and possible complications. Lastly, a 'Tips and Pearls' discussion is included to avoid common pitfalls and complications in management of the case.

The book consists of 56 chapters and an index. The first 5 chapters discuss the surgical approach to the knee in total knee arthroplasty (medial parapatellar approach, subvastus approach, lateral approach, midvastus approach, and trivector approach). All techniques are explained in simple detail and indications for the particular approach are discussed. The surgical techniques for the quadriceps snip and the tibial tubercle osteotomy are discussed in the next 2 chapters. Autologous cartilage implantation, chondral injuries, articular cartilage paste grafting, and arthroscopic abrasion arthroplasty are described in chapters 9 through 12. The next 6 chapters review ligament reconstruction and repair procedures followed by mensical injuries and their subsequent repair using a variety of procedures (chapters 19-27). Chapters 28-31 review fractures and their repair with internal fixation, followed by a discussion of repairs of the quadriceps and patellar tendons. A majority of the next 13 chapters instructs the reader in different techniques related to total knee replacements, including posterior cruciate issues, varied surgical techniques, and rare fractures after surgery. Lastly, the final chapters review patellofemoral syndrome, osteotomies (femoral and tibial), and tissue expansion in total knee arthroplasty.

This textbook describes a wide variety of surgical techniques for the knee. Many of the techniques are uncommon procedures; however, this text can be considered an excellent reference to review in the case of the referral of an unfamiliar surgical technique. Many chapters display excellent artist renditions of surgical techniques, however, several chapters have actual photographs of surgical procedures and photomicrographs of cartilage. The discussion of postoperative care, particularly of the rehabilitative process, is limited in all chapters, but this was not the author's intention for the text. I recommend this book for reference only and to confer with the referring physician for particular guidelines for postoperative rehabilitation of the client.

Sylvia Mehl, PT, OCS

Burgener FA, Kormano M, Pudas T. *Bone and Joint Disorders: Differential Diagnosis in Conventional Radiology.* 2nd ed. New York, NY: Thieme; 2006, 404 pp, illus.

Within the preface of *Bone and Joint Disorders: Differential Diagnosis in Conventional Radiology,* the authors acknowledge that while conventional radiography remains the backbone of musculoskeletal radiology, exposure to conventional radiography during physician training has decreased in favor of newer and more exciting imaging modalities. The intent of this book is to assist clinicians with the interpretation of radiologic findings in order to arrive at a general diagnostic impression and a reasonable differential diagnosis. The authors, who are all radiologists, state that this book is meant for physicians with some experience in musculoskeletal radiology that wish to strengthen their diagnostic acumen. This is the revised version of a book that was originally published in 1985.

This book is comprised of 15 chapters that are generally organized according to classes of radiologic findings. Separate chapters comprehensively address the differential diagnosis of osteopenia, osteosclerosis, periosteal reactions, trauma and fractures, localized bone lesions, joint diseases, and joint and soft tissue calcifications. The remaining 8 chapters are organized according to different regions, with a focus on describing the differential diagnosis of lesions specific to the particular anatomic sites. The actual text within most of the chapters is minimal; instead the authors have deferred to using tables that succinctly describe radiographic findings, relevant clinical comments, and usual causes as applicable for different lesions and diseases. Radiographic illustrations and drawings are included to visually demonstrate the radiographic features described in the text and tables.

An obvious strength of this book with regard to differential diagnosis is its organization based upon radiographic findings rather than disease specific processes; this is an especially valuable feature of this book, considering that specific radiographic findings require consideration in the differential diagnostic process. Other strengths are its reliance on comprehensive yet concise tabular data, which allows this book to serve as an outstanding quick reference text. Additionally, over 1,100 radiographic illustrations and drawings are presented in this book; these figures are high quality and supplement the text and tables very well. A reference list is also included at the end of the book that contains 28 textbook citations; unfortunately, these references are not cited in the book.

This is an advanced radiography text that is geared toward radiologists and other physicians with experience in musculoskeletal radiology. It is assumed that the reader understands basic conventional radiographic competencies such as indications and analyses. Therefore, this would not be my first choice as a radiography text for physical therapists or physical therapist students. However, this book would serve as a valuable adjunct for professional and postprofessional physical therapy radiography courses, especially those taught in physical therapy orthopaedic fellowship or residency programs. The chapters that discuss trauma and fractures, joint diseases, and radiographic findings of the spine and pelvis are especially relevant for physical therapists in general orthopaedic practice. This book would also serve as a useful reference text for a hospital or university library, where it can be accessed by several different disciplines.

Michael D. Ross, PT, DHS, OCS

Mirzayan R. *Cartilage Injury in the Athlete.* New York, NY: Thieme Inc; 2006, 315 pp, illus.

This text provides a comprehensive review of the structure and function of articular cartilage, response of cartilage to injury, and current operative and conservative management techniques for chondral injuries. More than 50 orthopaedic physicians contributed to the material presented in the chapters of the book. The authors provide detailed information on each of the topics described. The chapters are then divided into 7 different sections. The authors' purpose is to present evidence-based information regarding the various management strategies for chondral injury in the athlete. The strategies presented in the text are applicable to those patients and athletes in whom a total joint replacement is not indicated.

The first section of the book contains an in-depth review of the composition, function, and structure of articular cartilage. A comprehensive review is provided on the response of articular cartilage to injury and the changes in the biomechanical properties of repaired cartilage. The second section provides detailed information on the current imaging techniques used to detect chondral damage, and the clinical evaluation of chondral injuries. The text includes several assessment tools such as the Cincinnati Knee Rating System and the Knee Injury and Osteoarthritis Outcome Score (KOOS) that could be used by the clinician to assess and document functional outcomes in our patient population. The third section includes a detailed description of the mechanism of action for selective and nonselective nonsteroidal anti-inflammatory agents used in the management of chondral injuries. In addition, there is a chapter that discusses the current evidence available in the use of viscosupplementation injections and the use of glucosamine and chondroitin sulfate. The remaining chapters deal with detailed descriptions for the operative treatment of chondral injuries. The operative procedures described include the osteochondral autologous transfer system (OATS), the osteochondral allograft transplantation, marrow stimulation, mosaicplasty, and the autologous chondrocyte implantation (ACI). Additional chapters describe the operative joint specific treatment for osteochondral lesions in various joints while also supplementing the text with MRI and arthroscopic views of each joint. There is a chapter devoted specifically to cartilage injury and management in the skeletally immature athlete.

This book provides comprehensive information on the most current operative and nonoperative techniques in the management of chondral injuries. At the end of each chapter, an extensive list of references is provided for the reader. This book is recommended for the physical therapist or clinician who works with patients who have chondral injuries or have had a surgical procedure to repair chondral defects. Although this book may not enhance knowledge directly relating to current physical therapy practice, it does provide the clinician with an extensive description of the most up-to-date surgical

procedures for the management of chondral lesions. The material presented would give the clinician a greater understanding of the current techniques, which would be then integrated into our clinical reasoning, and treatment of the patient with articular damage.

Kathleen Geist, PT, OCS

Houglum J, Harrelson G, Leaver-Dunn D. *Principles of Pharmacology for Athletic Trainers.* Thorofare, NJ: Slack, Inc.; 2005, 409 pp.

This text is intended for the athletic trainer practicing in the traditional sports setting and in rehabilitation. Because athletic trainers have a limited background in biochemistry, the authors have attempted to present the information as concisely as possible. As challenging a topic as pharmacology is, the authors have done an adequate job presenting difficult concepts and making them understandable. The authors have stated and realized that athletic trainers are no longer just taking care of young athletes but do care for the aging population and therefore require knowledge of pharmacology for athletes of all ages. *Principles of Pharmacology* was written to help the trainer understand basic principles of pharmacology as well as the broad classification of drugs. This book is unique in that it not only provides detailed information, but also applies specific applications for the health care professional.

The book is divided into 14 well-organized chapters. Each chapter has a list of foundational concepts that help organize the structure of each chapter. The authors have included summaries after each major topic within the chapter, which helps retention. Key words are in italics and tables and text boxes are used throughout the book to help explain concepts. Each chapter begins with a list of learning objectives that the reader should be able to accomplish by the end of reading each chapter. At the end of most chapters is a section on the role of the athletic trainer in regards to each section. The first 3 chapters are dedicated to background information including introduction to pharmacology and pharmacodynamic principles and mechanism of actions of drugs. Chapters 4 through 12 break down drugs for treating specific disease processes. Chapters 13 and 14 deal with controversial issues regarding pharmacology and sports including performance-enhancing drugs and drug testing in sports. The book concludes with an excellent glossary and reference guide to use, pharmacological abbreviations, and a suggested reading list and bibliography.

Chapter 1 provides foundational concepts and background information needed to understand pharmacolology. This includes a description of classification of drugs, drug names, drug development, and drug informational sources.

Chapter 2 describes pharmacokinetic principles and the processes that affect drugs from entry to exit. This chapter includes the site of actions of drugs, their half-life, drug chemical structure, and impact they have on the human body. It also discusses routes of administration of the drugs, distribution, metabolism, and excretion as well as effect on exercise.

Chapter 3 is the last chapter that focuses on background information. This chapter focuses on pharmacodynamic principles, mechanism of actions of drugs, and their therapeutic considerations. This chapter includes descriptions of the biological effects of drugs, how a single dose of medication differs from multiple or maintenance doses, and different therapeutic considerations including patient compliance, dose calculations, drug monitoring, age, and liver and kidney function. Lastly, the chapter analyzes drug interactions, any adverse drug reactions, medication errors, and again the impact on exercise.

Chapter 4 discusses medication management in athletic training facilities. The chapter begins with discussing drug regulatory system in athletic training facilities and progresses to the chain of command in the training room. An extensive discussion was done on record keeping in the training room. This chapter provides an excellent transition from pharmacology to a discussion on specific drugs for a multitude of disorders.

Chapter 5 begins a set of 7 chapters that focuses on treating sets of disorders. Chapter 5 discusses drugs for treating infections. The authors do an excellent job of providing background information on infections with excellent figures and easy-to-read tables. The antibacterial drugs are listed with explicit descriptions of each one. An excellent table is listed which discusses the drug's generic name, trade name, and how it is taken. As previously stated each chapter from now on discusses the role of the athletic trainer in treating infections.

Chapter 6 discusses the drugs for treating infections. This chapter does a fine job of simplifying the inflammatory process, then discussing nonsteroidal anti-inflammatory drugs, corticosteroids, glucosamine, rheumatoid arthritis and gout, and lastly topical anti-inflammatory products. The chapter also goes into adverse affects of using anti-inflammatory drugs in which the athletic trainer should look for.

Drugs for treating pain are the topic of chapter 7. In this chapter the authors give a brief overview of pain, then discuss the different drugs that can be used for pain including: acetaminophen, opioid analgesics, caffeine, topic analgesics, and local anesthetics. After each drug is listed, the mechanism of action, effects and uses, and effects and pharmacokinetics are detailed.

Chapter 8 is a brief chapter dealing with drugs for relaxing skeletal muscle. This chapter includes a table describing the drugs that have a CNS depressive effect with their generic and trade name given. The mechanism of action and their effects and dosage are also described.

Chapter 9 describes the drugs for treating asthma. It is one of the most extensive chapters as you can imagine with the number of athletes that athletic trainers interact with that have asthma. The disease process of asthma is discussed as well as classification of asthmatics. A detailed table of a stepwise approach to managing asthma was also detailed. The authors then broke down asthma medications between quick relief drugs and long-term therapy drugs. An excellent role of the athletic trainer is well written and quite detailed.

Chapter 10 focuses on drugs for treating colds and allergies. A description of the common cold, allergic rhinitis, and heat-related illnesses are discussed first. A useful paragraph is written on prevention of colds and virus and nondrug approaches. Next, the different classification of drugs is described as well as a bonus section on adverse affects and drug interactions are detailed. A detailed table is also listed which describes over the counter

medications as combination products and their particular effect on the body.

Chapter 11 is devoted solely to drugs for treating the gastrointestinal disorders. Gastrointestinal physiology and disorders of the gastrointestinal tract are first presented, followed by nondrug measures to treat a vast number of disease processes including Reflux and ulcers. Lastly, gastrointestinal drugs are discussed with specific details on their effect in the gastrointestinal system. Overall, this chapter offers a thorough presentation of the pathophysiology disorder and medical and nonmedical management of gastrointestinal disorders.

Chapter 12 pertains to drugs for treating hypertension and heart disease. This chapter will prove very valuable for the Athletic Trainer working in an outpatient orthopaedic physical therapy setting dealing with an older population. The chapter gives a brief overview of hypertension, myocardial infarction, and heart failure. It then goes into a more detailed description of drug therapy for these disorders. The chapter finished differently than other chapters as it breaks down each disease process and describes the goals and drug therapy in an easy to read fashion.

Chapter 13 gives an excellent and detailed description on performance enhancing drugs. The authors do an excellent job in breaking down the chapter into 5 different sections including stimulants, anabolic agents, anti-inflammatory drugs, beta-blocker, and oxygen delivery enhancers. An excellent guide of prohibited substances for competition is listed as well banned substances for the NCAA. In my opinion, this is one of the best detailed chapters, which also lists potential side effects as well as things for the athletic trainer to watch for. A less detailed role of the athletic trainer is listed as well.

Chapter 14 is the last chapter in the book, which pertains to drug testing in sports. It is an excellent chapter that really sets the stage for the future of athletic trainers and the crucial role they play in drug testing. The history of drug testing is discussed as well as different legal considerations the athletic trainer must consider in regards to drug testing. An excellent discussion was led on components of a drug testing program and how to organize a drug testing program including collection and methodology. Lastly, a discussion on current and future challenges in regards to drug testing is discussed.

The only constructive criticism that I would have of the book is that it concludes with an excellent glossary and list of pharmacological abbreviations that has become extremely important and necessary especially for athletic trainers not trained in pharmacology.

Overall, *Principles of Pharmacology* provides an excellent background in pharmacology, a detailed description of 8 categories of drugs with details regarding their drug action, administering and dispensing of drugs, medication adverse affects, and classification of drugs. The authors provide an up-to-date summary of pharmacology and its approach to treatment. The authors appeared to have mastered this challenging topic. Its design was to help athletic training students understand the basic principles of pharmacology and broad classification of drugs. I believe the authors succeeded in their goal. I would recommend this text not only to athletic training students, but athletic trainers and physical therapists involved in patient care.

Although this book was written primarily for athletic trainers, it would be beneficial for physical therapists and physical therapy students. The emergence of direct access has made it imperative that physical therapists have a working knowledge and understanding of the actions and interactions of commonly prescribed medications.

David M. Nissenbaum, MPT, MA, LAT

webwatch

National Guideline Clearinghouse
http://www.guideline.gov/

The National Guideline Clearinghouse™ (NGC) is a comprehensive database of evidence-based clinical practice guidelines and related documents. NGC is a collaborative effort among the Agency for Healthcare Research and Quality (AHRQ), and the U.S. Department of Health and Human Services.

The purpose of the site according to the authors is to *"provide physicians, nurses, and other health professionals, health care providers, health plans, integrated delivery systems, purchasers and others an accessible mechanism for obtaining objective, detailed information on clinical practice guidelines and to further their dissemination, implementation and use."*

Some of the unique aspects of the site include:

- Links to full-text guidelines, and/or ordering information for print copies.
- Palm-based PDA downloads of all guidelines contained in the database.
- A guideline comparison utility that allows users the ability to generate side-by-side comparisons for any combination of two or more guidelines.
- An electronic forum, NGC-L for exchanging information on clinical practice guidelines, their development, implementation, and use.
- An annotated bibliography database where users can search for citations for publications and resources about guidelines, including guideline development and methodology, structure, evaluation, and implementation.

Also to keep users of the site informed the website offers a 'What's New' section to see what guidelines have been added each week and includes an index of all guidelines in NGC. There is also a NGC Update Service. This service allows a weekly electronic mailing of new and updated guidelines posted to the NGC Web site.

PRACTICE AFFAIRS REPORT "PT GOVERNANCE 101: AN EXAMPLE OF AN EFFECTIVE GRASS ROOTS EFFORT"

As many of you know the Governing body of the APTA is the House of Delegates. The 'House' is made up of 406 physical therapists each of who votes on all issues regarding governance of the APTA as well as in elections of the APTA officers. The House, as a body, establishes APTA Positions/Standards, directs the actions of the APTA Board of Directors, approves the goals and objectives of the APTA, etc. The delegates come from all 50 states plus the District of Columbia and Puerto Rico and the state's representation (ie, number of delegates) varies based on the number of APTA members registered in each state and territory. There are also additional delegates representing the Student Assembly (5 nonvoting delegates), the PTA Caucus (5 nonvoting delegates), and the APTA Sections (1 nonvoting delegate from each Section). Although these latter delegates do not vote, they can bring forth motions, participate in the debate of motions, and lobby for or against a candidate and/or a potential motion being brought forth. Superficially, it would be easy to question the significance of being a nonvoting delegate and wonder how much impact that individual could have on the process. I learned from my predecessor (Steve McDavitt) how huge an impact a nonvoting delegate could have and many of you as Section members helped to reinforce that this year.

As the Orthopaedic Section Delegate I worked with a core group of individuals including Steve McDavitt, Bill Boissonnault, and Ken Olson who in collaboration with the AAOMPT, several other APTA Sections, and the APTA Board of Directors worked to lay the foundation to defeat RC 12-06, which was a motion being brought forth at the recent 2006 House of Delegates. This motion would have rescinded a current APTA Position that provides guidelines regarding procedures that a PT could delegate to a PTA. The current position was established in June 2000 and reads as follows:

PROCEDURAL INTERVENTIONS EXCLUSIVELY PERFORMED BY PHYSICAL THERAPISTS (HOD P06-00-30-36)

The physical therapist's scope of practice as defined by the American Physical Therapy Association Guide to Physical Therapist Practice includes interventions performed by physical therapists. These interventions include procedures performed exclusively by physical therapists and selected interventions that can be performed by the physical therapist assistant under the direction and supervision of the physical therapist. Interventions that require immediate and continuous examination and evaluation throughout the intervention are performed exclusively by the physical therapist. Such procedural interventions within the scope of physical therapist practice that are performed exclusively by the physical therapist include, but are not limited to, spinal and peripheral joint mobilization/manipulation, which are components of manual therapy, and sharp selective debridement, which is a component of wound management.

Part of the overall effort was an e-mail blast to the Orthopaedic Section membership and I am excited to say that the response from the Section membership was enormous. I had at least a dozen Chapter Chief Delegates, some of whom have been involved in this process for 30+ years, inform me that this was the first time that they had members of their state chapter contact them to direct them how to vote regarding a motion being brought before the House. This is truly amazing and demonstrates the importance of your ability to influence the outcome of an important issue via a grass roots effort. Our response was so overwhelming that after 3 months of discussion, weeks of deliberation, grass roots communication from the Orthopaedic Section, the AAOMPT, and other members and therapists as well as Pre-House deliberations, RC 12-06 was defeated. In fact, it ended up that there was a seldom used parliamentary procedure implemented to keep the motion from ever being heard on the floor of the House, which is extremely unusual. This is unusual since the House, as a body, tends to be very open to debate and discussion and therefore will seldom act to prevent discussion from taking place. The parliamentary procedure exercised in the House was 'Object to Consideration' made by Colorado which was sustained by significantly more than the 2/3 required to sustain the objection. Significantly more than 2/3 of the required delegates did not want to hear any discussion on RC 12. Therefore RC12-06 was not heard or discussed in the House of Delegates and therefore no vote was taken since the clear majority did not feel it had any merit for consideration. Clearly we were able to articulate our opposition to RC 12-06 to the vast majority of the delegates. As I said earlier, this is an excellent example of how effective a grass roots effort can be when effectively planned and implemented.

Unfortunately it does not appear that this is an issue that will go away and therefore we must remain vigilant and proactive to maintain the clearly differentiated roles and responsibilities of both the PT and PTA. I hope that this experience will energize each of you to become more en-

gaged with issues at the local, state, and national levels. Remember that every individual has the right and responsibility to be active in governance of the PT Profession.

Bob Rowe, PT, DMT, MHS, FAAOMPT
Orthopaedic Section Delegate
Practice Committee Chair

EDUCATION COMMITTEE REPORT

The Education Committee has already been busy at work planning next year's Combined Sections Meeting program. CSM will be held in Boston February 14-18th, 2007. If you have never attended CSM you don't know what you are missing. The programming is designed to bring therapists up to date on the latest research, techniques, and policy issues facing PT today. The meeting is stimulating and also a great place to network. We have 3 preconference courses planned: Mark Bookhout is teaching "Evaluation and Treatment of the Thoracic Spine and Ribs," Michael Timko is teaching "Manual Therapy Techniques for the Foot and Ankle Complex," and Jennifer Gamboa and Nancy White are teaching "The Nuts and Bolts of Integrating Wellness into Orthopedic Practice." Each Education Group and SIG is also sponsoring short courses, and we have several others as well for a total of 14. You can also attend the Orthopaedic Section Business Meeting on Saturday morning as well as our Celebration on Saturday night. Please mark your calendars and plan to attend!

Ellen Hamilton, Chair
Beth Jones, Vice-Chair
Tara Fredrickson, Section Staff

orthopaedicnews

Section Members in the News

Many association leaders, physical therapists, and physical therapist assistants gathered at the 2006 Honors and Awards ceremony during the Annual Conference and Exposition in Orlando, FL to honor and thank their colleagues for the contributions and commitment to practice, research, and education.

Congratulations to the following Orthopaedic Section members who were some of this year's recipients:

37h Mary McMillan Lecturer
Stanley V Paris, PT, PhD, FAPTA

Catherine Worthingham Fellows of APTA
Richard W Bohannon, PT, EdD, NCS, FAHA, FAPTA
Susan S Deusinger, PT, PhD, FAPTA
David G Greathouse, PT, PhD, ECS, FAPTA
Carole B Lewis, PT, PhD, GCS, FAPTA
Richard K Shields, PT, PhD, FAPTA

Lucy Blair Service Award
Janet R Bezner, PT, PhD
Jill Schiff Boissonnault, PT, PhD
Elizabeth Domholdt, PT, EdD, FAPTA
Nancy R Kirsch, PT, DPT, PhD
Diane E Nicholson, PT, PhD, NCS
Christopher M Powers, PT, PhD

Marilyn Moffat Leadership Award
Helene M Fearon, PT

Oustanding PT/PTA Team Award
Edie Knowlton, Benner, PT, PhD, OCS
Juliana Robine, PTA

Chattanooga Research Award
Kathleen K Mangione, PT, PhD, GCS
Rebecca Craik, PT, PhD, FAPTA

Margaret L Moore Award for Outstanding New Academic Faculty Member
Mark Bishop, PT, PhD, CSCS

Mary McMillan Scholarship Award – Professional Education Level
Keith G Avin, BS, MS, SPT
Deborah Lynn Bryan, SPT
Gail Christine Carpenter, PT
Nadia Abdalla Eldarrat, SPT, CSCS
Amanda Jean Guerin, SPT

Minority Faculty Development Scholarship Award
Rolando T Lazaro, PT, DPT, GCS

Minority Scholarship Award for Academic Excellence – PT Students
Antoinette Spector, SPT

ORTHOPAEDIC SECTION, APTA, INC.
CSM 2007 – PRE-CONFERENCE COURSES
BOSTON, MASSACHUSETTS

Evaluation and Treatment of the Thoracic Spine and Rib Cage

Tuesday & Wednesday, February 13th & February 14th

Course Description:
This two day course will cover the functional anatomy and biomechanics of the thoracic spine and rib cage. Emphasis will be placed upon making a positional diagnosis for thoracic spinal dysfunction and treatment will utilize an eclectic approach with the primary emphasis on muscle energy technique. Evaluation and treatment of structural rib dysfunctions will be included. Evaluation and treatment for adverse neural tension signs in the upper extremity, commonly associated with thoracic outlet syndrome, will be presented with treatment directed toward addressing extraneural interfaces prior to neuromobilization.
Program Objectives: Upon completion of this course, you'll be able to:
1) Review the anatomy and biomechanics of the thoracic spine and rib cage; 2) Become familiar with the palpatory anatomy of the thoracic spine and rib cage; 3) Be able to make a positional diagnosis of thoracic spinal dysfunction, identifying neutral and non-neutral dysfunctions; 4) Be able to treat thoracic spinal dysfunctions utilizing muscle energy and direct joint mobilization techniques; 5) Understand how to evaluate and treat structural rib dysfunctions; 6) Understand the importance of evaluating and treating the patient for adverse neural tension signs in the UE; 7) Be able to design an exercise program for patients with thoracic spine and rib cage dysfunction
Speaker: Mark R. Bookhout, PT, MS, FAAOMPT

Saying Goodbye to Managed Care: The Nuts and Bolts of Integrating Wellness, Health Promotion and Orthopaedic Physical Therapy into a Cash-based Practice

Wednesday, February 14th

Description:
This course will present the rationale and a business model for a full-spectrum cash-based musculoskeletal health, wellness, and rehabilitation clinic. Participants will learn specific strategies for overcoming roadblocks, as well as, designing, marketing, and implementing health promotion, fitness, and wellness services. The model and strategies presented are based on the speakers' own experience in a successful, full-spectrum cash practice in Arlington, VA.
Program Objectives: Upon completion of this course, you'll be able to:
1) Understand the rationale and economic factors supporting a cash practice model; 2) Be able to identify and develop solutions for impediments to cash practice and the integration of health promotion, fitness, and wellness services; 3) Understand a specific model for developing, marketing, and implementing cash based rehabilitation, fitness, and health promotion service lines; 4) Be able to implement above model for specific cash services in participants' area of interest/expertise.
Speakers: Jennifer Gamboa, DPT, OCS, MTC; Nancy White, MSPT, OCS

Manual Therapy Techniques for the Foot and Ankle Complex: A Hands-on Laboratory and Clinical Application Course

Wednesday, February 14th

Description:
Manual therapy techniques are often an important component of a comprehensive rehabilitation program when treating individuals with foot and ankle related pathologies. This one day course will focus on teaching the skills that will help clinicians improve their proficiency with manual therapy techniques directed at the joints of the foot and ankle complex. Lecture and laboratory experiences will be integrated throughout this course. Information related to evidence-based practice guidelines, anatomical and biomechanical considerations, as well the hands-on skills necessary to effective perform the techniques will be discussed in this course.
Program Objectives - Upon completion of this course, you'll be able to:
1) Integrate anatomical and biomechanical concepts relating to the examination and manual therapy techniques for joints of the foot and ankle complex; 2) Critically appraise examination and manual techniques directed at the foot and ankle complex, consistent with available evidence-based literature; 3) Demonstrate proficiency with proper selection, safe execution and progression of appropriate manual therapy techniques; 4) Integrate manual therapy techniques into an individualized comprehensive rehabilitation program; 5) Summarize the indications, contraindications, and evidence to support and refute the use of manual therapy techniques for the foot and ankle complex
Speakers: Rob Martin, PhD, PT, CSCS; Stephen Paulseth, DPT, SCS, ATC; Stephen Reischl, DPT, OCS; Michael Timko, PT, MS, FAAOMPT

Watch for more details to come on APTA's web site: www.apta.org

GREETINGS OHSIG MEMBERS:

The OHSIG continues to work on behalf of our members with emphasis on two initiatives.

1) **OSHA Alliance Task Force Update**
Task Force Members were announced by Co-chairs Kathy Rockefellar and Drew Bossen. Members include Dennis Isernhagen, Robert Fleming, Miriam Joffe, and Margot Miller, along with Kathy and Drew. MaryFran Delaune from APTA's Practice Committee serves as our liaison with OSHA. The Task Force had its first conference call early in June to discuss drafting the Alliance Agreement between APTA OHSIG and OSHA. Three goals and objectives need to be addressed in the Alliance Agreement: training and education, outreach and communication, and promoting the national dialogue on safety and health.

2) **Occupational Health Specialization Certification Task Force Update**
Task Force Members include Barb McKelvy, Deborah Lechner, Jennifer Steiner, David Miller, and Margot Miller. A survey was sent to OHSIG members and members of the Orthopaedic Section. 300 signatures are needed from therapists agreeing to sit for the exam within 5 years of an exam being offered. This information is needed for the American Board of Physical Therapy Specialties (ABPTS) as evidence that PTs support Occupational Health Specialization. We plan to resend the survey as we have not reached 300. Please respond if you receive the survey and have not done so. We need your assistance!

We are also in process of getting 100 letters of support for therapist specialization from employers, physicians, insurers, etc. If you would like to help, please contact Barb McKelvy. She will get you a sample letter of support.

3) **OHSIG in the NEWS**
Education Chair, Dee Daley, and the OHSIG Board of Directors submitted an article "*Physical Therapists in the Workplace*," which will be printed in the June issue of *Workplace Ergonomic News*. The article discusses how PTs assist employers in primary, secondary, and tertiary prevention levels, "matching the worker and the work" through the full spectrum of the work life cycle. Employers are finding a natural fit between Physical Therapists' functional approach and corporate prevention plans.

If you have questions, comments, or if the Board can serve you better, please contact any one of us. You can find the OHSIG officer listing at www.orthopt.org. Remember, we work on your behalf!

Sincerely,
Margot Miller, PT
OHSIG President

SAFE PATIENT HANDLING AND REHABILITATION: THE WHITE PAPER AND BEYOND

Kathleen Rockefeller, PT, ScD, MPH

Physical contact with patients is part of the practice of physical therapy. Providing "hands-on" care is also important in other health care professions, such as nursing. There is strong evidence, however, that patient handling and movement tasks, like transferring and repositioning patients, are associated with exposure to risk factors for work-related musculoskeletal disorders and injuries.[1] Members of the nursing profession have reported high rates of these disorders in numerous studies over the past decade.[2] Despite much attention, these disorders have proved difficult to control and prevent. For years, nurses have received education on 'safe lifting' techniques (often from therapists) despite the weakness of the scientific evidence for their efficacy or effectiveness.[3]

Strategies using the principles of ergonomics appear to hold more promise for prevention. The use of modern equipment can be substituted for the use of the caregiver's body as a derrick. There is a growing body of strong evidence that using equipment to assist in patient handling tasks will decrease exposure to risk factors for musculoskeletal disorders. Programs that apply a philosophy of routinely using equipment have often been termed 'zero lift' or 'low lift.'[4] Successful implementation of these programs requires a number of key elements be in place: equipment, management commitment and employee involvement, policies, training, and medical case management. These programs have demonstrated an impact on the incidence and severity of work-related musculoskeletal disorders and their associated costs.[5]

Specific policies, procedures, and regulations targeting best practices for safe patient handling are increasing in number. Several states (Texas, Ohio, and Washington) have passed legislation requiring safe handling programs in a number of health care settings, while other states are actively pursuing similar legislation. And the United States is far behind other countries with respect to these trends – Great Britain, Canada, Australia, and New Zealand have been actively promoting and implementing safe patient handling initiatives for years.

Equipment and devices now available to assist with patient handling and movement are a far cry from the old lifts with

chains and hand-cranked mechanisms that were scary for patients and inconvenient for caregivers. Modern equipment is more maneuverable, adjustable, and provides a smooth and consistent motion to assist patient movement. There are numerous options available, such as slings of different designs and removable footplates. A wide range of devices can be used to help caregivers address the mobility needs of patients who range from completely dependent to almost independent. A variety of so-called 'total' lifts are available for patients who are completely dependent and require maximal assistance. Patients who have at least some weight-bearing capacity might benefit from the use of 'sit-to-stand' devices that provide support and assistance while freeing the health care provider to focus on the patient. And the various devices traditionally used in rehabilitation, such as slide boards, may also play a role on this continuum.

But how do the goals of improving safety for patients and caregivers fit with the goals of rehabilitation, which include promoting improved function and independence for patients? How can physical therapists better protect our own bodies from exposure to excessive risk? How can we improve the safety of the work environment for our colleagues who we are frequently asked to coach or to train?

As the number of facilities implementing low-lift environments grew, so did reports about perceived 'tensions' between nurses and therapists related to the use of equipment for patient handling. Therapists expressed some concerns that the use of equipment would interfere with rehabilitation while nurses felt that therapists were at times barriers to efforts to improve safety for nurses and their patients. Many of these comments were shared through the Patient Safety Center of Inquiry at the James A. Haley Veteran's Hospital in Tampa, FL. (The Patient Safety Center was established in 1999 and has been a national leader in efforts to promote to safe patient handling and movement and related research.) As a result, in 2004, director Audrey Nelson, PhD, RN, FAAN, formed an interdisciplinary task force with the APTA and the ARN (Association of Rehabilitation Nurses). The group was composed of therapists and nurses representing their respective association, along with Dr. Nelson and representatives from the VA.

The goal of the task force was to discuss the perspective and concerns of both organizations and to suggest possible strategies for addressing them. The group developed a White Paper, "Strategies to Improve Patient Handling and Health Care Provider Safety in Patient Handling and Movement Tasks: A Collaborative Effort of the American Physical Therapy Association, Association of Rehabilitation Nurses, and the Veteran's Health Administration" that was made available to members of both associations and other interested parties.

The Task Force made the following recommendations:

1. Implement the elements of OSHA's Ergonomics for the Prevention of Musculoskeletal Disorders: Guidelines for Nursing Homes. These guidelines center on an ergonomic process that includes: management commitment, employee involvement, risk assessment, identifying solutions, policies and procedures, case management, training, evaluation of the process, and continuous improvement. Although the document targets nursing homes, the process is applicable to other health care settings.

2. Build and support a culture of safety in rehabilitation settings that protects staff as well as patients. Nurses traditionally have operated in a culture that values patient safety over self-protection. Therapists have perhaps considered themselves less vulnerable as a result of expertise in body mechanics. The risks inherent in patient handling and movement tasks do not discriminate between the bodies of nurses and the bodies of therapists. More is documented, however, about work-related musculoskeletal disorders among members of the nursing profession.

3. Improve communication channels between nurses and physical therapists to facilitate safe patient handling and movement tasks. Therapists and nurses should bring their respective expertise and collaborate on these issues for the benefit of all. Sharing different perspectives can increase the likelihood of arriving at viable solutions.

4. Develop policies and procedures for the therapeutic use of patient handling equipment. Equipment should be evaluated for its potential to improve safety for both patient and caregiver and then for its potential impact on rehabilitation goals.

5. Develop competency based assessments that demonstrate proficiency for use of all patient handling equipment used on the units. Therapists are often asked to train others on patient handling. The appropriate use of equipment should be an important part of such training, including recognition of the role of equipment use in rehabilitation. Initial and ongoing training are both important, in addition to staying up-to-date on the equipment options.

6. Encourage research that supports the improvement of patient and staff safety while maximizing patient rehabilitation potential. More needs to be learned about the specific risk factors inherent in physical therapy practice.[6] In addition, the potential of using equipment to complement rehabilitation for classifications of patients commonly seen by physical therapists should be investigated.[7,8] This seems especially appropriate for patients with partial weight-bearing capacity.

While the task force felt these recommendations were a good beginning, it decided to continue conversations about the use of equipment for safe patient handling while also promoting rehabilitation. An expanded task force was formed and the American Occupational Therapy Association was also invited to participate. In early 2006, a group of therapists and nurses attended the 6th Annual Safe Patient Handling & Movement Conference (an annual conference organized by the Patient Safety Center and supported by a number of other organizations as well). Participants attended educational sessions and had multiple op-

portunities to interact with vendors, view equipment, and 'kick the tires' while thinking how equipment might impact therapy. At the end of the conference, the attendees met again to talk about the conference, to share thoughts and experiences, and to brainstorm about ideas to assist in promoting this knowledge and practice.

With the increased awareness of and activities related to the use of equipment to assist in patient handling and movement tasks, task force members felt that there are now many opportunities for therapists to use their knowledge, skills, and creativity to capitalize on the features of the equipment. One goal is to match the needs of individual patients with the features of equipment to facilitate more 'therapeutic moments' and opportunities to improve function as well as improve safety for patients, therapists, and other caregivers.

Therapists should take advantage of opportunities to educate themselves on what equipment is available, with what features, as well as, the growing body of literature. A great deal of information is available online. Most vendors or manufacturers of equipment have web sites describing their products and features and often other relevant information such as architectural assistance. A few vendors have had displays in the exhibit hall at our conferences, including Combined Sections and Annual Conference. The more interest we show, the more vendors may be interested in participating in future events as well as collaborating with us. In the meantime, therapists should talk with vendors about the therapeutic use of handling equipment, ie, what works, what doesn't, what's missing, and what we would like to see developed. Where are the gaps in the technology? Vendors do want to hear our feedback, concerns, and questions.

Currently, thoughts are being shared about plans to present a variety of educational sessions on safe patient handling in rehabilitation at future conferences and meetings. The Occupational Health Special Interest Group is participating in these discussions and is very interested in hearing from members about their educational needs and interests related to this topic. The task force felt that continued efforts were needed to develop educational materials addressing a variety of audiences and goals. In addition, marketing plans and business case scenarios may need to be created.

A number of conference participants are considering research projects in a number of related areas especially with respect to the use of sit-to-stand technology for patients with partial weight-bearing capability as well as therapeutic outcomes related to equipment use. Others are interested in the development of 'best practices' for the rehabilitation use of equipment and designing other strategies to encourage and reinforce the use of equipment across disciplines. Another related role for therapists that was discussed is to promote the use of equipment in the home environment and to act as advocates in assisting patients to acquire equipment.

There are no simple solutions to the multiple challenges of improving safety during patient handling and movement activities while facilitating rehabilitation goals at the same time. There are, however, now many more options as well as exiting opportunities for physical therapists to address these challenges. With our knowledge, skills, and experience we are well-suited to use our creativity and take on leadership roles in these activities.

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foot&ankle

SPECIAL INTEREST GROUP

PRESIDENT'S MESSAGE

Stephen Paulseth, PT, DPT, SCS, ATC

The past CSM in San Diego was another success for our SIG programming, thanks to the efforts of Robroy Martin and the guest lecturers he assembled. They presented a wonderful overview about Ankle Arthritis including the etiology, biomechanical processes, the medical evaluation and surgical treatment, and the physical therapy interventions. The presentations were well attended despite the large array of orthopaedic programming that were offered concurrently. Thanks again to the lecturers and to those who attended. Next year we plan on offering a preconference hands-on foot and ankle manual therapy course as well as our general program entitled: **A Comprehensive Update on Ankle Instability.**

In our annual Business Meeting at CSM we established a task force that will develop a survey which will be sent to all entry-level PT programs. The objective is to ascertain the foot and ankle content being taught nationally so that a basic level can be met, or at least recommended. This information will also help us to depict the necessary criteria for establishing specialization and a fellowship for foot and ankle PT. Robroy Martin will serve as the new Vice President of our rapidly growing SIG. The FASIG in concert with the Orthopaedic Section are formulating a brochure to provide information to our members and others about our SIG. It primarily will outline the purpose of the FASIG which includes:

1. Foster clinical practice of the foot and ankle based upon science.
2. Provide standards for entry level education for the treatment of the foot and ankle.
3. Encourage and foster clinical research dissemination, presentation, and mentoring.
4. Provide a forum for the interdisciplinary treatment of the foot and ankle.
5. Establish standards of measurement and terminology relative to the treatment of the foot and ankle.
6. Provide a framework for the interaction of other health professionals who treat foot and ankle pathologies.
7. Provide a network for enhancing communication between clinicians, academicians and researchers interested in the treatment of the foot and ankle.

I hope that each of you with an interest in the foot and ankle will support our SIG. We always appreciate your input concerning our purpose, programs, and objectives.

TIBIALIS POSTERIOR DYSFUNCTION: A BRIEF OVERVIEW

Stephen Paulseth, PT, DPT, SCS, ATC

The tibialis posterior (TP) muscle is possibly the most vital dynamic anatomical entity of the foot and ankle during locomotion. It attaches to the majority of the tarsal and metatarsal bones, with the primary insertion site being the navicular/ keystone bone of the medial arch. When dysfunctional, the progression of deformity and pain is substantial. The epidemiology of this disorder often involves spontaneous rupture in women over age 55. Frequently it occurs unilaterally and with a flexible flat foot - 15% of population (asymptomatic), and during development.[1] Understanding the function and pathology of this muscle can aid the clinician in establishing the most appropriate intervention.

The functions of the tibialis posterior include:

1. Decelerate subtalar and midtarsal joint pronation and lower extremity internal rotation during initial contact.
2. Assist digit flexors and soleus in decelerated forward momentum through stance.
3. Accelerate STJ supination and LE external rotation in mid stance.
4. Stabilize MTJ into supination about oblique axis.
5. Stabilize all lesser tarsals and metatarsals.
6. Assist in heel rise with soleus and digit flexors to decelerate tibial forward motion and stop ankle dorsiflexion.[2]

The etiology of TP dysfunction is multifactorial. Such factors as the level of activity correlated with age, variations in intensity, abrupt change in normal activity or different sports, and whether they are an untrained athlete. The individual's shoeware, including use of foot orthoses, increased medial wearing, proper shoes for the specific activity, and changes in playing surface can play a role in development of this disorder. Further, metabolic/systemic deficiencies such as improper diet, increased BW, endocrine problems, disease, vascularity changes, iatrogenic, and aging causes may contribute. An individual's mechanical /flexibility status, strength imbalances, foot/LE alignment of the lower quarter or idiopathic causes may occur.[1,3] To summarize the common etiologies of overuse problems like tibialis posterior dysfunction one can adopt Micheli's 6 Ss (shoes, surface, speed, structure, strength, stretching).

The pathomechanical changes in TP dysfunction ranges from acute tenosynovitis to rigid flat foot deformity. There is

usually slippage of the TP out of the groove behind the medial malleolus which results in trauma to the tendon slips at the navicular tuberosity or sustentaculum tali (lose pulley effect). Eventually, instability of os navicularis, tarsal and plantar ligaments, plantar fascia, and basically all passive stabilizers of the medial foot occur with increased supinator weakness, especially the TP and soleus.[2,3]

The differential diagnoses for TP dysfunction and pathology are generally systemic, neurological, or orthopaedic/sports. The latter includes proximal tibialis posterior (medial shin splints or medial tibial stress syndrome), Tarsal Tunnel Syndrome, Kohler's disease, Os Navicularis, Stress Fracture, S/P Ankle Fracture, Posterior Fibrous Tarsal Coalition, or Posterior Impingement Syndrome. Systemic differentiation includes; Reiter's Syndrome, Ankylosing Spondylitis, Inflammatory Disease, Gout/Pseudogout, and RA. The neurological related differentials include: neuropathy, FLH (Fibrolipomatous Hamartoma), or Duchene Muscular Dystrophy to name a few.

The biomechanical changes in the foot complex and distal extremity during the flatfoot progression has been well described in the literature.[2-4] Simply, the mechanical sequelae of 'Flat Foot Deformity' is as follows:

1. Midfoot (MTJ) unstable/ STJ valgum
2. Tibia internal rotation and knee valgum
3. Hyper mobile 1st ray (dorsal)
4. Forefoot unable to pronate due to ground, therefore stays abducted (transverse plane)
5. Eventually lateral ankle/CFL impingement
6. Leads to planovalgus deformity (flatfoot)

A classification of flatfoot deformity has been suggested by numerous investigators.[1,3,5] These include the most frequent, acquired/flexible (hereditary) which may be due to coxa vara, tibial/femoral torsion, or STJ defect. Also, absent osseus deformity, reducible deformity, rigid or congenital (rare) deformity. The inevatible deformity is often the result of tibialis posterior tendon degradation and eventual rupture. It has been classified and graded by many.[1,3,6] One of the most pertinent for TP dysfunction was offered by Geiderman.[1]

Stages of TP Degeneration:

I - normal tendon length but degeneration in tendon, medial forefoot pain, swelling, mild weakness.

II - flexible planovalgus—tendon rupture or degeneration —hindfoot flexible, unable to plantarflex the ankle adequately during single limb stance.

III - as in II with hindfoot fixed and lateral abutment.

IV - valgus talar tilt and lateral ankle degeneration.

The evaluation of flatfoot deformity and associated TP dysfunction is extremely involved and beyond this article. There are very few reliable tests for this condition. After a complete history is acquired from the patient, the physical examination should include extensive postural observation including static foot position. Many clinicians utilize the "too many toes sign" which somewhat yields the hindfoot-to-forefoot relation and abductus.[5] Passive assessment should detect ROM, mobility of the deformity, viability of the TP tendon/swelling, and joint play. Dynamic tests such as the Double Stand on Toes test, single heel rise, TP muscle testing, LE external rotation (active and passive), 1st Metatarsal rise test, and gait should be considered.[3] Ultimately, imaging studies may be necessary, although different opinions exist about when they are required. The reliability of these clinical tests is controversial. Interestingly, MRI, single heel rise, and too many toes sign are less reliable, whereas the 1st Metatarsal rise test, double heel rise, and tenography are preferred.[5]

Independent of the TP dysfunction evolution and eventual deformity, the functional capacity of the involved foot is most vital. There are many ways to evaluate the pathology and many treatment protocols that are beyond the scope of this article. Briefly, the intervention applied to the particular patient should incorporate a device(s) to help in realignment of the distal extremity. This can be done via taping acutely if tolerated, foot orthoses, UCBL device, ankle foot orthoses/braces, hiking boot, or shoe customization. Enhancing the mechanical advantage of the TP or soleus in propulsion of the extremity by a specific LE strengthening (concentric, eccentric and isometric) regimen, proprioceptive control, stretching, and manual techniques are also necessary. In severe and progressive cases, surgical intervention may be required.[6] Physical therapists that treat these patients may have a difficult task of effectively intervening, especially when later stage deformities are seen.

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painmanagement

SPECIAL INTEREST GROUP

PRESIDENT'S MESSAGE

Joseph A. Kleinkort, PT, MA, PHD, CIE, CEAS, DAAPM

A new study by the American Pain Foundation shows that 51% of chronic pain patients currently using opioid analgesics felt that they had little or no control over their pain. Over 60% indicated that they had breakthrough pain one or more times per day. Chronic pain now affects over 50 million people and left under treated can significantly impair one's quality of life and well-being. Most importantly 77% said that they are looking for new ways to treat their pain. Only 14% were happy with their current treatment of pain and 48% didn't feel that they were getting adequate information on treating their condition.

This shows us that there is a wide open field that the physical therapist can significantly contribute to in many ways. We can reduce pain through pain modulating modalities. We can certainly increase exercise tolerance to enhance the person's own neurochemical cascade. And we can do all the new and often amazing techniques such as PRRT! There are so many ways we can touch the person with chronic pain to reduce their discomfort. It is important to work closely with the entire team that is assisting the patient so that the outcome can be the very best possible. At times we will see some improvement and then a total collapse as is illustrated by John Garziones' article to follow.

By the time you receive this it will be fall and officer elections will be upon us. I will write my final message next edition before I hand the baton over to our new President. I hope that you all participate in our upcoming election and support our new slate of officers as well as you have me.

THE DEATH OF A MAYOR

A Case of Killing Pain

John E. Garzione, PT, DPT

Recently, the 62-year-old Mayor of the town where I practice passed away unexpectedly. This is not an unusual event as people die daily. The thing that strikes me is the circumstances that lead up to the tragic event.

Three months ago, Mr. M arrived at my office for a physical therapy evaluation of his severe lumbar pain from spinal stenosis and also a constant right arm pain which was caused by pulling himself out of a chair using his arms. He was just discharged from an area hospital where he had spent the past week undergoing diagnostic tests and medical pain management. A surgical consult was obtained and the surgeon felt that he was not a candidate for spinal decompression surgery. Prior to his hospitalization, the patient reported that he had a 6-month history of worsening back pain.

His medications included: OTC Ibuprofen, Zocor, Metformin, Synthroid, Androgel, Morphine Sulfate, Prednisone dose pack, and multiple vitamins. His primary care physician did not want to pursue more aggressive medical pain management for fear of 'addiction.'

Mr. M rated his pain as 8-9/10; DASH Index was 90.5 % disability for the right arm. His physical therapy evaluation indicated a partial right rotator cuff tear and spinal stenosis affecting the left L4-5 spinal area. He was able to walk for 50' with a rolling walker, but was not able to lie in bed, sleep, get out of a chair without maximal assistance, sit for over 30 minutes at a time, stand for over 10 minutes at a time, or raise his right arm to change an overhead light bulb. He reported that he lost 55 lbs. in the past month due to the severe pain.

BP was 110/60, pulse was 100 BPM and regular, and there were no Bruits heard in the carotid arteries. The Mankopf test with spinal flexion[1] resulted in a bounding pulse rate of 105 BPM.

The Mankopf test is described as a means to determine malingering as well as the impact that a painful maneuver has on a person's physiology. If the test is positive, the pulse quality increases with up to a 5% rate increase during the painful position. There is an increase of Adrenalin response with the painful maneuver causing the cardiovascular changes similar to the 'fight or flight' response.

Physical therapy was instituted 3 times a week for 8 weeks, and a home exercise program was prescribed.

He progressed to walking with a cane for 2 blocks and was able to return to work between 6 to 8 hours a day depending on his pain levels. On his last physical therapy visit, he reported that his pain level was 3/10 except in the morning when his pain was 7/10 until he was able to move around. Sleeping in his bed all night was not possible due to back pain, and resting was accomplished in a recliner chair at night. His Mankopf test remained positive and actually increased his pulse rate to 110 BPM.

So far, this sounds like a pretty straight forward scenario of people we see in our clinics all the time. In his editorial, 'Chronic pain can kill: a clinician's perspective' Romano[2] reported that chronic pain can be life threatening, as pain is a significant source of stress which can cause dysfunction with a person's immune system. Supporting this premise was Tennant's literature review[3] which concluded that persistent pain adversely affects the body's cardiovascular, endocrine, immune, neurological, and musculoskeletal systems. Tachycardia, which increased with the Mankopf test, has been implicated in contributing to cardiac diseases including Myocardial Infarct.[4]

The morning before his death, the Mayor was having a cup of coffee with his brother. Mr. M developed severe chest pain with diaphoresis and requested to be taken to the local hospital emergency room as he knew that he was having a cardiac event.

In the emergency room he underwent an EKG and blood work which indicated an acute myocardial infarct and elevated blood sugars. Coumadin was administered and he was transferred to a regional cardiac care hospital where he subsequently died from intracranial bleeding from 4 ruptured aneurysms secondarily associated with the use of Coumadin. The medical examiner reported that the physical and emotional stress of his pain caused his diabetes to be uncontrolled which worsened his cardiac status.

This case illustrates that chronic severe uncontrolled pain can result in significant medical problems as the body decompensates. I wonder how many other premature deaths could be prevented with more aggressive pain control.

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performingarts

SPECIAL INTEREST GROUP

NOMINATIONS FOR BOARD OF DIRECTORS FOR 2007

PASIG Candidate Statements for Vice President, Secretary, and Nominating Committee Member

PASIG VICE PRESIDENT (ELECTED) 3-YEAR TERM

Duties:

- Assumes all duties of the President if she/he is unable to serve and/or attend scheduled meetings.

Additional Responsibilities:

- Serves as a voting member of the Executive Board.
- Reviews the policies and procedures and updates annually.
- Serves as liaison to Orthopaedic Section office regarding changes to Policies and Procedures.
- Attends the following meetings: PASIG Executive Board Meetings and conference calls, PASIG Annual Business Meeting at CSM.
- Forwards copies of official correspondence to the President and to the Section's office.
- Assists the President in providing for the orientation of all new officers and chairs.
- Chairs the PASIG Education Committee to facilitate PASIG programming at CSM.
- Coordinates PASIG programming (for CSM) with the Education Chair of the Orthopaedic Section based on suggestions by the PASIG membership.
- Serves as liaison for all PASIG program speakers to the Orthopaedic Section and is responsible for meeting all speaker information deadlines for CSM.
- Other duties as assigned by the President.

VICE-PRESIDENT; PERFORMING ARTS SPECIAL INTEREST GROUP
CANDIDATE: TARA JO MANAL MPT, OCS, SCS

Personal Statement: As my career choices demonstrate, I have a strong commitment to the education of physical therapists, the Orthopaedic Section, and the APTA. Currently in the position as VP of the Performing Arts Special Interest Group (SIG), I have successfully increased attendance at our national programming and introduced educational opportunities to the SIG. As participation in the DACP in Performing Arts PT demonstrates, I feel strongly that we need to define the practice areas within our clinics and update them as our profession grows. A SIG has the unique opportunity to be a leader in the evidence-based approach to PT practice in their area. The majority of my career has been dedicated to general orthopaedic clinical practice, and the clinical and didactic training of physical therapy students and postprofessional residents. I am dedicated to the advancement of physical therapy, the education of physical therapy students and professionals, and the development and promulgation of best practice in orthopaedic physical therapy. Continuing in my position as VP and Education Chair of the PASIG will help me to achieve my goals.

Biography: Tara Jo Manal, MPT, OCS, SCS received a MPT from the University of Delaware in 1993, and is currently enrolled in a PhD program at the University of Delaware. Tara is the University of Delaware Director of Clinical Services and Director of the UD Orthopaedic Residency Program, and has an active clinical practice. She is dual certified as a Sports and Orthopaedic Certified Specialist. Mrs. Manal is an instructor in Biomechanics, Orthopaedics, and the Spine Management class at UD. She is on the Finance Committee of the Orthopaedic Section, Core member of the Credentialed Residency/Fellowship Program Directors/Faculty Group, and Vice President of the Performing Arts Special Interest Group. Tara received the Excellence in Teaching Award from the Sports Section in 2005 and the Orthopaedic Section in 2006. She has published in the area of injury and rehabilitation and continues to present her work on the local, national, and international levels.

PASIG SECRETARY (ELECTED) 3-YEAR TERM

Duties:

- Records minutes of the PASIG Annual Business Meetings and Executive Board Meetings.
- Carries out official correspondence on behalf of the PASIG including mailed notification of meetings and elections
- Sends notices as specifically requested by the PASIG Executive Board.

Additional Responsibilities:

- Serves as a voting member of the Executive Board.
- Records minutes of Executive Board conference calls.
- Distributes minutes to the Executive Board.
- Serves as editor for the PASIG newsletter and Chair of the Publication Committee.
- Sends all information to be included in Orthopaedic Phys-

ical Therapy Practice prior to each deadline (newsletter submission) to the Section office.
- Serves as liaison to the editor of Orthopaedic Physical Therapy Practice and APTA publications.
- Attends the PASIG Executive Board Meetings and conference calls, and the PASIG Annual Business Meetings at CSM.
- Forwards copies of official correspondence to the PASIG President and to the Section office.
- Maintains a file of minutes from meetings and conference calls and records associated with the newsletter for use in assisting the President in the orientation of the successor to the office of Secretary.
- Acts as historian for the PASIG by maintaining a historical account of PASIG activities/meetings, etc.
- Other duties as assigned by the President.

SECRETARY; PERFORMING ARTS SPECIAL INTEREST GROUP
CANDIDATES: KAREN HAMILL, PT, CSCS; JANET KONECNE, PT, OCS, DPT, CSCS

KAREN HAMILL, PT, CSCS

Personal Statement: I would be honored to serve as Secretary for PASIG, because this role will allow me to continue enhancing the rehabilitation and prevention of injuries in artists. I am interested in continuing the strong leadership that PASIG has committed to in serving the performing artists. We need to continue to augment the treatment of performing artists as well as convey state of the art approaches to others so as to continue fostering the growth of the PASIG. Communication of evidence-based practice will not only benefit performers and therapists but also all health care professionals and educators. Performing artists have a unique passion for their field and the importance of maintaining their health is usually an afterthought. I will continue to educate performers as well as stage and company managers regarding the benefits of injury prevention. Heightening the visibility of therapists that work with performing artists will promote and encourage increased education and research.

Biography: Karen Hamill has worked as a Physical Therapist in California for 10 years. She has practiced in a variety of settings and populations relying on state of the art, evidence-based interventions. Karen is currently working on her Doctorate in Physical Therapy and Orthopaedic Certified Specialist certification. She possesses numerous certifications including: Pilates Instructor, Strength and Conditioning Specialist, and Massage Therapist. Karen also took part in the training for NeuroDevelopmental Technique and the Emergency Medical Technician for the County of Los Angeles. Working backstage at Disney and at numerous facilities in Southern California, including Pantages Theater and Orange County Performing Arts Center, has enabled Karen to collaborate with Stage and Company Managers for various companies. She assisted with the Dance Clinic of California State University, Long Beach working closely with the athletic trainers. She currently works in the community by performing dance screens to help maintain the health of performers.

JANET KONECNE, PT, OCS, DPT, CSCS

Personal Statement: It is my belief that physical therapists have a unique and extremely valuable role in the treatment and education of all performing artists. My work with instrumentalists, vocalists, dancers, ice skaters, and in the theater, as well as my own experiences in the music industry as a performer has helped me understand and appreciate the wonderful work that our SIG has done, and the information that our leaders have contributed to the profession. I have served at the State level, just completing the second term as a Board Member on the CPTA Board as a Director. I continue my role as the Federal GAC Liaison for California and have volunteered as the State Task Force Chairperson on Health, Wellness, and Fitness for the last 2 years. I would love the opportunity to assist in the group's work and this seems like a great opportunity to do just that. I thank the Nominating Committee for thinking of me as a potential candidate and I look forward to serving the organization in this fashion, should I be elected.

Biography: Dr. Janet Konecne graduated with her PT degree in 1982 from Northern Arizona University where she also studied Bassoon. Her career as a PT began at Rancho Los Amigos Medical Center in Downey, California, where she worked with people with spinal cord injuries and a variety of patients with neurologic and arthritic conditions. She fostered her interest in orthopaedics and began working in outpatient clinics where she has continued her professional work, directing a large sports medicine clinic for 15 years. Her interest in performing art medicine prompted the opening of her own clinic, Allegro Physical Therapy in 2002, where she currently treats all types of orthopaedic injuries. She received her Masters in Biokinesiology and her Postprofessional Doctorate from the University of Southern California, and has been an OCS for 10 years. She has taught at the University of Southern California, and Chapman University and currently teaches in the Physical Therapy Department at Western University in Pomona, California, instructing in both the entry level and transitional programs. She also consults with the Thornton Music School at the University of Southern California in the areas of prevention and wellness for musicians. She presented her work on hip labral tears at the IADMS conference in Laban, England in 2003. She is an active member of the music community in Southern California, working as a free lance bassoonist in addition to her physical therapy practice.

NOMINATING COMMITTEE MEMBER; PERFORMING ARTS SIG

NOMINATING COMMITTEE MEMBER (ELECTED) 3-YEAR TERM

Duties:

- Is responsible directly to the membership.
- The senior member of the Committee becomes its Chair.

Additional Responsibilities:

- Carries out or supervises the carrying out of the Policies and Procedures for elections via mail ballot and works with the Orthopaedic Section office on coordinating this project.
- Prepares a slate of candidates for each PASIG election that is submitted to the Executive Board four months prior to the CSM business meeting.

CANDIDATES: ERICA BAUM COFFEY, PT, MS, SCS; HEATHER SOUTHWICK, PT

ERICA BAUM COFFEY, PT, MS, SCS

Personal Statement: I have always had an interest in both dance and gymnastics, stemmed from 13 years of competitive gymnastics including 4 years as a member of the University of Massachusetts Women's Gymnastics Team. In 1998, I graduated with a Master of Physical Therapy from the University of Pittsburgh's Physical Therapy Department. I later returned to complete my postprofessional Master of Science degree and the Centers for Rehab Services Sports Physical Therapy Residency Program. Since completing the residency program my clinical time has consisted of both a general orthopaedic and sports injury caseload with a focus on adolescent and adult dancers as well as adolescent gymnasts. I was named the physical therapist for The Pittsburgh Ballet Theater in 2001 where along with an athletic trainer, we provide early season screenings, on-site coverage during rehearsals and performances, and conditioning programs for both injured and healthy dancers.

Biography: I have been an active PASIG member since 2004. Although this may seem like a brief period, during this time, I have presented at APTA Combined Sections, attended the PASIG Business Meetings, and joined the PASIG Practice Committee. As a result of this involvement, I was asked to become Co-Chair of the PASIG Practice Committee. I have expanded my knowledge of dance and the dance community through my work with The Pittsburgh Ballet Theater as well as by participating in the development of an Annual Post-Hire Health Screen for Professional Dancers through the coordination of the Taskforce on Dancer's Health and DanceUSA. These most recent activities have expanded my knowledge of both PASIG members and others with knowledge of performing arts who may not yet be members, both of which will help me in my duties as Nominating Committee member.

HEATHER SOUTHWICK, PT

Personal Statement: As a former dancer, I have always been passionate about caring for dancers. My position at Children's Hospital Boston has given me experience with diverse diagnoses and has also given me the opportunity to treat dancers of all ages and levels. I have treated the Boston Ballet company dancers for 10 years now and feel it is time to become more involved in the PASIG and the APTA. As a practitioner, I have always felt supported by the PASIG through publications, networking, and currently the monthly citation blasts. Working with many of the members of the PASIG on the Taskforce for Dancer Health has helped me to reconnect with physical therapists treating dancers all over the country. I hope to lend my skills and experience to members of the PASIG as part of the Nominating Committee.

Biography: Heather Southwick is a physical therapist at Boston Ballet and Children's Hospital Boston. She is a former dancer with an undergraduate degree in dance. As part of her undergraduate degree, she danced in London and studied at the Laban Center for Movement in Dance. Heather runs a clinic for screening and injury prevention for the Boston Ballet School. She is a member of the International Association of Dance Medicine and Science and the Performing Arts Medical Association and has presented at both conferences. She is on the Taskforce for Dancer Health for Dance/USA and has served as the Co-chair of the committee developing a screening form to be used nationally on professional companies. She teaches injury prevention classes to the Boston Ballet's Summer Dance Programs, in addition to treating the students coming from all over the country for these programs.

PASIG

The Performing Arts Special Interest Group (PASIG) is teaming up with the American Red Cross to hold an **"Emergency Response Course for the Performing Artist"** course September 15-17, 2006 at the University of Delaware. E-mail Tara Jo Manal, PT, MPT, OCS, SCS: tarajo@udel.edu with additional questions. **HURRY!** Space is limited to the first 25 registrants!

PERFORMING ARTS SPECIAL INTEREST GROUP OFFICER DIRECTORY

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Education Committee Chair, Tara Jo Manal See above	**Membership/Web Site Committee Chair, Julie O'Connell** See above

animalpt

SPECIAL INTEREST GROUP

OPEN POSITION

There is one open position for the Animal PT SIG offices; that of Vice President. Below are the duties and requirements. If you are interested in being a candidate for this position, please contact Katie Bruesewitz of the SIG Nominating Committee at Bruesewitz@kmwb.net, or by phone at 507-753-2075.

VICE PRESIDENT

Duties per Bylaws:

- Assumes the duties of the President if she/he is unable to serve and/or attend scheduled meetings.

Additional Responsibilities:

- Serves as a voting member of the Executive Board.
- Reviews the policies and procedures and updates annually.
- Serves as liaison to Orthopaedic Section office regarding changes to policies and procedures.
- Attends the following meetings: SIG Executive Board Meetings and Conference Calls, SIG Annual Business Meeting at CSM.
- Forwards copies of official correspondence to the President and to the Section office.
- Assists the President in orientation of new officers and chairs.
- Reviews and edits the newsletter before it is sent to the Board Liaison.
- Coordinates the annual survey of the membership and submits for publication in the Animal PT SIG newsletter.
- Assists in developing questions for liaisons to investigate each year.
- Reviews the web site periodically and submits suggestions to Section office.
- Contributes to the Animal PT SIG newsletter and solicits information from others.
- Maintains a written outline of duties and responsibilities and other helpful information for this position and for orientation to the successor.

MARYLAND LIAISON REPORT

by Steve Strunk, PT, our Maryland State Liaison and APTSIG Vice President

VETERINARY PRACTICE ACT

"2-301

(a) In this subtitle, the following words have the meanings indicated.

© 'Direct supervision' means that the veterinarian licensed and registered in the State is in the immediate vicinity where veterinary medicine is being performed and is actively engaged in the supervision of the practice of veterinary medicine.

(f) 'Practice of veterinary medicine' includes, but is not limited to, the practice by any person who:

(1) Diagnoses, advises, prescribes, or administers a drug, medicine, biological product, appliance, application, or treatment of any nature, for the prevention, cure, or relief of a wound, fracture, bodily injury, or disease of an animal;

(2) Performs a surgical operation, including cosmetic surgery, upon any animal;

(3) Performs dentistry on any animal;

(4) Performs any manual procedure upon an animal for the diagnosis or treatment of sterility or infertility of the animal;

(5) Represents himself as engaged in the practice of veterinary medicine;

All treatment of animals is under the jurisdiction of the Veterinary Board. The only exception is wildlife rehabilitation, which is regulated by the Department of Natural Resources. There are currently only 2 ways a PT or PTA can legally practice with animals as described in the Agriculture Article below:

1. A person administering to the ills and injuries of his own animals if they otherwise comply with all laws, rules, and regulations relative to the use of medicines and biologics; or
2. Any nurse, attendant, technician, intern, or other employee of a licensed and registered veterinarian when administering medication or rendering auxiliary or supporting assistance under the responsible direct supervision of a licensed and registered veterinarian

PHYSICAL THERAPY PRACTICE ACT

"*Practice of Physical Therapy* means to practice the health specialty concerned with:

(1) The prevention of disability in ***patients/clients***, and (ii) the physical rehabilitation of ***patients/clients*** with a congenital or acquired disability."

The PT practice act was amended to replace 'individual' with 'patient/client' in order to reflect current terminology used by the Federation of State Boards of Physical Therapy and the APTA. However, this change alone does not place animal practice with-

in the scope of physical therapy. An exemption to the practice of veterinary medicine is required in the veterinary practice act, along with amendments to the physical therapy practice act defining further qualifications, to make physical therapy practice with animals legal.

USE OF THE TERMS "PHYSICAL THERAPY" AND "PHYSICAL THERAPIST"

"Physical therapy" is a protected term in the state of Maryland. Use of the term by anyone to describe services rendered in veterinary practice is prohibited. There are no regulations prohibiting a PT or PTA from referring to her/himself as such in any setting.

CONTINUING EDUCATION

The MSBPTE does not accept courses in animal rehabilitation for continuing education credit. This is due to the fact that treatment of animals is not within the scope of physical therapist practice. One exception is that currently the MSBPTE does accept all courses offered through the APTA or its affiliates. They are in the process of examining this policy and are deciding whether or not to grant CEUs for animal courses provided by the APTA or its affiliates in the future.

STATE LIAISON REPORT

After several years of inquiries, the MSBPTE formed a task force in August 2001 to investigate and pursue the practice of physical therapy with animals. This development was vital as the Maryland Veterinary Board rebuked all approaches by physical therapists acting as a state liaison for the SIG. The task force performed preliminary work taking approximately 2 1/2 years before the veterinary board decided to entertain this contingent. Negotiations between the PT board and veterinary board ensued, and have been ongoing for about 2 1/2 years. Tentative agreement has been reached on educational criteria. However, other aspects are in dispute. The PT board will not approve of any regulations that conflict with or contradict regulatory and practice parameters that exist for human physical therapy. The veterinary board insists on regulations that would do just that.

BOTTOM LINE

The only ways a PT or PTA can practice with animals are either on their own animals or as an employee under direct supervision of a veterinarian. This practice may not be referred to as 'physical therapy;' however, there are no regulations preventing a PT or PTA from identifying her/himself as such. No continuing education credits will be given for course work in animal rehabilitation. The only exception is that currently credit will be given for animal course work offered through the APTA.

Steve Strunk, PT
Animal Physical Therapy SIG Liaison

CANINE VESTIBULAR DISEASE

Catherine Cauley, PT

After learning in January, 2005 that dogs suffer from vestibular disease, I investigated the anatomy of the canine inner ear and discovered that it is essentially identical to that of the human inner ear. As a Physical Therapist, I had some experience treating vestibular disease in humans. I hypothesized that dogs may suffer from the same vestibular dysfunctions as humans, most specifically benign positional vertigo (BPV).

Benign positional vertigo is the most common form of vestibular disease in humans. It is a peripheral vestibular problem where an otoconia crystal is displaced from the inner ear utricle into the semicircular canals. It is more common as one ages, just like canine vestibular disease is more common in geriatric dogs. The BPV can be a result of a head injury, after a viral infection but is most often idiopathic. The displaced otoconia gives inaccurate information to the brain when the head's position is changed. The mismatched vestibular information causes vertigo and dizziness which is often accompanied by disequilibrium/imbalance, nausea/vomiting, falling, and/or nystagmus.

With people, there is a 90% cure rate in one session when a vestibular therapist performs a repositioning maneuver to relocate the displaced otoconia back into the utricle. First the therapist must determine the involved semicircular canal (left versus right and anterior versus posterior versus horizontal). I began treating dogs with vestibular disease in March 2005 under the supervision and referral of veterinarians providing concurrent care. After obtaining consent from the owners, I would evaluate the dog's function, cranial nerves, nystagmus, etc. If the dog had symptoms consistent with BPV (mainly positional nystagmus), I would perform a canalith repositioning treatment (CRT) maneuver.

The first dog I treated was Glacier, a 10 1/2 year old Husky mix, in Hartford, Wisconsin at the Hartford Animal Clinic under the supervision and referral of Dr. Mark Lindborg and Dr. Kelly Wright. Glacier had not eaten or drank voluntarily in 8 days since the onset of canine vestibular syndrome with symptoms of head tilt and imbalanced gait. She was hospitalized twice in that time for IV fluids and force feeding. Glacier could walk but was still unsteady and had a moderate head tilt. Glacier's owner had been with her all day before I had seen her and tried to get her to eat. He had even made her favorite food, chicken. Much to our surprise and delight, Glacier began eating 10 minutes after the repositioning maneuver and had no further problems thereafter.

Since treating Glacier, I have evaluated 20 dogs with vestibular disease. Nine demonstrated symptoms consistent with central vestibular disease (ie, vertical nystagmus, resting nystagmus after 72 hours, direction changing nystagmus, and/or other neurological deficits). Seven of the peripheral cases I saw had symptoms consistent with unilateral vestibular loss such as vestibular neuritis or labrynthitis (ie, resting nystagmus within the first 72

hours of onset and no other central or neurological signs). The other 4 of the peripheral cases had symptoms consistent with BPV (ie, positional nystagmus) and were successfully treated with a repositioning maneuver. One of the 4 had BPV in both ears. The CRT is rotating the dog through a series of positions to relocate the displaced otoconia back into the utricle. It is a painless procedure and takes less than 15 minutes to perform.

Further research is needed to clarify if this treatment could be as successful for dogs as it is for people. I suspect that BPV may be as common with dogs as people but many cases of vestibular disease consistent with BPV were not referred to me because the symptoms were less severe. There may also be treatments adopted from human models that can expedite recovery from central and other peripheral causes of canine vestibular disease.

For further information, feel free to contact Catherine Cauley at dizzydogs@wi.rr.com.

Catherine Cauley graduated from Marquette University with her Masters in Physical Therapy in 1997 and has worked at Aurora/West Allis Memorial Hospital since then. She began training in canine rehabilitation in 2000 and began practicing physical therapy in veterinary medicine in January, 2005 at Pewaukee Veterinary Services. She received Herdman Vestibular Competency certification (for humans) in 2006.

CANINE ARTHROSCOPY "WHERE LESS REALLY IS MORE"

Sherman O. Canapp Jr., DVM, MS

Arthroscopy has proven to play a significant role in the diagnosis and treatment of joint diseases in humans, horses, and most recently dogs. Arthroscopy allows enhanced visualization of intra-articular structures and is associated with limited postoperative morbidity. Nowadays, arthroscopy has replaced virtually all arthrotomies in human patients. Arthroscopy has only become possible in dogs since the development of small-sized arthroscopes. Arthroscopy in dogs was first reported in 1978 and has seen an increasing level of interest and rapid development since that date. Small animal veterinary surgeons are currently capable of performing arthroscopic procedures on the stifle, shoulder, elbow, hip, and carpal and tarsal joint.

Arthroscopy has numerous advantages over arthrotomy for diagnosis and treatment of joint disease. Arthroscopy entails less disruption of the periarticular soft tissue. Decreased soft tissue disruption leads to less pain and less chance of infection. In most cases, return to use of the limb is quicker because of less surgically induced pain. This is especially true when multiple joints are involved and are operated arthroscopically under the same anesthetic procedure. A recent study by Hoelzler MG, et al, published in *Veterinary Surgery*, compared stifle arthrotomy to arthroscopy. Results of this study revealed a significant decrease in lameness, more comfortable range of motion, increased thigh circumference, and decreased synovial fluid inflammation in dogs treated with arthroscopy compared to those treated with an arthrotomy.

Arthroscopy may be employed in a diagnostic, therapeutic, or combined modality. Using arthroscopy as an exploratory procedure may prevent the necessity for an arthrotomy and is an important advantage in cases where a surgically treatable lesion is not found. Visualization of the joint typically is better with arthroscopy than with an arthrotomy. In joints like the shoulder and elbow, arthroscopy allows inspection of multiple areas within the joint that would not otherwise be possible without performing multiple arthrotomies. In addition, the magnification combined with the fluid medium allows one to see joint pathology that cannot be appreciated with an arthrotomy. Visualization of synovial membrane and cartilage pathology, in particular, is better after arthroscopy compared to arthrotomy. With practice and development of proficiency, the length of an arthroscopic procedure is less than an arthrotomy procedure. Cosmetic appearance of the dog is typically better after arthroscopy compared to arthrotomy. For many owners, cosmetic appearance is very important.

Disadvantages of arthroscopy are that its use is limited to large dogs, the equipment is expensive, and considerable training is needed to become proficient with its use. Depending on the specific joint, the dog must be at least 45 pounds or 20.5 kg before an arthroscopy can be performed. Even though the price of arthroscopy equipment is decreasing, one can easily spend $20,000 – $60,000 for the equipment and instrumentation. Arthroscopy requires considerable practice, advanced hand-eye coordination, and needs to be performed on a regular basis to be performed proficiently.

Dr. Canapp received extensive training in arthroscopy during his residency at the University of Florida and is currently performing arthroscopic procedures for the diagnosis and treatment of diseases of the shoulder, elbow, stifle, and hock. Diagnostic and therapeutic arthroscopic procedures in the shoulder include: osteochondritis dissecans (OCD), bicepital tenosynovitis, glenoid fractures, and joint laxiety (glenoid humeral ligament tears). Arthroscopic procedures of the elbow include: OCD, fragmented medial coronoid process, an ununited anconeal process, and debridement of chronic osteoarthritic changes. Arthroscopy of the stifle include: OCD, diagnosing partial cranial cruciate ligament ruptures, debriding meniscal tears, and ruptured cruciate ligament remnants prior to an extracapsular stabilization or the tibial plateau leveling osteotomy (TPLO), and performing the meniscal release prior to the TPLO. Arthroscopy of the hock is limited to the diagnosis and treatment of OCD.

The average cost of arthroscopic procedures is $1,700 for unilateral procedures and $2,500 for bilateral procedures. Dogs are typically hospitalized for one day following surgery. Post-op care includes physical therapy, treatment with nonsteroidal anti-inflammatory drugs for 2 weeks, and joint protective agents such as glucosamine and chondroitin sulfate for life.

In the developmental stage of arthroscopy in the dog, a frequently expressed comment was that arthrotomy was as valuable and as easy (or easier) to perform as arthroscopy. Now that the advantages of arthroscopy have been demonstrated, the skepticism has changed into enthusiasm. The same evolution occurred with arthroscopy in both humans and the horse.

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