



Clinical Case Report Competition

Utopia Academy

Spring 2009

Third Place Winner

Margaret Bacon

Effects of massage and hydrotherapy for
chronic unresolved medial knee pain

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Utopia Academy competition

3rd place - Margaret Bacon

for

Effects of massage and hydrotherapy for
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Submission Date: April 17th 2009

Submitted to: Randal Persad

By: Margaret J. Bacon, AP07

Case Study Synopsis:

Question: What are the effects of massage therapy in the treatment of a seven year old bucket handle tear of the left medial meniscus?

Approach: Physical application of therapeutic massage modalities were used in combination with client education and a comprehensive home care plan of action.

Results: Client compliance with home care including hydrotherapy and strengthening exercises was directly proportional to outcome. When he completed the tasks, benefits of decreased pain and increased function of the left knee were noted. Hands-on work proved to have positive results with pre and post treatment evaluations where increased extensibility of hypertoned structures allowed for posturing which reduced the stress on the area of complaint (left knee). Client has requested further bi-weekly appointments to help maintain increased range of motion and monitor muscular rebalancing.

Introduction

This case study explores the effects of massage in the treatment of Andrew*, a 34 year old athletic yoga teacher presenting with recurrent left side medial knee pain. Pre-existing symptoms were intensified six years ago while living in India studying yoga. At that time his yoga instructor forced both his left knee and hip into extreme external rotation in order to position him in seated padmasana (lotus posture). An acute sharp pain localized at the medial aspect of the knee as well as an audible popping sound resulted from the adjustment. My client thought, at first, it was a yogic "opening" - a release of soft tissue allowing him to move deeper into his practice. He continued through the pain and finished the day of classes. That evening the swelling and pain increased indicating to him that what had happened that day may have been pathological and therefore solicited the expert advice of a resident chiropractor and MD. At the time an MRI was done as well as orthopedic special testing diagnosing a bucket handle tear¹ of the left medial meniscus, and grade 2 sprain of the medial co-lateral ligaments. Due to financial limitations the recommended surgery was never done. Rehabilitation was self designed and included icing the knee after physical activity, reducing weight bearing activities, and limiting extreme up and down hill hiking or walking. No massage, physical therapy, or other body work was done at the time of the injury. Treatment since then includes massage received sporadically but never to directly address the knee pain.

On the first day I saw Andrew for assessment and initial hands on work his major complaint related to his left knee including recurrent sharp pain at the medial aspect and joint effusion. A self described "minor" secondary complaint was tight hips, he believed related to shortened muscles surrounding the joint. Symptoms relating to his knee, he said, were elicited by predictable posturing for example; knee flexion greater than 145 degrees, passive over pressure external tibial rotation, and extensive closed chain weight bearing activities or ballistic pivoting and jumping. Pain was reported as worse when his hips are "tight", muscles are fatigued, or if he is not paying attention to alignment during more challenging yoga poses. Pain is relieved by rest, elevation, ice, and use of a tensor bandage. Andrew continues to teach and practice yoga daily mostly pain free with slight modifications like placing a rolled towel in the popliteal space during seated knee flexion. He continues to live an extremely active life to a high level of function. He admits a tendency to work through the pain decreasing intensity only with visible swelling or

when his knee "gives way, locks, or buckles". Identical symptoms, mild swelling and sharp pain on the medial aspect are now occasionally noticed on the right knee as well. Bio-mechanical history relating to his knees and additional precipitating factors for trauma include competitive snowboarding as well extensive surfing and skateboarding. He mentioned that seasonal injuries to the knee were common, bad enough to keep him from activity for a day or two but not severe enough to require medical attention. The same R.I.C.E. treatment was applied for every trauma. Apart from his primary complaint Andrew's intake interview revealed no other health concerns, in fact unsolicited gratitude was expressed for his current state of fitness and wellness.

Postural observations were made from all angles. Andrew was dressed down to bike shorts to facilitate accurate findings. Initial visual assessment showed bi-lateral pes planus with a subtalar eversion and lax medial longitudinal arch, lateral tibial torsion on anterior facing patella with a prominent fibular head, while standing the knees appeared hyperextended with a valgus formation, iliotibial was well defined with lateral hamstrings (bicep femoris) visible anteriorly, muscle definition was noted indicating a mesomorph body type. Muscle tone was consistent in the upper body, limb and trunk displaying no remarkable postural deviations or imbalances. The greatest area of concern after the postural analysis include the excessive lateral tibial rotation in combination with the taught ITB perhaps creating an excessive external pull on the low leg causing malalignment of the knee during joint motion.

Results of initial orthopedic testing of the hip and knee are summarized in Table 1.

Table 1. Initial assessment results

Special test	positive results (bi-lateral unless otherwise noted)	negative
Knee joint effusion		+
Collateral ligaments	valgus stress test excessive movement	
Cruciate ligament tests	ant. + post. draw tests L < R	
McMurry's/ Apply's compression		+
Patellar	Apprehension/Clarke's compression squinting / patella alta Nobel compression	

Ely's	Rectus femoris(shortened)	
Thomas test	Rectus femoris(shortened)	
Sartorius muscle tests	Palpable trigger points at ASIS attach.	
Ober's	Incomplete	

Of special note: Marked apprehension verbally expressed by my guest inhibited me from completing both Ober's and patellar grind tests.

Muscle testing of quadriceps, hamstrings, gastrocs, soleus, tibialis anterior, fibularis longus and brevis, as well as thigh adductors, abductors, flexors and extensors all resulted in strong and pain free function.

Review of all initial information indicates predisposing factors may be contributing to the vulnerability of Andrews' knee. Included in these findings are a history of snow boarding where his feet were in bindings, fixed in a flexed externally rotated posture as well as the acute trauma experienced six years ago in India. Surfing and skate boarding, also requiring deep knee bending with rotation, may have contributed to his current condition. This physical history in combination with his unique presenting postural malalignments are predisposing factors for knee injury. At no point has Andrew mediated the pain with any medications, over the counter or doctor prescribed. Following the R.I.C.E. principle of rest, ice, compress, and elevate to mitigated any symptoms and pain has always produced positive results. Apart from complaints relating to his knees Andrew is in excellent health with an uncomplicated health history, motivated to participate fulling in deducing symptoms and maintaining tissue health and joint function. Due to Andrew's extensive athletic lifestyle and occupation a key goal is create a plan which compliments activities which strengthen weaker muscles or restore balance to muscular antagonists and develop efficient modifications to provocative posturing like deep knee bends.

Treatment Plan

A couple of passages from Kessler's *Management of Common Musculoskeletal Disorders* were foundational in the action plan designed for my client. I was guided by specific anatomical structures outlined as "involved" with various pathological dysfunctions including both longitudinal meniscal tears and valgus-external rotation loading conditions. Focusing on highlighted structures helped to support a therapeutic approach where techniques were chosen which directly effect those listed as affected. For example as a result of reading Kessler's details on pathomechanical loading in a valgus-external rotation I chose to use cross fiber fictions to

support the laying down of functional scar tissue on the medial aspect of the knee where over stretched damaged ligaments may be causing progressive instability at the joint line. From further reading I learned the common etiology of knee buckling or giving way results from abnormal joint receptor activity. This fact pointed me in the direction of incorporation neuromuscular techniques like muscle energy and proprioceptive retraining into the plan in order to help improve neuromuscular function. I drew too from the wisdom of Magee and Rattray's chapters on the knee and orthopedic dysfunction respectively. I didn't try to reinvent the wheel during this study. Instead I looked to the experience of published therapists and tried my own hands using their recommendations for the treatment of my client's major complaints and assessment findings. I credit their collective wisdom for the largely positive treatment outcomes of my client's sense of increased joint stability and proprioceptive awareness as well as his decrease in pain related complaints. The following paragraph outlines the specific technique used over the course of the three treatments.

The first section includes the major complaints and clinical assessment findings which were addressed during the three treatment sessions. Following this is a list of the techniques chosen on the basis of their therapeutic effects on intake notes. Goals and intentioned outcomes conclude the treatment section.

Major complaints and clinical assessment findings which were addressed during the three treatment sessions included some unilaterally specific to the left knee like; buckling/ giving way not related to specific activity and localized pain at medial knee joint line that is worse with external tibial rotation. Bi-lateral findings were; functional pes planus, hypertoned lateral hip rotators, fibrous ITB tibial attachments, lateral adhesions in vastus lateralis, cramping of triceps suri with prolong contraction, decreased internal and external rotation at the hip, client apprehension with therapist induced patellar manipulation and valgus force, and multiple trigger points and tender nodules along entire lateral aspect of leg. The numerous soft tissue attachments to the medial meniscus were also considered important factors to address during treatment as they are often involved in a meniscal injury. These approximating structures include; the medial collateral ligament of the knee, the coronary ligaments and the joint capsule itself. The presenting laxity of the MCL suggested by the positive valgus stress test made my client a prime candidate for any technique which increases joint stability.

Specific massage techniques used were chosen on the basis of their therapeutic effects on specific intake notes. Modalities included; myofascial trigger point therapy, post isometric contraction stretching, cross fiber frictions, fascial reshaping, muscle stimulatory techniques,

Golgi tendon organ release, and petrissage.

Ideal goals or outcomes for this case include; increased knee stability , decreased knee pain and discomfort, increased hip external, client education, strengthening of dynamic knee stabilizers ,lengthening of shortened leg musculature, facilitation of functional scar tissue, and improve joint proprioception.

Please see the enclosed clinical records for further explanation of treatment content including the areas targeted with listed techniques.

Clinical reasoning behind Andrew's treatment plan was that increasing joint stability will decrease the risk for further pathology as well maintaining the health of surrounding tissues. I believed this could be achieved by both increasing the strength of the dynamic stabilizers and decreasing the tone of the antagonising muscles and structures generating a lateral pull on the tibia. I did this by providing homecare strengthening and proprioceptive exercises as well as hands on work using the techniques listed above. Hand written clinical records specify where and when during the treatment listed modalities were employed. Please find copies of these documents enclosed.

Reading of qualified yoga anatomists wisdom relating to the bio-mechanics of various yoga postures involving, especially, the knee were extremely helpful in the understanding of the nature of Andrew's symptoms. I have included a key quote for your interest as I believe it does an excellent job of explaining is basic language factors contributing to knee injury whether it be traumatic or progressive.

"If an overzealous student continues to pull the foot up after his thigh stops externally rotating, or if a student or teacher forces the knee downward, the thighbone and shinbone will act like long levers that apply great force to the knee. Like a pair of long-handled bolt cutters, they will pinch the inner cartilage of the knee between the inner ends of the femur and tibia. In anatomical terms, the medial meniscus will be squeezed between the medial femoral condyle and the medial tibial condyle. In layman's terms, the inner ends of the thigh and shin will squeeze the inner cartilage of the knee. With even moderate force, this action can seriously damage the meniscus. Such injuries can be very painful, debilitating, and slow to heal." -Roger Cole, Ph.D.

Andrew's request for a pain free yoga practice motivated further research following our first

session together. Close examination of the most challenging positions for Andrew was done with an eye for kinesiology in order to develop a way in which he could get into and out of them without eliciting any pain or discomfort. One posture in question is called "Lotus" or seated "auspicious" pose. Traditionally this pose places great stress on both the knees and hips requiring a great deal of flexibility in both joints. With this in mind I explored different ways to achieve roughly the same physical alignment of spine while reducing the necessary rotation of lower limb joints. This was done by asking Andrew to roll the end of his yoga mat up enough to raise his ischeal tuberosities of the ground, functionally elevating and decreasing the external rotation of his hips. Secondly, I asked Andrew to place two inch foam blocks under each knee. Supporting the knees in this fashion reduced the stretch to the medial aspect of the knee an area already over stretched as indicated by the valgus stress test. Finally a rolled towel was placed in the popliteal space to increase joint gaping and decrease the chance of structures being impinged during knee flexion. Other modifications suggested were designed to add stability to the knee during both closed and open chain activity. Included in these recommendations were to use a foam block between the thighs to prevent undo medial folding of the knees during standing balancing postures as well as to increase proprioceptive awareness and therefore neuromuscular firing of the adductors especially vastus medialis oblique. Joint proprioceptive education was suggested with self administered digital pressure at the joint line while moving the knee into and out of flexion when seated. Also for seated postures, a self administered isometric resistance applied to the ball of the foot flexing was designed to activate gastrocs thereby stabilizing the posterior aspect of the joint. These modifications concluded the homecare plan designed to specifically address Andrew's request for a pain free yoga practice. All modifications were attempted by Andrew during treatment time and monitored for proper bio-mechanics. On first attempts they seems beneficial decreasing apprehension in all plans of movement. Future reassessment will offer a stronger argument towards their long term benefit.

Before concluding the treatment portion of the study I would like to draw special attention to the third treatment record. Treatment on this day shifted from the client's original complaint to address an injury suffered two days prior to our scheduled appointment. Ironically the mode of injury was a direct result of his preexisting knee instability and tendency to push the envelope when it comes to a physical challenge. He had attempted to jump up on a low counter top in order to launch himself and tackle his roommate. Not surprisingly, his knee gave out causing him to fall backwards. Despite icing the knee mild effusion and point tenderness was present when we met. He had not elevated the leg or ceased weight bearing since the accident. The session that day included decreasing visible swelling in the area by using lymph and postural drainage.

Passive range of motion of the hip was also added to help with venous return and inguinal node pumping. Apart from these additions treatment was conducted according to plan and is described on the clinical records.

Reassessment

A reassessment, was included in the last session. Appropriate orthopedic tests were repeated to highlight any marked difference, summarized in table 2.

Table 2. Reassessment results

Special tests	positive results(right side tested only for effusion)	negative
Knee joint effusion	Right knee (mild)	left side
Collateral ligaments	valgus stress test, excessive movement	
Cruciate tests	ant. + post. draw tests excessive movement	
McMurry's/Apply's compression		+
Patellar	Apprehension patella alta Nobel compression	
Ely's	Rectus Femoris(shortened)	
Thomas test	Rectus femoris(shortened)	
Sartorius muscle tests	Palpable trigger points at ASIS attach.	
Ober's	not completed	

Due to Andrew's injury two days ago and presenting right side knee effusion special tests were not performed bi-laterally except were noted. Reassessment showed no objective shift from initial measurements. Subjective results however, were more encouraging. Muscle soreness localized on the medial thigh indicated increased MVO firing and that targeted strengthening exercises were working appropriate muscles. A decrease in discomfort and pain at the knees was noted both during ADLs and yoga posturing. The client also found that with the knowledge of low limb anatomy including how a hypomobile joint (his hips) places additional stress on his knees. Further understanding of the compensatory stress the knee takes on with hip hypomobility proved further motivation to maintaining the therapeutic exercise plan of action. A single application of frictions to the medial collateral ligaments produced inconclusive results. Further application of this specific work is necessary to produce notable change. Andrew intends to

continue experimenting with postural adjustments, strengthening and stretching recommendations. A package of photocopied notes illustrating low limb and hip anatomy were discussed and the given as educational material to assist his understanding of his specific complaints. He found the time taken to review this material extremely helpful.

Discussion:

An exploration of the anatomy and arthokinematics of the leg in padmasana helped guide my treatment plan as well as educate my client as to what structures may be contributing to his symptoms. For example of the 12 muscles that cross the knee joint, 8 of them cross the hip joint (4 quads, 3 hamstrings, and sartorius) and 1 of them crosses the ankle joint (gastrocnemius via the Achilles tendon). Reasoning suggests that if there is something dysfunctional going on at the knee, it is imperative to look at the muscles that stabilize these two other joints. When I did this I found, bi-laterally, excessive tone of all lateral hip rotators, limited external hip rotation with a firm ligament end feel, multiple trigger points in gluteus medius, and along the vastus lateralis ITB attachment. Dorsi flexion was limited by hypertoned triceps suri complex, fibrous bands with tender points were palpated in all muscles comprising the posterior leg compartment. In short, soft tissue has either contributed to or accommodated for the presenting knee pain. Either way I believed that addressing these dysfunctions would decrease the stress on the knees. I then went ahead and began working proximal prior to attempting any work at the knee. While this might be a great idea in theory time management should be mastered prior to negotiating this treatment approach. I found that in order that I actually address the area of complaint I went over the allotted time. In the future I would encourage a pretreatment hydrotherapy application of steam or paraffin in order to reduce the time spent increasing the extensibility of the tissues.

Of mild concern was the fact that both my client and I noticed that my pressure shifted, using less, when treating the more effected side perhaps shifting to a less therapeutic depth and reducing the effectiveness of the more specific techniques like GTO release. Once noted verbal cuing by Andrew was requested where he was asked to communicate any bi-lateral difference in depth or pressure during treatment so that corrections be made. This verbal feedback was very helpful, allowing me to proceed confident that I would not cause undo pain or discomfort while maintaining the therapeutic intention.

A key area neglected to be addressed directly was the patella femoral joint. The visual assessment included bi-lateral squinting patella. Joint play to the area during physical

assessment revealed decreased distal glide of the patella. After rereading the arthrokinematics of the knee during flexion I was reminded that knee flexion requires a caudal glide of the patella in the trochlear groove of the femur. Manual joint play specifically increasing the ability of the patella to glide distally will facilitate the knee moving into greater flexion. Understanding this now I know for next time to consider including such joint play where indicated as outlined on page 547 and 249 of Kessler's *Management of Common Musculoskeletal Disorders: Physical Therapy Principles and Practice*.

Conclusion

Work with a specific orthopedic complaint for the case study was solicited for the specific reason that it poses the most challenges for me at this time in my learning. Included in those challenges are time management and an considerable aversion to introducing pain or stress with my touch. Fortunately I was "called" up on both self determined keys to treatment competence highlighted by lengthy treatment goals and the use of cross fiber frictions respectively. My client was fundamental in my learning here. In full cooperation he promised to let me know were I was on the pain scale, effectively coaching me until my touch felt the same bi-laterally. I want to finish by expressing great appreciation for my client who took on the role with great enthusiasm which, participating fully during treatment and with homecare instructions, however involved they were. I look forward to greeting future clients looking for treatment that relates to their orthopedic concerns with new confidence and knowledge.

1."A bucket-handle tear is a tear around the rim of the meniscus, causing the central portion (the bucket-handle) to displace into the joint. These types of tears generally involve large amounts of the meniscus, and are often amenable to meniscus repair (rather than removal of the meniscus). Patients with these bucket-handle tears may have limited motion of the knee joint if the meniscus tear is large enough to get caught inside the knee." - Jonathan Cluett, M.D., Orthopedic specialist

*The client's name has been changed in order to respect client confidentiality.

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