



PASIG MONTHLY CITATION BLAST: No.17

January 2007

Dear PASIG members:

We look forward to seeing you at Combined Sections Meeting in Boston. We hope our members will attend all of our PASIG programming, business meeting, and mingle at our reception as well as support our members presenting their research. Below is a summary of PASIG activities and performing arts-related presentations at CSM. Stop by the Orthopaedic Section table for a handout of these PA-relevant topics or print this out. (Please check locations in onsite programming updates.)

Our special interest topic this month, to get us primed for our CSM PASIG programming, is *Hip pathology*, contributed by PASIG past president, Brent Anderson PT, PhD, OCS. The format is an annotated bibliography of articles on the selected topic from 1996 – 2006. Anyone interested in overseeing a special topic citation blast, please volunteer. As always, your comments and entry contributions to these Citation BLASTs are welcome. Please drop me an e-mail anytime.

Shaw Bronner
Chair, PASIG Research Committee
sbronner@liu.edu

* * * * *

Friday, 2/16/07

1:00 – 5:00 PASIG PROGRAMMING

Evaluation, Rehabilitation and Medical Management of the HIP joint through the lifespan of the performing artist – An evolving Art

1:00 – 1:30 LIVE- Hip evaluation and clinical decision making on a Dancer.
Michelina Cassella PT

- 1:30 – 2:20 Differential Diagnosis of Hip Pain in the Performing Artist.
RobRoy L. Martin PT, PhD, CSCS
- 2:20 – 3:20 Non operative and operative management of hip pathology in performing artists. **Pierre D'Hemecourt, MD**
- 3:20 – 3:40 Management of Rectus Femoris tendonitis in an Elite Figure Skater.
Tara Jo Manal PT, DPT, OCS, SCS
- 3:40 – 4:40 Post operative management of the hip in the performing artists- an evolving art. **Keelan R Enseki PT, MS, OCS , SCS, ATC, CSCS**
- 4:40 – 5:00 Clinical pearls of rehabilitation of hip pain and labral tears in dancers.
Heather Southwick PT, MS
- * * * * *
- 5:00 – 6:00 **PASIG Business Meeting**
- 6:00 – 7:30 **PASIG Reception**
- * * * * *

PLATFORMS / POSTERS

Orthopaedic Section

Thursday, 2/15/07

Platform Session B: Foot & Ankle

- 12:00-12:15 Neville CG. Effect of the Airlift PTTD brace on foot kinematics in subjects with Stage II posterior tibial tendon dysfunction.
- 12:15-12:30 Carcia CR. Evidence of validity for the foot and ankle ability measure (FAAM) in individuals with chronic ankle instability.
- 12:30-12:45 McPoil TG. Variations in foot posture and mobility between individuals with anterior knee pain and controls.
- 12:45-1:00 Cornwall MW. Reliability of the Foot Posture Index.

Friday, 2/16/07

Platform Session A: Hip & Knee

- 10:30-10:45 Martin RRL. Evidence of reliability and responsiveness for the hip outcome score (HOS).
- 10:45-11:00 Martin RRL. Evidence of validity for the hip outcome score (HOS) in assessment of hip arthroscopy.

Platform Session B: Shoulder, Occupational Medicine, Performing Arts

- 9:15-9:30 Pidcoe PE. Does rehabilitation intensity affect the prognosis of a functional recovery in a skeletally immature female elite gymnast with a nonreduced Type 2 manubriosternal dislocation
- 9:45-10:00 Ojofeitimi S. Effect of an in-house comprehensive management program on injury rates and healthcare costs.

- 10:00-10:15 Berglund C & Philipps LE. Flexor hallucis longus tendinitis in a dancer. *Recipients of PASIG Student Scholarship Award.*
- 10:15-10:30 Gamboa JM. Injury patterns in elite adolescent preprofessional ballet dancers and the use of screening data to describe and predict injury characteristics.
- 10:30-10:45 The Gymnastics Functional Measurement Tool: Pilot validation of a physical abilities field test for competitive gymnasts.
- 10:45-11:00 Bronner S. Comprehensive injury surveillance of dance injuries: A proposal for uniform guidelines for professional companies.

Platform Session B: Spine

- 2:00-2:15 Lyons CL. Neuromuscular electrical stimulation as an adjunct to traditional lumbar stabilization exercises for patients with lumbar segmental instability.

Saturday, 2/17/07

Platform Session A: Spine, Elbow, Other

- 3:00-3:15 Mintken PE. Implementation of a direct-access musculoskeletal clinic in a University setting.

Friday & Saturday 2/16 & 2/17/07

Poster Presentations

- 8:00-10:00 Buscema CJ. The immediate effects of lumbosacral region manipulation on hip passive range of motion in patients with low back pain.
- Teyhen DS. Assessment of the lateral abdominal muscles during the active straight leg raise in a patient with lumbopelvic dysfunction.
- Krause DA. Snapping popliteus syndrome in a 21-year-old female runner.
- Erickson ML. Hip flexibility and strength as risk factors for the development of patellofemoral pain.

Sports PT Section

Friday & Saturday 2/16 & 2/17/07

Poster Presentations

- 8:00-10:00 McClinton SM. Reliability of a weight-bearing ankle dorsiflexion measure with varied foot and knee positions.

The hip is a frequently injured joint in the dancer. A common diagnosis is “snapping hip” or tendoni of the hip flexors. More recently, there is growing body of evidence of internal derangements of the hip joint in athletes, including dancers. The advances in hip arthroscopy have allowed many dance to return to dance activity. There are, however, a growing number of concerns regarding these procedures and who are the best candidates for a successful outcome. This compilation of abstrac can be divided into snapping hip and tendinosis of the hip with accompanying imaging; internal derangements of the hip joint; and arthroscopic intervention and rehabilitation of the hip.

Brent Anderson PT, PhD, OCS

Bharam S (2006). Labral tears, extra-articular injuries, and hip arthroscopy in the athlete. Clin Sports Med **25**(2): 279-92, ix.

Labral tears in athletes can lead to disabling hip pain and affect their athletic performance. Other intra-articular lesions, including chondral injuries, capsular abnormalities, and ligamentum teres tears, commonly coexist with acetabular labral tears. Isolated athletic injury or repetitive traumatic activity can lead to labral tears; however, underlying structural (femoroacetabular impingement) and developmental abnormalities predisposing athletes to labral pathology must be addressed. Recent studies have demonstrated lesions associated with acetabular labral tears, and that labral tears rarely occur as isolated injuries. Return to sport is favorable in athletes who have labral tears if they are properly treated with arthroscopic intervention.

Borody C (2005). Symptomatic herniation pit of the femoral neck: a case report. J Manipulative Physiol Ther **28**(6): 449-51.

OBJECTIVE: To discuss herniation pits of the femoral neck as a possible source of hip pain in a young athletic population. **CLINICAL FEATURES:** A 25-year-old former varsity volleyball player sought treatment for recurrent episodes of sharp left hip pain after intense physical activity. Radiographs revealed a small, oval, lobulated radiolucency with a thin sclerotic border in the superolateral aspect of the left femoral neck. Passive internal rotation of the left hip reproduced the complaint. Iliopsoas tendinitis/bursitis tests did not reproduce the complaint. **INTERVENTION AND OUTCOME:** The patient reported no significant reduction of hip pain after a variety of conservative therapies including soft tissue therapy, stretching, interferential current, and long-axis distraction. **CONCLUSION:** There is evidence to suggest that herniation pits of the femoral neck are a result of mechanical stress from the overlying joint capsule and iliopsoas tendon. Herniation pits of the femoral neck should be considered a potential cause of hip pain, particularly if the patient is physically active.

Byrd JW, Jones KS (2006). Adhesive capsulitis of the hip. Arthroscopy **22**(1): 89-94.

PURPOSE: It is postulated that adhesive capsulitis of the hip is more common than suggested in the published literature, which recounts only a few isolated cases, and that this condition shares many of the same characteristics seen in the shoulder. The purpose of this study was to investigate and report the findings of the first clinical case series on this condition. **TYPE OF STUDY:** Clinical case series, retrospective review of prospectively collected data. **METHODS:** Since 1993, all hip arthroscopy cases have been prospectively assessed with a 100-point rating system. In 1999, adhesive capsulitis was first recognized as a causative factor. Since then, 9 patients have been identified with this condition with at least 1 year of follow-up. **RESULTS:** There was 100% follow-up at an average of 17.3 months. The average age was 43.7 years. There were 8 women and 1 man. Radiographs were normal in 8 cases and revealed mild degenerative disease in the 1 male patient. Magnetic resonance imaging/arthrography failed to reveal evidence of adhesive capsulitis. Examination under anesthesia revealed an average loss of 25 degrees of rotational motion (19.4 external, 5.6 degrees internal). Full range of motion was regained with manipulation. Arthroscopy revealed characteristic findings of adhesive capsulitis in all cases and coexistent pathology in 6 cases (5 articular lesions, 3 labral tears, and 1 ruptured ligamentum teres). The 8 women with normal radiographs all improved with an average of 32 points (preoperative, 56.4; postoperative, 88.4). The 1 man with degenerative changes showed negligible improvement. There were no complications. **CONCLUSIONS:** Adhesive capsulitis of the hip is not as rare as suggested by the paucity of available literature. The clinical characteristics are similar to the shoulder, principally consisting of painful restricted motion and a clear predilection

for middle aged women. It may occur with or without associated intra-articular pathology. Arthroscopy can be beneficial in the treatment of recalcitrant cases, but may assume less of a role with improved diagnostic skills essential to implementing a proper management strategy. LEVEL OF EVIDENCE: Level IV.

Coplan JA (2002). Ballet dancer's turnout and its relationship to self-reported injury. J Orthop Sports Phys Ther **32**(11): 579-84.

STUDY DESIGN: Retrospective cohort study. OBJECTIVES: To compare the relationship between the degrees of turnout, passive hip external rotation range of motion, and self-reported history of low back and lower extremity injury in ballet dancers. BACKGROUND: Ballet dancers are encouraged to externally rotate their lower extremities (turnout) as far as possible. This may cause stress on the dancers' low back and lower extremities, putting them at risk for injury. METHODS AND MEASURES: Thirty college-level ballet dancers and instructors were evaluated. Each participant completed an injury questionnaire that placed the participant either in a group with a self-reported history of low back and lower extremity injury or in a group without a self-reported history of low back and lower extremity injury. Each dancer's first-position turnout and passive external rotation range of motion for both hips were measured. The comparison between each dancer's first-position turnout and the measured hip external rotation range of motion was called "compensated turnout." A 2-sample test was used to determine if the average compensated turnout was significantly different in the injured and noninjured groups. RESULTS: The mean (+/- SD) compensated turnout values for the injured and noninjured groups were 25.40 degrees (+/- 21.3 degrees) and 4.7 degrees (+/- 16.3 degrees), respectively. This difference was significant at P = 0.006. CONCLUSION: Based on a self-reported history of low back and lower extremity injuries, ballet dancers have a greater risk of injury if they reach a turnout position that is greater than their available bilateral passive hip external rotation range of motion.

Crawford K, Philippon MJ, et al. (2006). Microfracture of the hip in athletes. Clin Sports Med **25**(2): 327-35, x.

Most studies addressing treatment of chondral injuries have involved the knee. Various techniques have been used in the knee. Microfracture has shown excellent results in the knee. Chondral injuries of the hip are common in athletes with labral tears and femoroacetabular impingement. The microfracture technique is now being used in the hip joint. Indications include full-thickness cartilage loss or unstable flap on a weight-bearing surface. An important contraindication is the patients unwillingness to follow the postoperative protocol and rehabilitation plan. The microfracture technique in the hip is similar to that in the knee. Postoperatively, patients use a continuous passive motion and are flat foot (20 lbs.) weightbearing for 8 weeks. Early results following microfracture in the hip have been encouraging.

De Paulis F, Cacchio A, et al. (1998). Sports injuries in the pelvis and hip: diagnostic imaging. Eur J Radiol **27 Suppl 1**: S49-59.

We discuss the role of imaging techniques in examining the athletes with sports injuries involving the pelvis and the hip. Pelvis and hip pain is of difficult clinical clarification because of the various athletic injuries which may affect the bone or soft tissues at different anatomic sites. Moreover, the symptoms of pelvis and hip injuries are similar in most cases and they are often diffuse and atypical. Diagnostic imaging can play an essential role because treatment success depends on a correct diagnosis and these techniques can actually differentiate the most frequent causes of pelvis and hip sports injuries such as groin strain, osteitis pubis, ischial intersection syndrome, snapping hip,

stress fractures, hernias and avulsion fractures. Finally, we discuss the role of magnetic resonance imaging in detecting the causes of hip pain other than sports injuries, such as avascular necrosis, reflex sympathetic dystrophy syndrome, herniation pit, acetabular labrum injuries. To conclude, diagnostic imaging techniques currently permit the direct and noninvasive depiction of pelvis and hip conditions. Particularly, magnetic resonance imaging is very helpful in detecting injury site, extent and characteristics; it can also predict the time period an athlete will be disabled and help define the best treatment planning.

Enseki KR, Martin RL, et al. (2006). The hip joint: arthroscopic procedures and postoperative rehabilitation. *J Orthop Sports Phys Ther* **36**(7): 516-25.

Recent technological improvements have resulted in a greater number of surgical options available for individuals with hip joint pathology. These options are particularly pertinent to the relatively younger and more active population. The diagnosis and treatment of acetabular labral tears have become topics of particular interest. Improvements in diagnostic capability and surgical technology have resulted in an increased number of arthroscopic procedures being performed to address acetabular labral tears and associated pathology. Associated conditions include capsular laxity, femoral-acetabular impingement, and chondral lesions. Arthroscopic techniques include labral tear resection, labral repair, capsular modification, osteoplasty, and microfracture procedures. Postoperative rehabilitation following arthroscopic procedures of the hip joint carries particular concerns regarding range of motion, weight-bearing precautions, and initiation of strength activities. Postoperative rehabilitation protocols that have been typically used for surgeries such as total hip arthroplasty are often not sufficient for the population of patients undergoing arthroscopic procedures of the hip joint. Postoperative rehabilitation should be based upon the principles of tissue healing as well as individual patient characteristics. As arthroscopic procedures to address acetabular labral tears and associated pathology evolve, physical therapists have the opportunity to play a significant role through the development of corresponding rehabilitation protocols.

Kocher MS, Kim YJ, et al. (2005). Hip arthroscopy in children and adolescents. *J Pediatr Orthop* **25**(5): 680-6.

Hip arthroscopy has become an established procedure for certain indications in adults, but experience in children and adolescents has been more limited. The purpose of this study is to report the early-term results of hip arthroscopy in children and adolescents. A consecutive case series of 54 hip arthroscopies in 42 patients 18 years old and younger over a 3-year period at a tertiary-care children's hospital with a minimum of 1 year of follow-up was reviewed. Patients were assessed with the modified Harris hip score (HHS) before and after surgery. Overall results and results by common diagnoses were analyzed. Indications for surgery included isolated labral tear (n = 30), Perthes disease (n = 8), hip dysplasia with labral tear after prior periacetabular osteotomy (n = 8), inflammatory arthritis (n = 3), spondyloepiphyseal dysplasia (n = 2), avascular necrosis (n = 1), slipped capital femoral epiphysis (n = 1), and osteochondral fracture (n = 1). Overall, there was a significant improvement in HHS from 53.1 to 82.9 (P < 0.001), with 83% of patients improved. By diagnosis, significant improvement in HHS was seen for patients with isolated labral tears undergoing labral debridement (before surgery 57.6; after surgery 89.2; P < 0.001), for patients with Perthes disease undergoing chondroplasty and loose body excision (before surgery 49.5; after surgery 80.1; P < 0.001), and for patients with hip dysplasia after prior periacetabular osteotomy undergoing labral debridement (before surgery 51.8; after surgery 79.8; P < 0.001). Complications included transient pudendal nerve palsy (n = 3), instrument breakage (n =

1), and recurrent labral tear (n = 3). Hip arthroscopy in children and adolescents appears to be safe and efficacious for certain indications in the short term.

McCarthy J, Barsoum W, et al. (2003). The role of hip arthroscopy in the elite athlete. Clin Orthop(406): 71-4.

Intraarticular hip disorders in the elite athlete are a relatively rare but serious potential consequence of high-level competition. Axial and torsional forces involving the hips of elite athletes place them at potentially higher risk for chondral injuries, labral injuries, or both. Ten patients (13 hips) had arthroscopy. Of the 10 patients, the average age was 24 years. Nine patients were men and one was a woman. Of the 13 (10 patients) arthroscopies done two cases were bilateral, and one patient had the same hip operated on twice. Seven of the patients were professional hockey players, one patient was a football player, one patient was a baseball player, and one patient was a golfer. All 13 hips (10 patients) had anterior labral tears, whereas two hips had anterior and posterior labral tears. Two hips had an average of four loose bodies, four had evidence of chondral lesions, and one had an anterior margin acetabular fracture. Twelve of 13 arthroscopies were successful; however, one patient had recurrent symptoms. There were no surgical complications. Hip arthroscopy is a safe and reproducible method to diagnose and treat intraarticular hip disorders in athletes, which facilitates earlier return to their respective sport.

McCarthy J, Puri L, et al. (2003). Articular cartilage changes in avascular necrosis: an arthroscopic evaluation. Clin Orthop Relat Res(406): 64-70.

Treatment methods for osteonecrosis (avascular necrosis) are wide and varied. When untreated, progression of the disease is common and may dictate femoral head replacement. However, before femoral head collapse, some patients have mechanical joint symptoms (locking, buckling, clicking) that are unaddressed by femoral head drilling alone. Radiographic examinations in these patients usually are nondiagnostic. Patients with these clinical criteria were evaluated arthroscopically. Between 1993 and 2000, seven patients were identified with known documented or radiographic diagnosis of avascular necrosis who had hip arthroscopy. Each patient's preoperative history, physical examination, plain radiographs, magnetic resonance imaging scans, and operative notes were reviewed from a prospectively-derived database. The duration and onset of symptoms were identified carefully. Case histories are presented on five of these patients. Articular cartilage changes were recorded and correlated to the preoperative radiologic studies. Hip arthroscopy is a minimally invasive, highly effective, joint-preserving surgery in the young patient with mechanical symptoms (locking, catching, buckling) and early avascular necrosis. Treatable lesions include loose bodies, synovitis, chondral flaps, and labral tears. In addition, accurate staging can be accomplished through direct observation.

Murphy KP, Ross AE, et al. (2006). Repair of the adult acetabular labrum. Arthroscopy **22**(5): 567 e1-3.

Although hip arthroscopy is a new technique, indications for its use are rapidly expanding. With better utilization and understanding of both radiologic assessment of hip pathology and clinical examination, specific intra-articular derangement is being identified. Longitudinal, peripheral, and intrasubstance anterior hip labral tears can be repaired using anterior paratrochanteric and anterior portals with standard hip arthroscopy equipment. Repair of the torn labrum may help re-establish the anatomic function of the labrum, thereby preventing biomechanical compromise through surgical

debridement, which may lead to degenerative changes associated with osteoarthritis. Although long-term results are still unknown, results of short-term follow-up are positive.

Narvani AA, Tsiridis E, et al. (2003). A preliminary report on prevalence of acetabular labrum tears in sports patients with groin pain. Knee Surg Sports Traumatol Arthrosc **11**(6): 403-8.

To the best of our knowledge, this prospective study is the first to investigate the prevalence of acetabular labrum tears in athletes presenting with groin pain. Eighteen athletes who presented to our sports clinic with groin pain, underwent clinical assessment and magnetic resonance arthrography (MRa) to detect presence or absence of acetabular labrum tears. Ethical committee approval and informed consent was obtained from each patient. In four out of these eighteen athletes (22%) the MRa demonstrated the presence of acetabular labrum tear. Three of them underwent arthroscopic debridement of their acetabular labrum tears and returned to their sporting activities within 8 months. Clicking sensation of the hip was a sensitive (100%) and specific (85%) clinical symptom to predict labral tears. The internal rotation-flexion-axial compression manoeuvre was sensitive (75%) but not specific (43%). The Thomas test was neither sensitive nor specific. The conclusion of the study is that acetabular labrum tears can be a common cause of groin pain in athletes. Sports clinicians managing athletes with groin pain have to be well aware of the condition.

Philippon MJ (2001). The role of arthroscopic thermal capsulorrhaphy in the hip. Clin Sports Med **20**(4): 817-29.

Arthroscopic thermal modification of collagen in the hip capsular tissue appears to be a treatment option for patients with hip instability. Traumatic hip instability is associated with frank dislocation or a subluxation, and labral tears. Atraumatic hip instability is associated with evidence of generalized ligament laxity. It can be associated with bone-collagen type disorders, including Ehlers-Danlos syndrome, Down syndrome, arthrochalis multiplex congenita, developmental dysplastic hip, and idiopathic type. As previously discussed by Bellabarba et al, capsular laxity may be the underlying cause of dynamic hip instability. The capsule is a fibrous, thick, and strong structure that encircles the proximal femur and the acetabulum. The capsule is thicker anteriorly than posteriorly, and consists of two sets of fibers, circular and longitudinal. The capsule ligaments play a very important role in hip stability. The hip joint capsule is reinforced by the iliofemoral, pubofemoral, and ischiofemoral ligaments. It remains sensitive to stretch and serves as a mechanism for muscular feedback and pain. The iliofemoral ligament limits hyperextension and lateral rotation of the hip joint and is taut in full extension. Full extension of the hip exposes the capsule and ligaments to a twisting and shortening effect that forces the head onto the acetabulum. We are currently studying the effect of iliofemoral ligament deficiency and its relationship to instability. Many of the properties of synovial lubrication depend on contact with articular surfaces, and incongruity due to instability may have some functional role in distribution of synovial fluid, leading to stresses from weightbearing and eventually to rapid deterioration of the articular surfaces. The high-level athletes in this series include two professional baseball players, three professional golfers (PGA), one professional football player (NFL), one figure skater (Olympic gold medalist), one gymnast (Olympic level, bilateral hips), and one ballet dancer; they returned to their pre-injury level of activity. The other patients returned to their pre-injury functional lifestyle. Hip instability appears to present consistently with stable gait abnormalities and painful sensation of instability. Recognizing the various patterns of hip instability is complicated, and therefore management and outcome of these disorders are quite variable. Bellabarba et al concluded that physical therapy alone had been unsuccessful and that temporary

success of a posterior capsular "plication" in one patient showed promise. Arthroscopic thermal modification of collagen in the hip capsular tissue appears to be a treatment option for patients with hip instability. The hip joint capsule is predominantly type 1 collagen, and the mechanism of tissue shrinkage through type 1 collagen alteration is well documented in the literature. Short-term results appear promising, however, more studies are required to determine the long-term efficacy of this procedure in the treatment of this challenging disorder.

Philippon MJ, Schenker ML (2006). Arthroscopy for the treatment of femoroacetabular impingement in the athlete. Clin Sports Med **25**(2): 299-308, ix.

Femoroacetabular impingement (FAI) has been recently recognized as a cause of hip pain, labral and chondral pathology, early osteoarthritis, and decreased athletic performance. Historically, treatment for FAI consisted of an open approach with surgical dislocation. It has been suggested that the operative trauma sustained during the open procedure may make it difficult for high-level athletes to return to play. As a result, an arthroscopic approach to treat FAI has been developed. The purpose of this article is to describe the arthroscopic technique for the treatment of cam and pincer-type hip impingement.

Philippon MJ, Schenker ML (2006). A new method for acetabular rim trimming and labral repair. Clin Sports Med **25**(2): 293-7, ix.

In the past, arthroscopic technique for the treatment of a torn acetabular labrum was limited to simple debridement of the torn tissue. However, due to recent advancements in the understanding of the function of the labrum, it has been suggested that labral repair can be beneficial. The purpose of this article is to report a new technique for arthroscopic rim trimming of pincer-type femoroacetabular impingement and labral repair through the lateral arthroscopic portal.

Rao J, Zhou YX, et al. (2001). Injury to the ligamentum teres. Mechanism, findings, and results of treatment. Clin Sports Med **20**(4): 791-9, vii.

In this article we discuss the role of the ligamentum teres in relation to the hip joint. The anatomy of the ligamentum teres is used to help with an understanding of the mechanism of the ligament's actions. This action and the modes of injury to the ligament are explored. We describe a simple classification system for injuries to the ligamentum teres, such that Group I are complete tears to the ligament; Group II are partial tears; and Group III are degenerative tears. As more experience is gained with the diagnosis and treatment of injuries to this integral structure, the clearer will be our understanding of the role of the ligamentum teres in the hip joint.

Stalzer S, Wahoff M, et al. (2006). Rehabilitation following hip arthroscopy. Clin Sports Med **25**(2): 337-57, x.

The management of hip injuries has evolved significantly in recent years with the advancement of arthroscopic techniques. These recent surgical advances require establishment of rehabilitation protocols that follow several basic principles including (1) consideration of soft-tissue healing constraints, (2) control of swelling and pain to limit muscular inhibition and atrophy, (3) early range of motion, (4) limitations of weight bearing, (5) early initiation of muscle activity and neuromuscular control, (6) progressive lower extremity strengthening and proprioceptive retraining, (7) cardiovascular training, and (8) sport-specific training. The following protocols should not be considered a cookbook approach to rehabilitation, rather guidelines that are used to achieve

consistent outcomes. These guidelines will continue to evolve as we learn more about the hip joint and surrounding musculature.

Tanzer M, Noiseux N (2004). Osseous abnormalities and early osteoarthritis: the role of hip impingement. Clin Orthop Relat Res(429): 170-7.

The purpose of this study was to establish that anterior hip impingement, secondary to an anterior femoral offset deficiency from a pistol-grip deformity, was a common etiology of hip disorders. This impingement results in a spectrum of injury ranging from anterior hip pain, labral tears, damage to the acetabular articular cartilage and idiopathic arthritis. This was accomplished through three separate but closely related studies: (1) an arthroscopic labral tear study of 38 patients who had hip arthroscopy for a labral tear (2) a hip cheilectomy study of 10 patients who had a cheilectomy for anterior femoroacetabular impingement and (3) an idiopathic arthritis study of 200 consecutive patients having THA. In all three studies, a common etiology was identified. Repetitive anterior femoroacetabular impingement resulted in anterior groin pain, labral tears, chondral damage and eventually arthritis. This impingement was caused by a pistol-grip deformity of the proximal femur in 97% of the cases in the arthroscopic labral study and 100% of the cases in the idiopathic arthritis study. The identification of anterior hip impingement as a cause of labral tears and idiopathic arthritis may allow surgeons to correct it early in its natural history and delay or prevent end-stage arthritis.

Wettstein M, Jung J, et al. (2006). Arthroscopic psoas tenotomy. Arthroscopy **22**(8): 907 e1-4.

Tenotomy may be indicated for psoas tendinitis or painful snapping if conservative treatment remains unsuccessful. Because of significant complications with open techniques, endoscopic operations have been developed. We present a new arthroscopic technique to access and release the psoas tendon from the hip joint. This procedure can be performed in addition to other arthroscopic procedures of the hip joint or alone. To exclude additional hip disease, a diagnostic round of the joint should be completed. After hip arthroscopy of the central compartment has been performed, traction is released and the 30 degrees arthroscope is placed via the proximal anterolateral portal lying on the anterior femoral neck. The medial synovial fold can be identified. This fold lies slightly medially underneath the anteromedial capsule at the level of the psoas tendon. The arthroscope is turned toward the anterior capsule. Sometimes, the tendon shines through a thin articular capsule, or it may even be accessed directly via a hole connecting the hip joint and the iliopectineal bursa at the level of the anterior head-neck junction. If this cannot be done, an electrothermic probe is introduced via the anterior portal to make a 2-cm transverse capsular incision. The tendon is released with the back side of the electrothermic device turned to the iliocapsular muscle that lies anterior to the psoas tendon. A complete release is achieved when the tendon stumps can be seen gapping at a distance and the fibers of the iliocapsular muscle are visible. The first 9 patients who underwent surgery performed according to this technique developed no complications, and their hip flexion strength was restored to normal within 3 months.

Winston P, Awan R, et al. (2007). Clinical examination and ultrasound of self-reported snapping hip syndrome in elite ballet dancers. Am J Sports Med **35**(1): 118-26.

BACKGROUND: Although snapping hip syndrome is commonly reported in ballet dancers, the prevalence, impact, and underlying mechanism of this condition have not been formally studied within a cohort of dancers. **PURPOSE:** To determine the prevalence, associated factors, and mechanisms of snapping hip and to investigate self-reported snapping with physical and ultrasound examination. **STUDY DESIGN:** Cross-

sectional study; Level of evidence, 3. **METHODS:** A snapping hip questionnaire was completed by 87 unselected elite ballet dancers at 2 institutions. Twenty-six of the dancers (50 hips) who were able to voluntarily snap their hips were selected from this group for further physical examination by 2 clinicians to determine whether there was a palpable snap, and each underwent an ultrasound examination of his or her hips. **RESULTS:** Ninety-one percent of dancers reported snapping hip, of which most (80%) had bilateral symptoms. Fifty-eight percent had pain associated with the snap, and 7% had taken time off dance because of this condition. Sixty percent of the dancers could voluntarily snap their hip. One or more of 3 dance movements elicited the snapping in 81%. The clinicians could palpate 46 of the 50 self-reported snapping hips. Ultrasound showed a snapping iliopsoas tendon in 59% of the hips and the iliotibial band snapping in 4%. In one third of cases, ultrasound was not helpful in identifying the cause of the snapping. **CONCLUSION:** Snapping hip is extremely common in ballet dancers. Some dancers have significant pain, yet many are asymptomatic. Self-reported snapping is likely to be palpable by the clinician. Iliotibial band snapping is evident by physical examination and ultrasound. Iliopsoas snapping was most common and required ultrasonic confirmation.

Yamamoto Y, Hamada Y, et al. (2005). Arthroscopic surgery to treat intra-articular type snapping hip. *Arthroscopy* **21**(9): 1120-5.

PURPOSE: To reveal the causes of the intra-articular type snapping hip and their frequency. **TYPE OF STUDY:** Case series. **METHODS:** We studied 2 hip joints of 2 male patients and 30 hip joints of 28 female patients with snapping hip syndrome, in which the accompanying pain was transiently relieved by intra-articular injection of local anesthetic. The mean age at diagnosis was 26 years. Plain radiography, hip arthrography, magnetic resonance imaging (MRI), and arthroscopy were performed in these patients and the findings were compared. **RESULTS:** Plain radiography findings showed no abnormality in 11 joints, hip osteoarthritis in 19 joints, and femoral head deformation caused by Perthes disease and synovial osteochondromatosis in 1 joint each. Excluding the case of synovial osteochondromatosis, 31 joints were examined by MRI, which failed to identify the cause of snapping hip in all cases. Hip arthrography revealed an intra-articular loose body in 2 joints with osteoarthritis. Arthroscopy revealed acetabular labral tears in all 11 joints with no abnormalities and 15 of 19 joints with osteoarthritis on plain radiography films, and incompatibility between acetabular labrum and deformed femoral head in 2 joints with osteoarthritis. In the case of femoral head deformation after Perthes disease, arthroscopy revealed detachment of the femoral head cartilage as a result of impingement of the acetabulum on the femoral head. Arthroscopic surgeries were conducted: partial limbectomy for acetabular labral tears, surgical removal of loose bodies, partial femoral head excision for incompatibility between acetabular labrum and deformed femoral head, and shaving or articular cartilage detachment. The surgeries resolved the snapping in all cases. **CONCLUSIONS:** Acetabular labral tear was the cause of 80% of cases of intra-articular type snapping hip. Incompatibility between the acetabular labrum and a deformed femoral head was found to be a cause of intra-articular type snapping hip. **LEVEL OF EVIDENCE:** Level IV, case series.