AAOS Now

Hip arthroscopy: Update, advances, and future applications

By Dean K. Matsuda, MD

Hip arthroscopy is arguably the most rapidly growing field in orthopaedic surgery

Supportive evidence is growing for hip arthroscopy, a procedure once held in low regard by many orthopaedic surgeons and considered by some as a challenging procedure without an indication. According to one source, the number of hip arthroscopies performed will double by 2013. This year, CPT codes were officially introduced for arthroscopic acetabuloplasty, femoroplasty, and labral repair. Thus, it may be time to revisit and review hip arthroscopy.

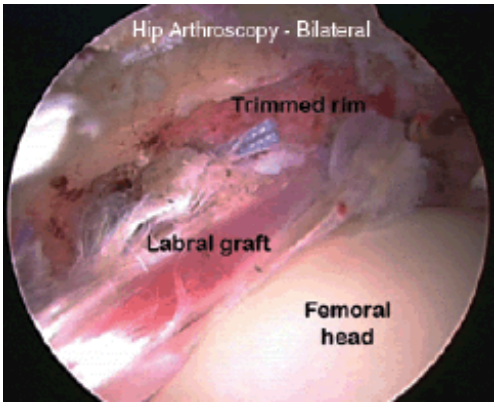

Fig. 1 *Arthroscopic labral grafting or reconstruction. Reprinted with permission from Matsuda DK: Many patients with FAI may benefit from hip arthroscopy. Orthopedics Today, (March 2010).*

Current indications for hip arthroscopy include but are not limited to the following: labral tears, femoroacetabular impingement (FAI), snapping hips, septic hips, and loose bodies, which were once perhaps the purest indication for hip arthroscopy.

Arthroscopic equivalent?

A recent systematic review comparing open dislocation, mini-open (Hueter anterior approach for femoral osteoplasty plus adjunctive hip arthroscopy), and arthroscopic surgeries for symptomatic FAI demonstrated that all methods were relatively safe and effective in short- to midterm follow-up. Arthroscopic surgery for FAI, performed by experienced surgeons, had outcomes at least as good as the other methods and fewer major complications.

The arthroscopic method not only is less invasive, but also permits detailed visualization of intra-articular pathology. At present, open procedures are employed for acetabular or proximal femoral osteotomies; in the hands of a surgeon experienced in hip arthroscopy, however, most FAI patients may be treated with arthroscopic means. Just as arthroscopy was instrumental in furthering the understanding of pathology and pathologic mechanisms in the knee, it appears to be doing likewise in the hip.

Through the ages

Although some insurers want to dictate an appropriate age range for open or arthroscopic FAI surgery of 15 to 55 years, this may be expanding in both directions. One study of adolescent athletes (11 to 16 years) demonstrated

favorable preliminary outcomes, but femoral osteoplasty in the setting of the open physis is controversial. At least one study has shown short-term improvement in patients older than age 60 with symptomatic FAI.

Labral lessons

Two long-term studies on arthroscopic labral débridement showed enduring successful outcomes in the absence of higher grade chondral lesions. This finding is being repeated in FAI surgery and could be viewed as a limitation of hip arthroscopy—or as an impetus for earlier detection and treatment.

Past treatment of labral tears was primarily selective débridement, but the trend toward labral repair and refixation (fixing a detached labrum to a new attachment site, typically following acetabuloplasty) is growing. Labral refixation appears to yield better outcomes than débridement, although the key factor is likely the preservation or restoration of labral function including its fluid seal effect. In select patients with nonsalvageable labrae, arthroscopic hip labral reconstruction using the iliotibial band or gracilis autograft (Fig. 1) shows encouraging early outcomes.

Osteoarthrosis: How much is too much?

A recent study supports hip arthroscopy as beneficial to clinical outcomes for FAI patients with mild osteoarthrosis. At present, it appears that there may be an evidence-based threshold beyond which hip arthroscopy may not be helpful for patients with FAI (less than 2 mm of residual joint width and/or less than 50 percent of remaining joint width).

One large series found that 90 percent of symptomatic FAI patients already have grade 3 or 4 chondral damage at the time of arthroscopy, suggesting the need for earlier detection and treatment.

Silent FAI

Prophylactic surgery for asymptomatic FAI is controversial. The rationale for it is to correct the skeletal deformities that cause mechanical chondrolabral damage before the damage becomes irreversible. Neither late nor unnecessary surgical interventions are desirable.

Radiographic FAI morphology is common and often bilateral. But FAI morphology does not necessarily equal FAI pathology. Symptoms of arthritis will not develop in all hips with radiographic FAI morphology. A large population-based study demonstrated a higher rate of osteoarthritic conversion for patients with FAI than for those with hip dysplasia, with even silent FAI progressing to osteoarthritis.

A large multicenter study of patients age 50 or younger who underwent total hip arthroplasty found that 73 percent of patients who had FAI deformities showed contralateral radiographic disease progression or needed total hip arthroplasty. In patients with bilateral FAI, perhaps a case can be made for prophylactic intervention on one hip if the other requires arthroplasty.

Dysplasia: How little (coverage) is too little?

Reports of successful clinical outcomes after arthroscopic selective labral débridement in patients with borderline or mild dysplasia have been published. But complications such as accelerated coxarthrosis and/or hip instability have occurred after acetabular rim reduction and/or excessive labral resection. The lesson from these studies is to not make a shallow socket shallower.

More pronounced dysplasia may benefit from a periacetabular osteotomy (PAO), either staged or concurrent with arthroscopic labral repair. Endoscopic triple osteotomy and mini-open PAO are being performed, and an endoscopic Bernese PAO may be on the horizon. FAI may coexist with dysplasia and may be the primary cause of labral pathology in this setting.

Crossover move (or remove)

How much bone should be removed in the management of FAI? Simply resecting every radiographic crossover sign is just that…simplistic. The goal is to eradicate the bony overhang and associated pathologic rim cartilage. Recent formulas and fluoroscopic techniques may permit precise rim reduction, but the optimal amount of rim resection is still unknown.

Dysplasia and posterior wall insufficiency (assessed by the posterior wall sign) also deserve careful consideration. In one study, 18 percent of patients with dysplastic acetabulae had a radiographic crossover sign that would contraindicate rim trimming. Although global pincer impingement typically lacks a crossover sign (unless also retroverted), more extensive rim reductions may be required and can be performed arthroscopically.

Over-resection of cam impingement with femoral osteoplasty may cause the rare iatrogenic femoral neck fracture, but under-resection has been a common cause of revision hip arthroscopy. With improved arthroscopic surveillance,

even subtle amounts of residual cam impingement can be detected and addressed. A role for computer-assisted navigation is under investigation but is currently undefined. Recently, a vascular safe zone anterior to the midcoronal plane of the proximal femur has been identified.

"Break"-ing news

Hip arthroscopy may also be useful in the trauma setting. In patients with traumatic hip dislocations, arthroscopy offers a minimally invasive option to remove debris that may contribute to posttraumatic osteoarthrosis, while permitting the management of concomitant chondrolabral pathology. Moreover, osteosynthesis of fractures once thought impossible to fix with the arthroscope is developing. Suprafoveal femoral head fractures (Fig. 2) and certain acetabular fractures have been successfully treated using arthroscopic techniques.

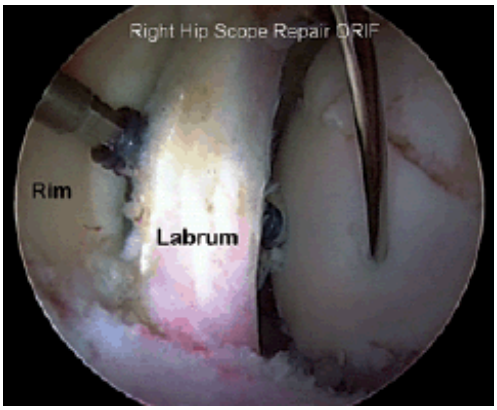

Fig. 2 *Arthroscopic osteosynthesis of femoral head fracture. Note acetabuloplasty for pincer FAI to improve path of screw fixation. Reprinted with permission from Matsuda DK: Hip arthroscopy for trauma: Innovative techniques for a new frontier. Orthopedics Today, (August 2010).*

Endoscopic elsewhere

Endoscopic procedures are being developed to treat areas adjacent to the hip, including the pubic "joint" (the symphysis pubis, adjacent pubic bone, and muscular attachments), the peritrochanteric space, and the deep gluteal space. Athletic pubalgia is increasingly being recognized and includes several conditions such as adductor and/or rectus abdominis tears or enthesopathies, osteitis pubis (Fig. 3), and posterior inguinal wall deficiencies. These conditions are often associated with and potentially caused by transfer stress from hip range of motion constraints in the athlete with impingement.

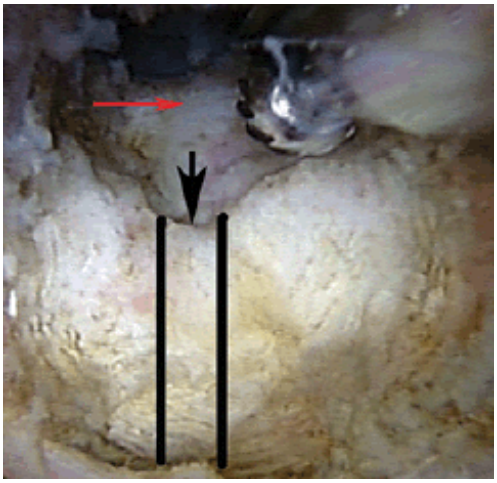

Fig. 3 *Endoscopic pubic symphysectomy for recalcitrant osteitis pubis after bilateral arthroscopic FAI surgeries. Reprinted with permission from Matsuda DK: Endoscopic pubic symphysectomy for recalcitrant osteitis pubis associated with bilateral femoroacetabular impingement.* Orthopedics *2010;33(3):199.*

Endoscopic procedures in the peritrochanteric space include the partial release or relative lengthening of the iliotibial band and trochanteric bursectomy in the patient with recalcitrant external snapping hip and secondary trochanteric bursitis. Tears of the gluteus medius and minimus may also be repaired endoscopically.

Endoscopic release of the entrapped sciatic nerve is being performed in the deep gluteal space and may not always be secondary to piriformis syndrome. As support grows for open repair of acute proximal hamstring avulsions or tears, the endoscopic equivalent has been performed in the relatively acute setting prior to significant scarring or retraction.

Horizontal perspective

What's on the near horizon? Screening for FAI using the flexion, adduction, and internal rotation and the flexion, abduction, external rotation tests may permit early detection of at-risk athletes. Delayed gadolinium-enhanced magnetic resonance image of cartilage can detect decrements in chondral glycosaminoglycan content and may aid in prognostication, patient selection, and early assessment of surgical outcomes. This, in turn, could provide accelerated insight into a possible hip preservation effect that might otherwise be decades away. Although microfracture chondroplasty of the hip has been shown to provide successful short-term results, innovative cartilage reparative and restorative techniques are being investigated.

Current hip outcome scores may have a ceiling effect that classifies pain-free walking as a successful end-point. Elite athletes, however, have much higher goals. More relevant hip scores for this generally young and athletic population are currently being developed that may help in comparative research. The International Society for Hip Arthroscopy attracts many members of the medical community who have a common interest in this rapidly evolving field of orthopaedics.

The learning curve for hip arthroscopy is long, but undefined. Safe arthroscopic hip access and labral débridement may no longer be sufficient to care for patients, including those with FAI. Standing-room-only attendance at hip arthroscopy courses such as the Arthroscopy Association of North America Hip Masters courses and the AAOS instructional course lectures is a direct reflection of growing interest in a procedure that once was looking for an indication.

Disclosure information: Dr. Matsuda—Arthrocare, Smith & Nephew, Biomet; Arthroscopy, Orthopedics Today*; Orthopaedics Overseas*

Dean K. Matsuda, MD, is director of hip arthroscopy at Kaiser West Los Angeles Medical Center. *He wishes to acknowledge the contributions of J.W. Thomas Byrd, MD, to this article.*

Editors note: *This is a review of current and potential applications of hip arthroscopy; it is not an endorsement of any evolving techniques.*

References

1. Matsuda DK, Carlisle JC, Arthurs SC, Wierks CH, Philippon MJ. Comparative systematic review of the open dislocation, mini-open, and arthroscopic surgeries for femoroacetabular impingement. *Arthroscopy*. 2011 Feb;27(2):252-69.
2. Philippon MJ, Yen YM, Briggs KK, Kuppersmith DA, Maxwell RB. Early outcomes after hip arthroscopy for femoroacetabular impingement in the athletic adolescent patient: a preliminary report. *J Pediatr Orthop*. 2008 Oct-Nov;28(7):705-10.
3. Javed A, O'Donnell JM. Arthroscopic femoral osteochondroplasty for cam femoroacetabular impingement in patients over 60 years of age. *J Bone Joint Surg Br*. 2011 Mar;93(3):326-31.
4. Byrd JW, Jones KS. Hip arthroscopy for labral pathology: prospective analysis with 10-year follow-up. *Arthroscopy*. 2009 Apr;25(4):365-8.
5. McCarthy JC, Jarrett BT, Ojeifo O, Lee JA, Bragdon CR. What factors influence long-term survivorship after hip arthroscopy? *Clin Orthop Relat Res*. 2011 Feb;469(2):362-71.
6. Espinosa N, Rothenfluh DA, Beck M, Ganz R, Leunig M. Treatment of femoro-acetabular impingement: preliminary results of labral refixation. *J Bone Joint Surg Am*. 2006 May;88(5):925-35.
7. Larson CM, Giveans MR. Arthroscopic debridement versus refixation of the acetabular labrum associated with femoroacetabular impingement. *Arthroscopy*. 2009 Apr;25(4):369-76.

8. Philippon MJ, Briggs KK, Hay CJ, Kuppersmith DA, Dewing CB, Huang MJ. Arthroscopic labral reconstruction in the hip using iliotibial band autograft: technique and early outcomes. *Arthroscopy*. 2010 Jun;26(6):750-6.
9. Matsuda DK, Burchette R. Arthroscopic hip labral reconstruction with gracilis autograft: surgical technique and preliminary outcomes. Paper 55; ISAKOS annual meeting, May 15, 2011.
10. Philippon MJ, Briggs KK, Yen YM, Kuppersmith DA. Outcomes following hip arthroscopy for femoroacetabular impingement with associated chondrolabral dysfunction: minimum two-year follow-up. *J Bone Joint Surg Br*. 2009 Jan;91(1):16-23.
11. Larson CM, Giveans MR, Taylor M. Does arthroscopic FAI correction improve function with radiographic arthritis? *Clin Orthop Relat Res*. 2011 Jun;469(6):1667-76.
12. Byrd JWT. Arthroscopic Hip Surgery for the Treatment of Femoroacetabular Impingement. *Orthopedics* March 2011;34(3):186.
13. Gosvig KK, Jacobsen S, Sonne-Holm S, Palm H, Troelsen A. Prevalence of malformations of the hip joint and their relationship to sex, groin pain, and risk of osteoarthritis: a population-based survey. *J Bone Joint Surg Am*. 2010 May;92(5):1162-9.
14. Clohisy JC, Dobson MA, Robison JF, Warth LC, Zheng J, Liu SS, et al. Radiographic structural abnormalities associated with premature, natural hip-joint failure. *J Bone Joint Surg Am*. 2011 May;93 Suppl 2:3-9.
15. McCarthy JC, Lee JA. Hip arthroscopy: indications, outcomes, and complications. *Instr Course Lect.* 2006;55:301-8.
16. Benali Y, Katthagen BD. Hip subluxation as a complication of arthroscopic debridement. *Arthroscopy*. 2009 Apr;25(4):405-7.
17. Matsuda DK. Acute iatrogenic dislocation following hip impingement arthroscopic surgery. *Arthroscopy*. 2009 Apr;25(4):400-4.
18. Paliobeis CP, Villar RN. The prevalence of dysplasia in femoroacetabular impingement. *Hip Int*. 2011 Apr 11;21(2):141-145.
19. Matsuda DK. Endoscopic pubic symphysectomy for reclacitrant osteitis pubis associated with bilateral femoroacetabular impingement. *Orthopedics*. 2010 Mar 10:199-203.
20. Philippon MJ, Wolff AB, Briggs KK, Zehms CT, Kuppersmith DA. Acetabular rim reduction for the treatment of femoroacetabular impingement correlates with preoperative and postoperative center-edge angle. *Arthroscopy*. 2010 Jun;26(6):757-61.
21. Matsuda DK. Fluoroscopic templating technique for precision arthroscopic rim trimming. *Arthroscopy*. 2009 Oct;25(10):1175-82.
22. Fujii M, Nakashima Y, Yamamoto T, Mawatari T, Motomura G, Matsushita A, et al. Acetabular retroversion in developmental dysplasia of the hip. *J Bone Joint Surg Am*. 2010 Apr;92(4):895-903.
23. Philippon MJ, Schenker ML, Briggs KK, Kuppersmith DA, Maxwell RB, Stubbs AJ. Revision hip arthroscopy. *Am J Sports Med*. 2007 Nov;35(11):1918-21.
24. Matsuda DK. The case for cam surveillance: the arthroscopic detection of cam femoroacetabular impingement missed on preoperative imaging and its significance. *Arthroscopy*. 2011 Jun;27(6):870-6.
25. McCormick F, Kleweno CP, Kim YJ, Martin SD. Podium No: 639. Vascular Safe Zones in Hip Arthroscopy. AAOS annual meeting, Feb 18, 2011.
26. Mullis BH, Dahners LE. Hip arthroscopy to remove loose bodies after traumatic dislocation. *J Orthop Trauma*. 2006 Jan;20(1):22-6.
27. Matsuda DK. A rare fracture, an even rarer treatment: the arthroscopic reduction and internal fixation of an isolated femoral head fracture. *Arthroscopy*. 2009 Apr;25(4):408-12.
28. Yang JH, Chouhan DK, Oh KJ. Percutaneous screw fixation of acetabular fractures: applicability of hip arthroscopy. *Arthroscopy*. 2010 Nov;26(11):1556-61.
29. Matsuda DK, Meyers WC, Larson CM, Zoga A. Athletic pubalgia: Current concepts and evolving management. *Ortho Orthopedics Today* February 2011.
30. Larson CM, Pierce BR, Giveans MR. Treatment of athletes with symptomatic intra-articular hip pathology and

athletic pubalgia/sports hernia: a case series. *Arthroscopy*. 2011 Jun;27(6):768-75.

31. Ilizaliturri VM Jr, Camacho-Galindo J. Endoscopic treatment of snapping hips, iliotibial band, and iliopsoas tendon. *Sports Med Arthrosc*. 2010 Jun;18(2):120-7.
32. Voos JE, Shindle MK, Pruett A, Asnis PD, Kelly BT. Endoscopic repair of gluteus medius tendon tears of the hip. *Am Am J Sports Med* 2009 Apr;37(4):743-7.
33. Martin HD, Shears SA, Johnson JC, Smathers AM, Palmer IJ. The endoscopic treatment of sciatic nerve entrapment/deep gluteal syndrome. *Arthroscopy*. 2011 Feb;27(2):172-81.
34. Domayer SE, Mamisch TC, Kress I, Chan J, Kim YJ. Radial dGEMRIC in developmental dysplasia of the hip and in femoroacetabular impingement: preliminary results. *Osteoarthritis Cartilage*. 2010 Nov;18(11):1421-8.
35. Crawford K, Philippon MJ, Sekiya JK, Rodkey WG, Steadman JR. Microfracture of the hip in athletes. *Clin Sports Med*. 2006 Apr;25(2):327-35.

AAOS *Now*
August 2011 Issue
http://www.aaos.org/news/aaosnow/aug11/clinical5.asp

6300 North River Road Rosemont, Illinois 60018-4262 Phone 847.823.7186 Fax 847.823.8125