

Severe Arthritic Changes Following Acetabular Labral Repair and Femoroplasty in an Air Force Pilot

Christopher J. Sardon; Mathew L. Resnick

- BACKGROUND:** Acetabular labral tears in the hip have become an increasingly common finding in active duty members due to improved diagnostic capabilities. This has led to a dramatic increase in operative management despite a lack of evidence to support clear long-term benefits. Literature review demonstrated overwhelmingly positive short-term outcomes for labral repairs; however, scattered case reports exist demonstrating debilitating outcomes in young patients, ultimately resulting in total hip arthroplasty.
- CASE REPORT:** A 27-yr-old pilot originally presented with groin pain. Initial X-ray demonstrated a CAM lesion of the right hip and subsequent MRA showed an acetabular labral tear. The patient underwent open arthrotomy with labral repair and femoroplasty with minimal improvement in symptoms. Repeat imaging over 2 yr showed early onset osteoarthritis with rapid progression and a recurrent labral tear. Due to the significant progression of osteoarthritis, the patient was given the choice between a repeat labral repair and total hip arthroplasty. The patient elected for hip arthrotomy with labral repair and extensive synovectomy, which yielded minimal improvement in symptoms.
- DISCUSSION:** Acetabular labral tears have become a hot topic in the field of orthopedics as a result of a surge in diagnoses likely due to improvements in imaging, most notably MRAs. This has led to considerable debate regarding how to best manage this condition. The literature overwhelmingly shows positive short-term outcomes for surgical management; however, long-term follow-up studies are lacking. The literature has demonstrated multiple case reports resulting in significant complications as a result of these operations, including chondrolysis and eventual need for total hip arthroplasty. Therefore, patient selection is critical as the population tends to be young and active, and the potential complications can be catastrophic. In any case, it is clear that further research is required.
- KEYWORDS:** chondrolysis, acetabular labral tears, femoroplasty, osteoarthritis, hip arthroplasty.

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Musculoskeletal injuries are one of the most common reasons for active duty military members to seek medical attention. In particular, an increasingly observed injury in the military population is acetabular labral tears. These tears typically present as chronic hip and groin pain with no specific injurious event. Physical exam often demonstrates pain on weight-bearing, flexion, and internal rotation. Although femoro-acetabular impingement (FAI) is often a contributing factor to acetabular labral tears, there is little data to suggest a particular cause for the dramatic increase in incidence. Ganz et al. have theorized that in the case of FAI, abnormal contact between the femur and labrum often results in tears.⁴ In support of this theory, Wenger and her associates found that in 87% of cases of acetabular labral tears, some structural abnormality of the joint existed.¹² However, the increase in incidence is more likely the result of improvements in imaging capabilities via magnetic resonance arthrogram (MRA) of the hip.

The introduction of MRA of the hip has dramatically increased the ability to accurately diagnose acetabular labral tears. Previously, plain radiographs and computed tomography revealed structural bony abnormalities such as CAM and Pincer lesions indicative of FAI. A “CAM lesion” is a bump that forms on the edge of the femoral head/neck interface. This lesion results from an aspherical femoral head that cannot smoothly rotate in the acetabulum, thus causing increased friction and subsequent bony formation. A “Pincer lesion” is an excess of bone formation over the rim of the acetabulum. Both

From Tinker AFB, OK.

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Address correspondence to: Christopher Sardon, M.D., M.P.H., Flight Medicine, 72nd Medical Group, 750 Air Depot Blvd., Tinker AFB, OK 73145; sardonc@gmail.com.

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of these lesions can cause FAI independently; however, they are frequently found in combination. If left untreated, FAI can lead to osteoarthritis and/or acetabular labral tears.⁹ Ganz et al. have suggested that surgical debridement of FAI to restore normal anatomy should be performed early on to prevent the development of osteoarthritis and/or labral pathology.³

Although plain radiographs and computed tomography can show signs of FAI, they cannot directly assess the labrum. MRI can be used to assess the labrum, but only in the presence of a joint effusion. MRA of the hip was introduced in the 1990s and was found to be a superior imaging tool.⁶ According to Chan et al., the sensitivity and accuracy of MRA for diagnosis of acetabular labral tears were 100% and 94%, respectively.² MRA uses direct injection of contrast into the hip joint, which distends the joint. This allows the contrast to penetrate into any tears of the labrum, thus improving the ability to identify acetabular labral tears.

The significant increase in diagnoses of acetabular labral tears has led the orthopedic community into much debate as to the best management options for these patients. However, the breadth of literature regarding surgical management of acetabular labral tears in the case of FAI is very narrow. Studies such as the systematic review performed by Bedi et al. report overwhelmingly positive outcomes for surgical management of labral tears and cite patient satisfaction percentages as high as 65 to 85%.¹ However, scattered throughout the literature are case reports that suggest the potential for serious complications.

One such case was presented in the *Archives of Orthopedic Trauma Surgery*, in which a young patient experienced months of hip pain.¹⁰ Initial workup and imaging was unremarkable, but an MRA demonstrated an acetabular labral tear, for which the patient underwent open repair. The patient experienced 1 mo of symptom alleviation before rapid deterioration, diagnosis of chondrolysis, and eventual hip arthroplasty. It is important to note that it was only with extensive imaging that the pathology was discovered, which helps explain the recent surge in such cases. The authors of this case report cite electrocautery as a possible factor in the development of chondrolysis, but acknowledge that further research is necessitated.¹⁰

Similar cases have been reported during surgical interventions for glenohumeral stability as well. A recent review of four cases of rapid and severe chondrolysis following surgery yielded a similar pathological timeline. All four patients underwent unremarkable procedures and were believed to be progressing normally postoperatively. However, in three cases, the patients began to experience pain and mobility restriction within 1 yr. Diagnostic imaging revealed loss of articular cartilage and the diagnosis of chondrolysis was made. In this study, the authors described the elusive nature of the etiology of chondrolysis in such surgical cases. Possible causes included exposure of chondrocytes to toxic substances (such as chlorhexidine, bupivacaine, or methylmethacrylate), trauma, autoimmune conditions, and thermal/radiofrequency energy damage intraoperatively. In general, it seems likely that the same causative factors in glenohumeral chondrolysis are at play in acetabular cases and the possible link warrants further research.¹¹

CASE REPORT

The patient is a 27-yr-old male active duty pilot in the U.S. Air Force. In 2013, the patient started developing right groin pain that was exacerbated by running, sitting, and bending over to put his shoes and socks on. He had no prior history of hip injuries, but did have a history of right ACL reconstruction. An X-ray was obtained of the right hip (**Fig. 1** and **Fig. 2**), which demonstrated a CAM deformity, indicating FAI as a possible cause of the patient's pain. He completed a course of physical therapy and NSAID use with no improvement in symptoms.

The patient was subsequently referred to an orthopedic surgeon for further evaluation. On exam, he had a markedly positive impingement sign with hip flexion, adduction, and internal rotation to 10°. At that time, an MRA of the right hip was obtained to evaluate for a possible labral tear. The MRA showed a degenerated anterior superior right hip labrum with a full-thickness tear of the base at the 2:00 position and a CAM lesion with an elevated alpha angle of 64°. Given the MRA findings, the patient was scheduled for right hip open arthrotomy with labral repair and femoroplasty.

During the postoperative period, the patient performed physical therapy as prescribed by his orthopedic surgeon; however, he had minimal improvement in symptoms. A repeat MRA was obtained 7 mo later due to increasing stiffness and right leg numbness in the L4–L5 distribution. The MRA did not show a recurrence of the labral tear; however, it did demonstrate early onset osteoarthritis. An intra-articular steroid injection was administered at this time without relief.

An additional MRA was obtained 6 mo later due to further increasing pain, which again showed mild osteoarthritis with no recurrence of the labral tear. The patient subsequently deployed and, upon return to his duty station, he endorsed continued worsening pain. At that point, an X-ray

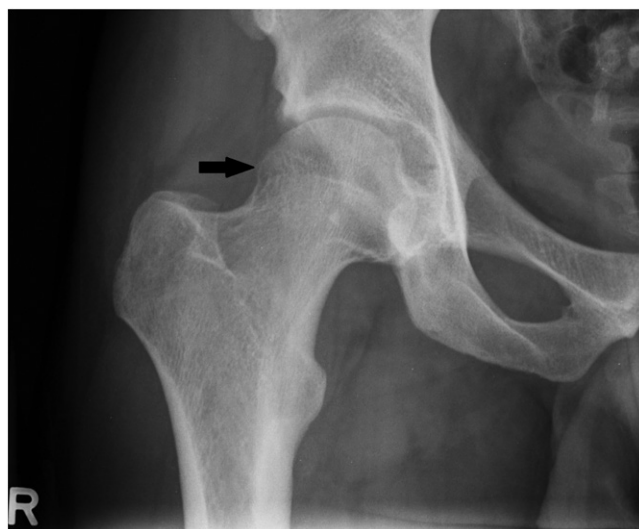


Fig. 1. AP view: CAM deformity (arrow) of the right hip suggestive of impingement.



Fig. 2. Frog-leg view: CAM deformity (arrow) of the right hip suggestive of impingement.

was obtained (**Fig. 3** and **Fig. 4**) which showed interval progression of the osteoarthritis. An MRA was again obtained and showed a recurrent acetabular labral tear. The patient discussed his options with his orthopedic surgeon and was given the choice between a repeat labral repair and total hip arthroplasty. The patient elected a right hip arthrotomy with labral repair and extensive synovectomy. The patient is currently continuing physical therapy with minimal improvement.

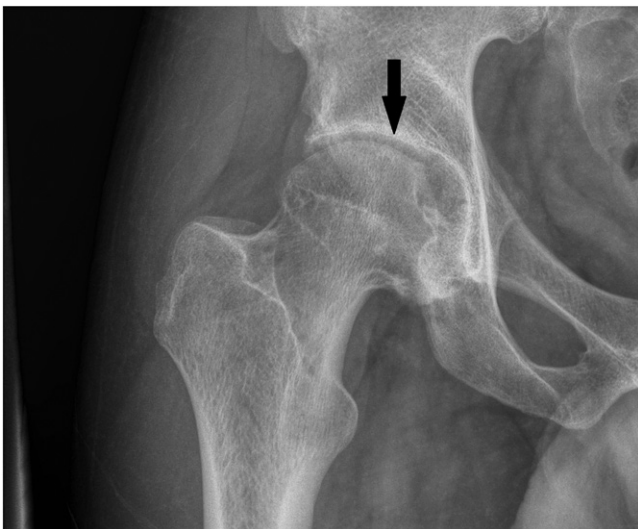


Fig. 3. AP view: Interval progression of osteoarthritis of the right hip joint with mild femoral head flattening (arrow).

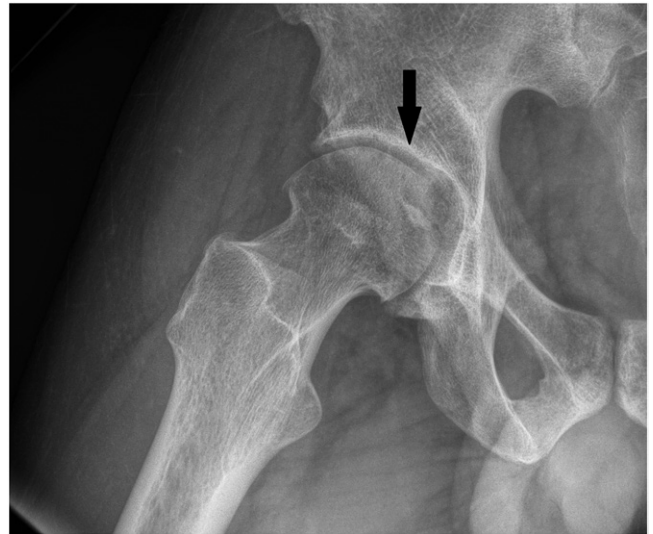


Fig. 4. Frog-leg view: Interval progression of osteoarthritis of the right hip joint with mild femoral head flattening (arrow).

DISCUSSION

Over the past decade there has been a dramatic increase in the diagnosis of acetabular labral tears in the general population due to the high sensitivity and accuracy of the MRA.² This diagnosis tends to be in young, active patients, which naturally correlates with the military population. As previously stated, it is likely the case that minor structural abnormalities in the hip joint cause an increase in joint friction, yielding tears and pain. Athletic populations are likely more effected by this phenomenon as a result of increased friction due to their more active lifestyle. Given this dramatic increase in diagnoses of acetabular labral tears in the general population, it can be inferred that this increase in cases translates into the military population as well. However, there are no studies to directly suggest that the more active military population is at an increased risk of labral tears in relation to the general population. In fact, there is little data to suggest that any specific intrinsic factors (body habitus) other than FAI are causal to the development of acetabular labral tears. In addition, there is no data at this time to support that any extrinsic factors (cutting sports, running, martial arts, etc.) contribute to the development of acetabular labral tears. Regardless, it is noteworthy that the increase in surgical management of acetabular labral tears can have an effect on mission readiness.

The bulk of the literature regarding surgical repair of acetabular labral repairs has been positive. In fact, patient satisfaction percentages have been reported as high as 65 to 85%.¹ However, the literature only reflects the short-term outcomes of acetabular labral repairs. This is a significant point to emphasize given the dramatic rise in surgical cases of acetabular labral repairs without any substantive long-term data to support its effectiveness. In addition, although there is evidence to support that arthroscopic repair of FAI has similar outcomes to open surgical treatment, there is no available data to compare the outcomes of arthroscopic vs. open surgical repair of the acetabular labrum.⁵

In addition to the lack of long-term data to support acetabular labral repairs, there have been multiple case reports demonstrating debilitating outcomes. The patient presented in this case report in many ways mirrors the demographics and symptom progression of a patient presented in the *Archives of Orthopedic Trauma Surgery*. Both patients were young, active, and developed chronic hip pain. Their acetabular labral tears were only diagnosed after advanced imaging with an MRA. In both cases, surgical repair of the labrum was performed with minimal improvement in symptoms and rapid deterioration. The referenced case eventually resulted in total hip arthroplasty, whereas the patient in the current case elected repeat labral repair instead of total hip arthroplasty in order to try and maintain his career as an Air Force pilot.¹⁰ Thus far, the patient in question is minimally improving and will potentially need a total hip arthroplasty.

This case brings up some very important aeromedical concerns that can have a significant impact on military mission readiness. Although reports of 65–85% success rates have been documented, that leaves 15–35% of patients dissatisfied with their acetabular labral repair.¹ In the civilian sector, poor patient satisfaction is undoubtedly unfortunate, but in the military this may negatively affect a unit's ability to accomplish the mission. If a patient is dissatisfied with their surgical labral repair, they are likely to have more missed duty days, fitness restrictions, duty restrictions, and mobility restrictions, which have a significant negative impact on mission readiness when that patient is a highly trained asset such as a pilot.

A total hip arthroplasty is a life-altering procedure and, as such, can have serious implications for the service member's career and flight status. Of paramount importance to any flying mission is the crew's ability to carry out their assigned tasks effectively, and their ability to egress the jet in the event that their safety is compromised. Generally, the benchmark is that the crew should be able to sprint 100 yd, demonstrating an ability to egress the aircraft. Additionally, surgeries with retained metallic hardware require a waiver to remain on flying duties if that hardware limits joint range of motion. In the case of a total hip arthroplasty, this is almost always the case. As with any other procedure, it is important to manage cases on an individual basis. Service members should discuss their flying status and management with both their orthopedic surgeon and their flight surgeon before undergoing any procedures.

Cases such as this bring up an important question as to the role of the flight surgeon. Often times a flight surgeon will refer an active duty patient to a specialist (frequently civilian specialists) who does not understand the nature of the military or aeromedical community. The specialist will then dictate the course of treatment without having a full understanding of the potential consequences their decisions have on a military member's career. This is where the flight surgeon needs to step in and present the patient with all of the information necessary to make an informed decision regarding their medical care and its impact on their career.

Overall, acetabular labral tears are a diagnosis with steadily increasing prevalence, likely due to advanced imaging techniques and diagnostic ability. When treated surgically, results

are reported to be overwhelmingly successful both from a utilitarian and patient-satisfaction perspective. However, long-term follow-up studies are lacking and anecdotal reports of drastic negative outcomes are present in the literature. The factors that impact surgical outcomes in these cases are unclear. Electrocautery, patient selection, genetic factors, and associated pathology have all been implicated as possible factors in patient outcomes.^{7,8} It has been suggested that patient selection, as with any surgical procedure, is paramount in these particular cases as the population tends to be young and active, and the potential complications are debilitating. In any case, it is clear that further research is required to elucidate the risk factors involved in negative surgical outcomes, as well as criteria for selecting patients most likely to benefit from such procedures.

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Authors and affiliations: Christopher J. Sardon, M.D., M.P.H., and Mathew L. Resnick, D.O., Flight Medicine, Tinker Air Force Base, OK.

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