Arthroscopic Decompression of Central Acetabular Impingement With Notchplasty

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Abstract: Acetabular notch osteophytes are often encountered during routine diagnostic arthroscopy of the hip. It has been our observation that when notch osteophytes are present, there is often corresponding chondral damage to the anterosuperior femoral head and ligamentum teres degeneration. We propose that removal of the notch osteophyte and decompression of the articulating surface offer an effective method of delaying the progression of arthritis. This article describes in detail the technique used to perform arthroscopic acetabular notchplasty, and a companion video, demonstrating the procedure, is included. Our experience suggests that decompression of the acetabular notch can remove offending structural abnormalities that can potentially cause further chondral damage and may hasten the progression of arthritis.

The popularity of hip arthroscopy has grown steadily over the past decade with an increased emphasis on the aging population.[1-4] As the aging patient population remains active, there are specific patterns of pathology that are unique to this group. Ganz and colleagues[5] suggested that gender differences play a role in acetabular architecture. They proposed that there is decreased acetabular articular surface in female patients due to a substantially wider notch. To date, there have been few studies focusing on the role of acetabular notch osteophytes in central acetabular impingement (CAI). The characteristic horseshoe shape of the acetabular articular cartilage contributes to a more uniform articular contact stress distribution and consequent decrease in peak contact stress.[6] Central acetabular osteophytosis has been shown to be an early manifestation of hip arthritis.[7] The osteophytes arise from the acetabular notch above the transverse ligament and progress to involve the acetabular notch circumferentially or even occlude the acetabular notch completely, resulting in lateralization of the femoral head. Notch osteophytes prevent the femoral head from proper contact with the acetabular cartilage and cause further erosion of the femoral head due to increased contact forces and mechanical abrasion.[6]

We propose that decompression of the acetabular notch with removal of any offending osteophytes can be effectively performed at the time of hip arthroscopy. This technical note and accompanying images and video describe in detail our methods for performing arthroscopic acetabular notchplasty.

Surgical Technique

We perform all hip arthroscopies at a tertiary referral center dedicated to hip arthroscopy and preservation. Our hip arthroscopy is performed with the patient in the modified supine position using a standard hip arthroscopy traction table in a slight Trendelenburg position to decrease perineal pressure on the perineal post. Proper anesthesia with paralysis is required for safe distraction of the hip joint and prevention of complications during hip arthroscopy. We routinely use 2 portals (anterolateral and modified anterior[8,9]) with a third portal—the distal midanterior portal—if necessary. After establishment of the portals and capsulotomy, a diagnostic arthroscopy is performed.

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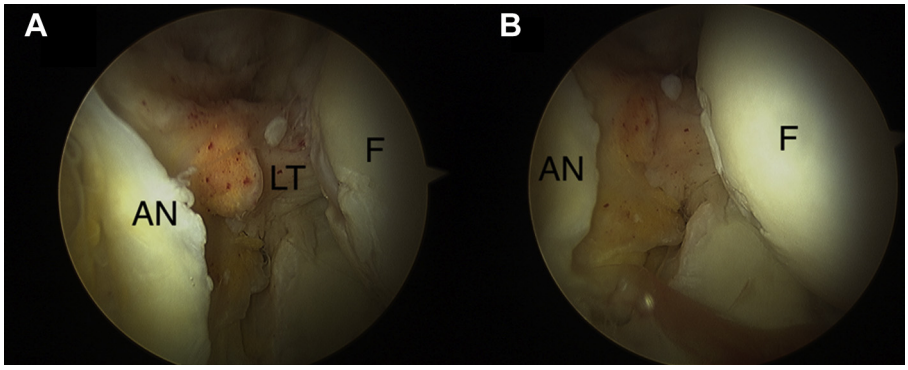

Fig 1. Intra-articular arthroscopic views of acetabular notch (AN). The degenerative ligamentum teres (LT) is visualized with synovitis. Femoral head (F) damage is noted.

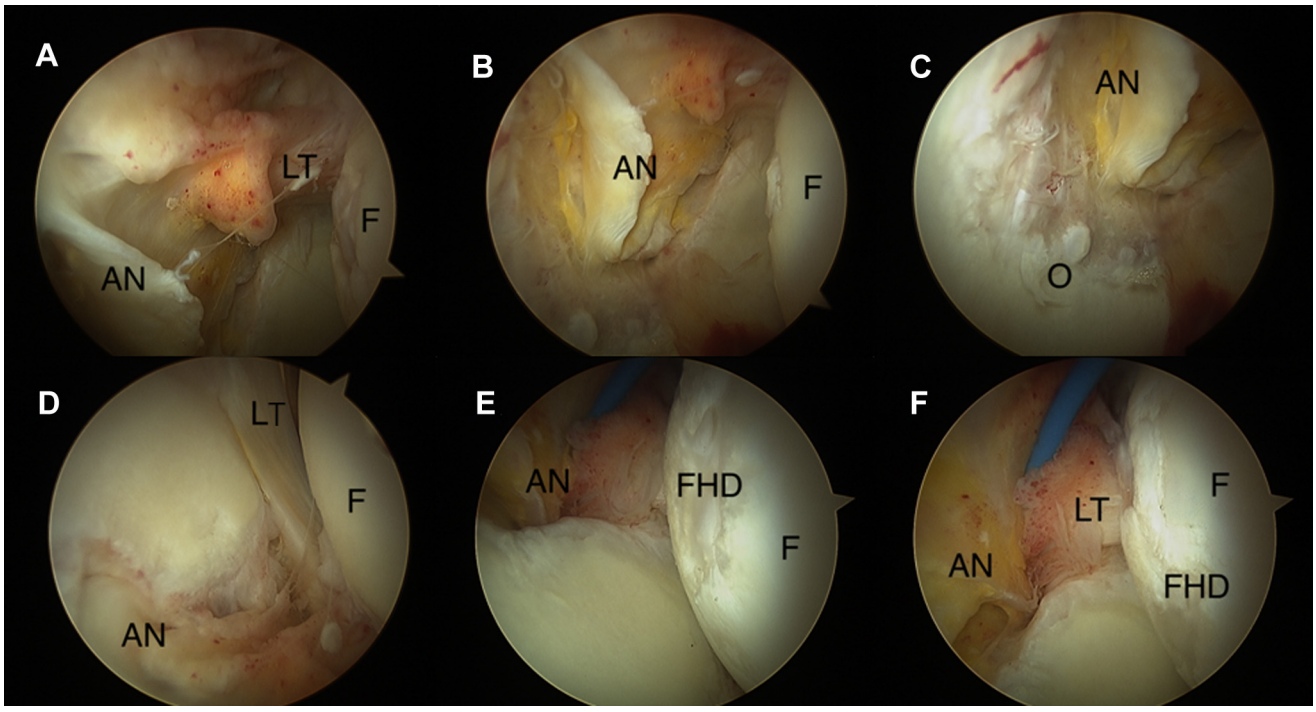

Fig 2. Intra-articular arthroscopic views of acetabular notch (AN) with osteophyte (O) femoral head (F), and femoral head damage (FHD). The degenerative ligamentum teres (LT) is visualized.

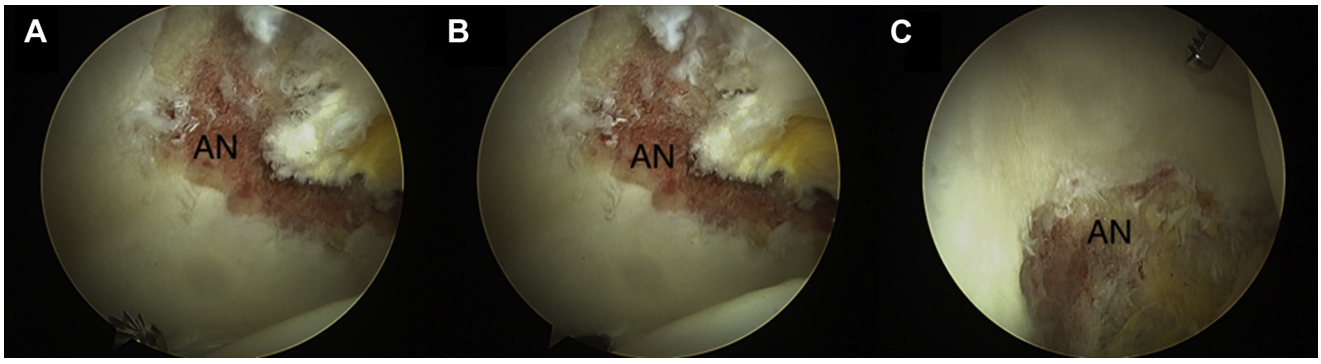

Fig 3. Acetabular notch (AN) with osteophyte resection after notchplasty.

Table 1. Pearls and Pitfalls

Ensure adequate distraction of the hip joint to ensure safe insertion of an arthroscopic burr.
Anterior acetabular notch osteophytes can be removed with a burr in the modified anterior portal.
Posterior acetabular notch osteophytes can be removed with a burr in the anterolateral portal.
Perform frequent dynamic fluoroscopic imaging to ensure adequate resection and prevention of over-resection.
Ensure a smooth resection surface to avoid femoral head damage.
Extensive femoral head damage may portend poorer outcomes.

Acetabular Notchplasty

The acetabular notch is visualized and probed (Video 1, Figs 1 and 2). A synovectomy of the notch is performed with electrocautery if synovitis is present. The amount of osteophyte removal can be measured on a routine anteroposterior radiograph of the hip when compared with the normal contralateral hip.

Removal of osteophytes adjacent to zones 1 through 3 usually can be completed with a long 5.5-mm round burr (Smith & Nephew, London, England) when viewing from the anterolateral portal and working through the modified anterior portal. Posterior osteophytes in zones 4 and 5 are technically more challenging to access from the modified anterior portal. If complete removal is not possible from the modified anterior portal, then placing the burr in the anterolateral portal might facilitate excision. In addition, a posterolateral portal may be necessary to access more posterior osteophytes within the notch.

If excessive bleeding is encountered, cautery is performed with a radiofrequency device. Notchplasty should not alter the underlying native architecture of the patient's acetabulum. To confirm adequate resection, a dynamic examination can be performed to evaluate for any evidence of CAI. Care must be taken to avoid irregularity of the resected surface, which can result in abrasive cartilage damage on the femoral head during contact (Fig 3). Table 1 discusses the pearls and pitfalls of this procedure. Figure 4 shows an acetabular notch with normal flexion/extension of the femoral head.

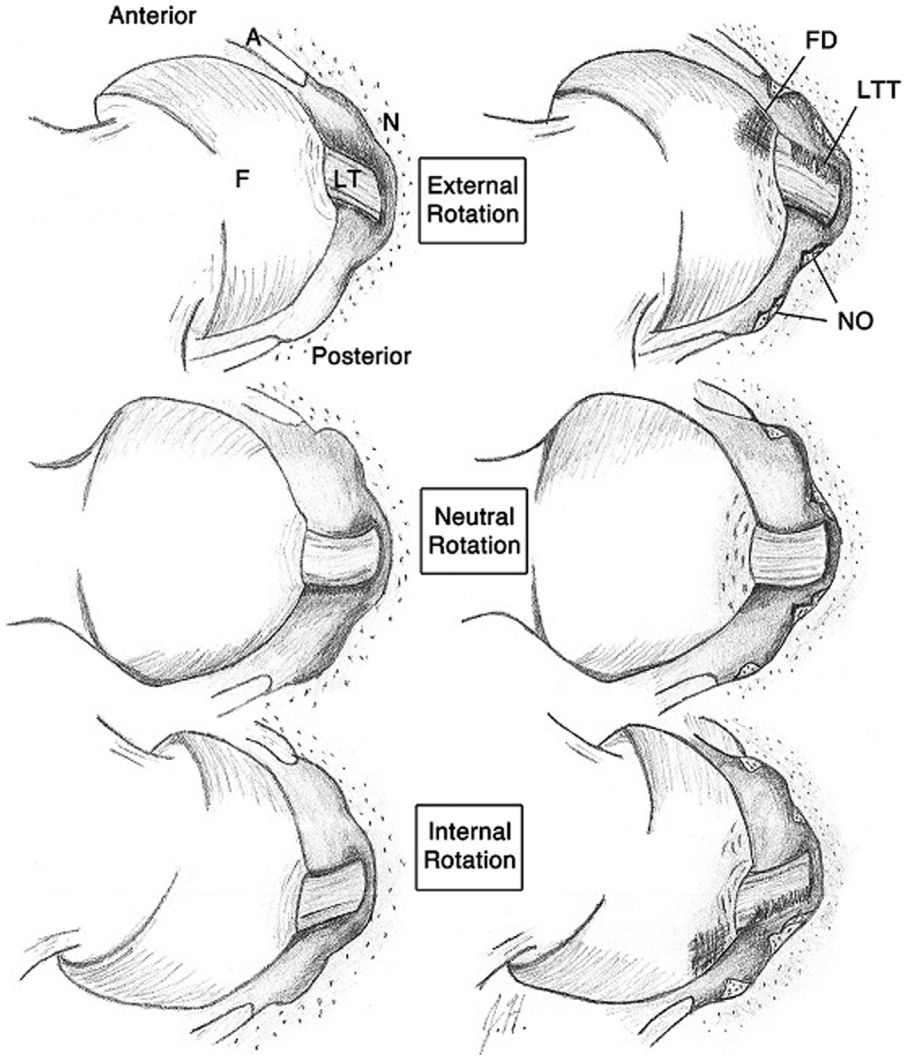

Fig 4. Acetabular notch with normal flexion/extension of femoral head. (A, acetabulum; F, femur; FD, femoral head damage; LT, ligamentum teres; LTT, ligamentum teres tear; N, acetabular notch; NO, notch osteophyte.)

All remaining bony pathology is corrected under fluoroscopic guidance. An acetabuloplasty is performed for pincer impingement, and a femoral neck osteoplasty is performed for cam impingement. Labral tears are repaired or reconstructed when possible; otherwise, they are selectively debrided until a stable labrum is achieved while preserving as much labrum as possible. Full-thickness cartilage damage is treated with debridement to create stable borders. Microfracture is performed when necessary according to the technique of Steadman and colleagues[10] in cases in which bone is present after the bony decompression at the surgeon's discretion.

Discussion

The occurrence of acetabular notch osteophytes is a challenging surgical problem during hip arthroscopy. Haviv and O'Donnell[11] suggested that the younger the patient, the more likely arthroscopy is to prolong the need for a total hip replacement. Because the aging population has been increasingly adopting a more active lifestyle, the incidence of hip arthroscopy in older patients has increased. These patients present a challenging problem to the hip arthroscopist, including difficulties with joint access, cartilage damage, and early arthritis. We believe that the acetabular notch osteophyte is a lesion that can be detrimental to the mechanics of the joint, as well as propagate chondral damage to the femoral head.[6] Notch osteophytes have the potential to lateralize the femoral head, thus altering the mechanics of the joint. Notch osteophytes are a nidus for chondral damage in the femoral head with repetitive motion. In patients with adequate joint space, evidence of femoroacetabular impingement, and minimal arthritis, we think that performing a notchplasty while addressing both intra- and extra-articular hip pathology is essential. We have thus developed a technique to perform an acetabular notchplasty to decompress the notch in CAI and prevent further chondral damage to the femoral head. We also perform a synovectomy at the time of decompression if there is evidence of synovitis. Potential risks of the procedure include increased traction time resulting in neurapraxia, minimally increased incidence of septic arthritis associated with arthroscopy, and potential acetabular fracture with overly aggressive resection of the osteophyte. In our experience with this technique, we have not encountered any complications. Hip arthroscopy can be used to effectively remove acetabular notch osteophytes associated with CAI while simultaneously addressing other conditions.

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