Technical Note

Microfracture in Hip Arthroscopy. Keep It Simple!

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Abstract: Despite all the advances in hip arthroscopy, microfracture is still the workhorse for treating focal and full-thickness cartilage lesions. The success of this treatment is owed to its reliability and simplicity. Given the structure of the hip joint, however, there are challenges to this procedure using a conventional microfracture pick. This note presents our current and preferred microfracture technique using a curve drill guide and flexible drill. This method offers greater range of access to different regions of the joint with ease, thus ensuring a reproducible and quicker procedure with less risk.

The goal with the microfracture is to promote migration of stem cells and growth factors from beneath the subchondral bone plate into the cartilage defect, which eventually heals to form fibrocartilage.[1-3] Currently, many options have been put forth for the treatment of severe chondral lesions, yet microfracture remains as a popular choice mainly for its simplicity.[2,4-9] The basics of performing the techniques has been developed for years in knee surgery. The anatomic complexity imparted by the "ball-and-socket" joint brings unique challenges when using the standard microfracture awl.[10,11] The "angle

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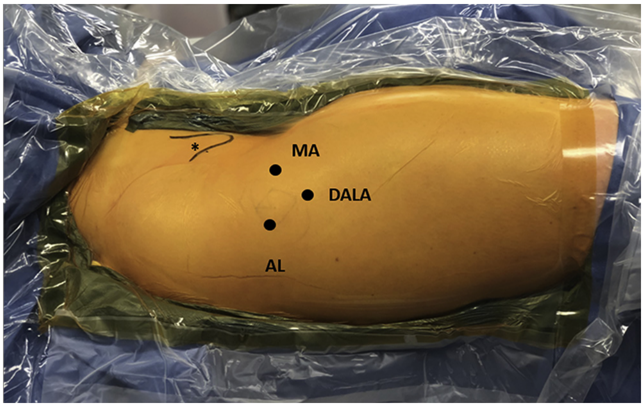

Fig 1. Patient in modified supine position. Right hip, patient's head is to the right and feet to the right, anterior superior iliac spine is marked (*). Portals are identified: anterolateral (AL), mid-anterior (MA), and distal anterolateral accessory (DALA).

of attack" with the awl is difficult to maintain, or even obtain, during the process. As a result, the surgeon risks slippage of the pick tip, which compromises the procedure. We present our arthroscopic microfracture technique using a curve drilling guide and flexible drill, which make this procedure reproducible and efficient.

Surgical Technique

Patient Preparation and Positioning

After being sedated under general anesthesia, the patient is placed in the modified supine position on the traction table (Supine Hip Positioning System; Smith & Nephew, Andover, MA) with an extra-padded post. Manual bilateral leg traction is applied to achieve full contact between the perineum and the post. The operative leg is positioned to neutral rotation and

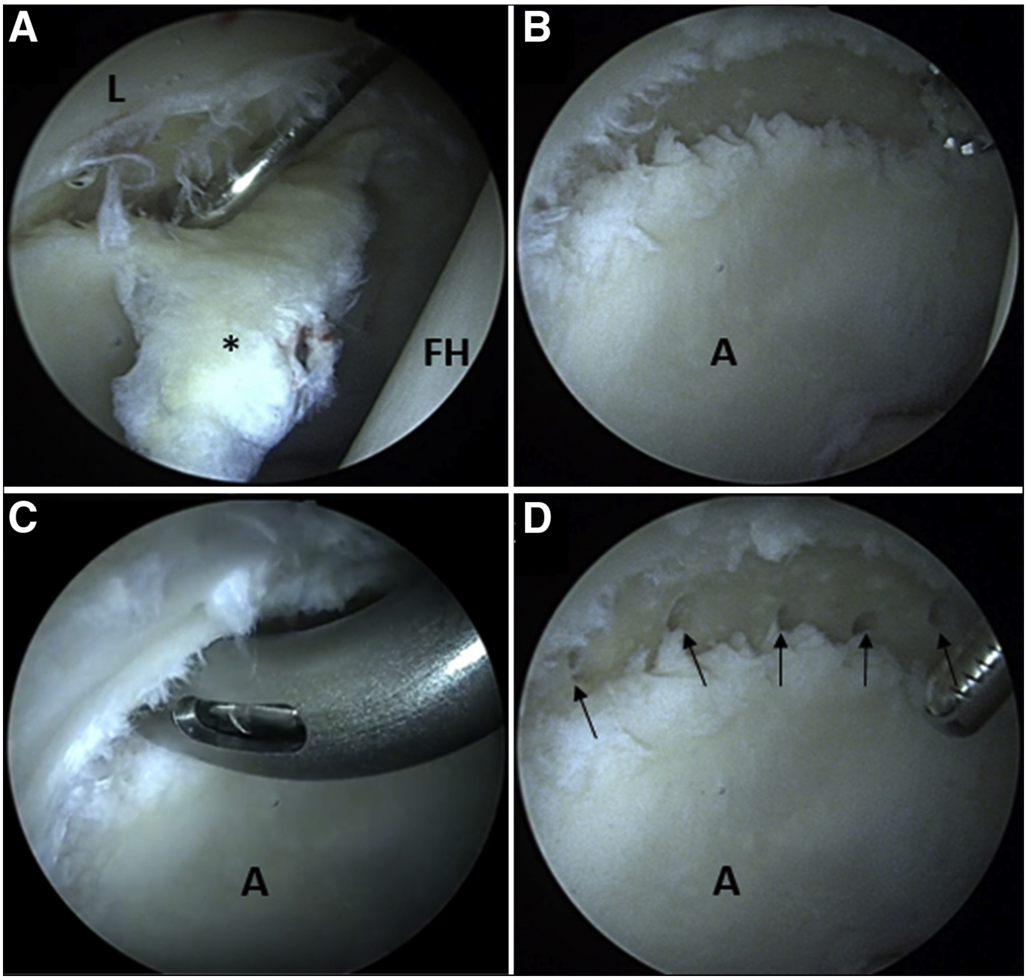

Fig 2. Intraoperative view from the anterolateral portal with the 70° arthroscope in a right hip. (A) During the diagnostic assessment, a large unviable chondral flap is found (*), and the probe from the mid-anterior portal is pointing to the cartilage defect. (B) Chondral flap has been removed. Bone-bed is prepared by stabilizing borders of the defect and removing the calcified layer. (C) While still viewing from the anterolateral portal, the 70° curve drill is inserted through the distal anterolateral accessory portal. The face of the curved guide sits perpendicular and flush to the bone-bed surface. (D) The final microfractured holes (black arrows) are shown. (A, acetabulum; FH, femoral head; L, labrum.)

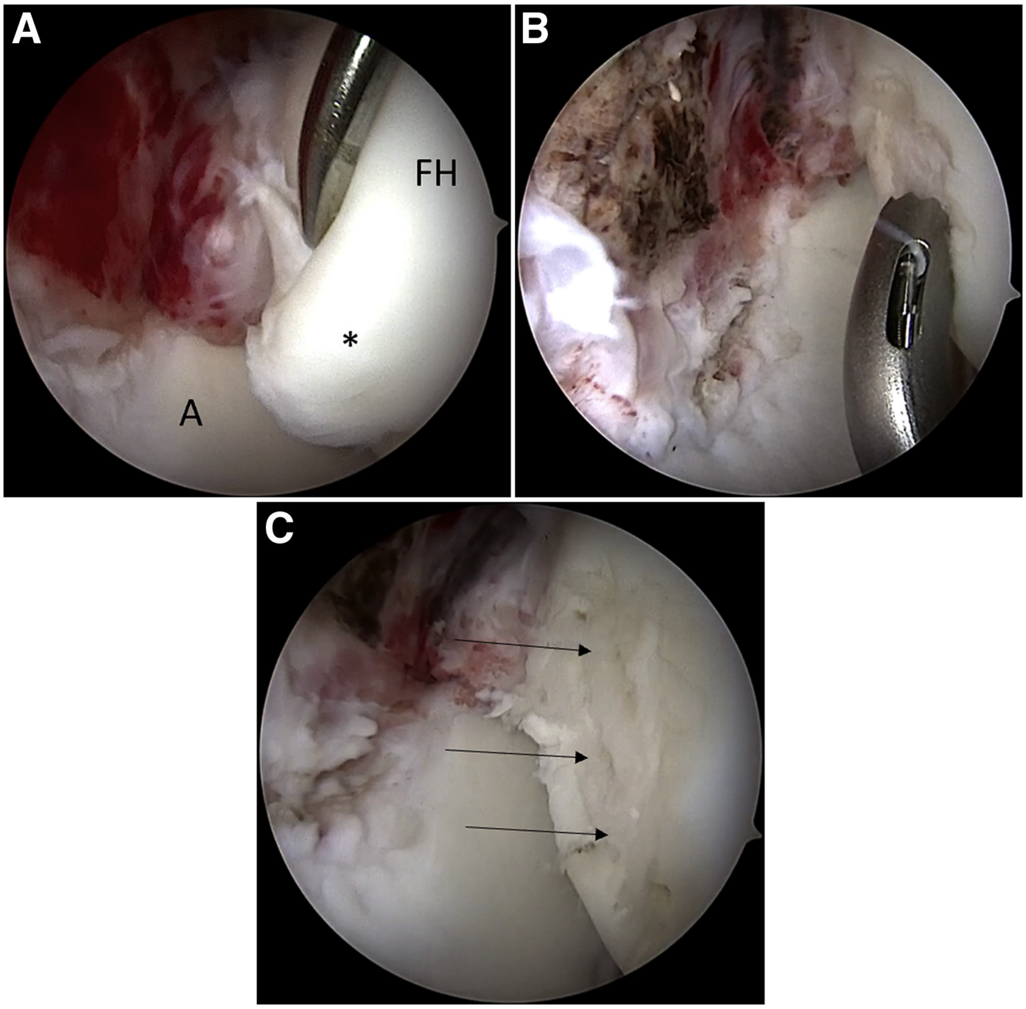

Fig 3. Intraoperative view from the anterolateral portal with the 70° arthroscope in a right hip with a chondral damage to the femoral head. (A) During the diagnostic assessment, an unstable chondral lesion on the femoral head is found (*). (B) Unstable cartilage has been removed and the borders of the defect are stabilized. The face of the 90° curved drill guide is placed flush to the subchondral bone. (C) The final holes (black arrows) are shown. (A, acetabulum; FH, femoral head.)

adduction, and the nonoperative leg is placed in 30° of abduction. The operative table is transitioned to 8° to 10° of Trendelenburg inclination.[12]

Fluoroscopy Technique

The C-arm is positioned on the nonoperative side of the patient and draped in sterile fashion. To obtain a true anteroposterior image of the pelvis, tilt the C-arm to compensate for the Trendelenburg inclination. Under fluoroscopy, the joint seal is broken and traction applied.[13]

Portals Placement

With the anterior superior iliac spine as an anatomic reference and fluoroscopic assessment, the anterolateral portal is created. Subsequent visualization using the 70° arthroscope will be used through this portal. The mid-

Table 1. Surgical Indications and Contraindications

Indications	Contraindications
• Focal and full-thickness cartilage lesion	• Extensive cartilage defect, over 2 cm^2 • Patients unwilling to commit to the required and specific postoperative management

Table 2. Advantages and Disadvantages

Advantages	Disadvantages
• Expedient	• Extended recovery time
• Cost-effective	• Fibrocartilage instead of hyaline cartilage
• Simple to perform	• Benefits may decrease at mid and long term
• Skiving is prevented	

Table 3. Pearls and Pitfalls

Pearls	Pitfalls
• Prepare acetabular bone-bed and microfracture drilling before anchor drilling for labral treatment.	• Inadequate bone-bed preparation, failing to remove calcified layer.
• Restore labral functionality with a repair or reconstruction so to "seal" the bone marrow clot.	• Inadequate space between drill holes may increase the risk of fractures.
• Before committing to drill, try different angles of approach from either the MA or DALA portals.	• Placing the drill on reverse may while retrieving the bit may increase the risk of the bit breaking in the joint.

DALA, distal anterolateral accessory; MA, mid-anterior.

anterior and distal anterolateral accessory portal are created and used for working portals (Fig 1).[13]

Diagnostic Arthroscopy and Cartilage Assessment

A methodical diagnostic arthroscopy is performed. The ligamentum teres, acetabular notch, iliopsoas impingement sign, labral/chondrolabral junction condition, and femoral and acetabular cartilage are all assessed. Microfracture is indicated if the cartilage defect exposures subchondral bone, categorized as Outerbridge lesion IV (Figs 2 and 3).[11,14,15]

Acetabular Microfracture Technique

According to preoperative planning and intraoperative findings, perform any acetabular rim trimming before microfracture drilling. If labral repair, reconstruction, or augmentation is needed, drill holes for the anchors after the microfracture. If a chondral defect is noted and fulfills criteria for microfracture (Table 1), proceed as follows.

Bone-Bed Preparation

First, remove all unviable and unstable cartilage around the edges of the defect with a shaver. Using a ring curette, scrape away loose cartilage to create perpendicular borders around the chondral lesion site. The same should be done to the calcified layer (Video 1).

Microfracture Drilling

Once the lesion site is prepared, the MicroFX OCD Osteochondral Drill System (Stryker, Kalamazoo, MI) is used. The 70° curved drill guide is introduce into the joint from either the mid-anterior or distal anterolateral accessory portal, which ever offers a perpendicular drilling trajectory relative to the bone-bed. Before drilling, ensure that that the drill bit is (1) centered and (2) assembled to reach the desired depth.

During the procedure, the arthroscope should be held by the assistant so that the surgeon can maneuver in one hand the curved drill guide and in the other the drill. Start from the periphery of defect and work towards the center, placing the holes 3 to 4 mm apart to avoid subchondral plate fractures (Video 1). During this process, the drill should exclusively be set on the forward speed. Keep the drill on forward while retrieving from the hole. This will reduce the risk of breaking the drill bit.

After drilling, use the shaver to remove debris that may have accumulated in the joint during drilling. Cease the fluid irrigation pump to ensure bleeding from each one of the microfractured holes (Video 1).

Table 4. Risks

- Subchondral plate fracture
- Subchondral cyst formation
- Drill bit breaking during drilling

Postoperative Rehabilitation

The patient is placed in a brace (X-Act ROM Hip Brace; Donjoy, Vista, CA) for 8 weeks. In addition, use of crutches is encouraged for 8 weeks with weight-bearing restriction of up to 20% body weight.[6] Gentle passive range-of-motion exercise is initiated during the first week, under the supervision of a physiotherapist.

Discussion

The purpose of this technique is to offer an alternative to accomplish the microfracture procedure in such a way that overcomes the challenges of accessing regions of a joint with high surface curvature. Our indications and contraindications are described in Table 1. To achieve a reproducible and lower-risk procedure, a curved guide with a flexible drill is used to reach angles without the creation of additional portals beyond the standard ones for hip arthroscopy. Additional advantages and disadvantages are presented in Table 2. In a recent systematic review, MacDonald et al.[16] concluded that favorable outcomes can be achieved after microfracture in hip arthroscopy but noted concerns regarding the potential formation of subchondral cyst.[1,10,16]

Domb et al.[6] published result with minimum 5-year follow-up after hip arthroscopy with microfracture for patients with symptomatic labral tears and femoroacetabular impingement. The authors reported that sustained and significant improvement in several patient-reported outcomes. Moreover, the authors also found that the outcomes did depreciate compared with those recorded at 2 years.

Microfracture in hip arthroscopy offers a feasible alternative for the management of certain types of severe cartilage defects.[17,18] Nevertheless, acknowledging the demanding nature of this arthroscopic procedure, attention to details is vital (Table 3). Furthermore, risks must be recognized and considered (Table 4).

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