



Arthroscopic Ulnohumeral Joint Debridement and Transolecranon Microfracture for Osteochondritis Dissecans of the Humeral Trochlea

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Abstract: Osteochondritis dissecans of the humeral trochlea is a rare cause of elbow pain adolescents. Despite being a juvenile form of osteochondritis dissecans, spontaneous resolution is not uniform, and more than one-half of patients experience ongoing pain, crepitus and loss of motion. Traditionally, nonsurgical management has been favoured as distal trochlea articular lesions were only accessible via olecranon osteotomy. Consequently, the threshold for intervention is high as the recovery prolonged. We present our technique of accessing the trochlear osteochondritis dissecans via ulnohumeral joint arthroscopy with transolecranon microfracture, which enables these lesions to be managed with reduced morbidity.

Osteochondritis dissecans (OCD) of the humeral trochlea is a rare cause of elbow pain in adolescents. They are commonly misdiagnosed, and few are diagnosed before presenting to a specialized upper-extremity service.^{1,2} Fortunately, the majority of trochlea OCDs present with characteristic radiologic features that distinguish them from other pathologies.² A “typical” trochlea OCD presents at a mean age of 13 years with pain (93%), crepitus (54%), mechanical symptoms (32%), and loss of motion (32%).² The characteristic radiographic finding is a “pseudo-intercondylar notch sign” or lucent lesion just lateral to the apex of the trochlear groove (Fig 1).³ This corresponds

with a hyperintense lesion on fluid-weighted magnetic resonance imaging (Fig 2). More than 90% are located on the lateral crista of the trochlea groove on coronal imaging. In the sagittal plane, trochlea OCDs are located at a mean of 190° from the anterior humeral line as quantified by Johnson method (Fig 3).^{2,4} As such, they were previously thought inaccessible without olecranon osteotomy.

Furthermore, despite being a juvenile form of OCD, spontaneous resolution is not uniform. Two-thirds of trochlea OCDs improve with nonsurgical treatment consisting of rest and abstinence of elbow loading for a period of 3 months. The rest remain either unchanged or are worse at a mean follow-up of 12 months.² Only a minority of patients demonstrate complete resolution with this protocol, and thus operative treatment is sometimes indicated. In capitellar OCDs, it has been shown that arthroscopic debridement and microabrasion/microfracture has been highly effective in the treatment of these lesions. This provides the underlying rationale for developing a surgical technique to treat trochlear OCDs also arthroscopically (Table 1).

Surgical Technique (With Video Illustration)

Careful evaluation of the preoperative magnetic resonance imaging and measurement of the coronal location and sagittal angle is crucial to both assist with intraoperative localization and to look for associated pathology (Table 2 and Video 1). Fifty-seven percent of

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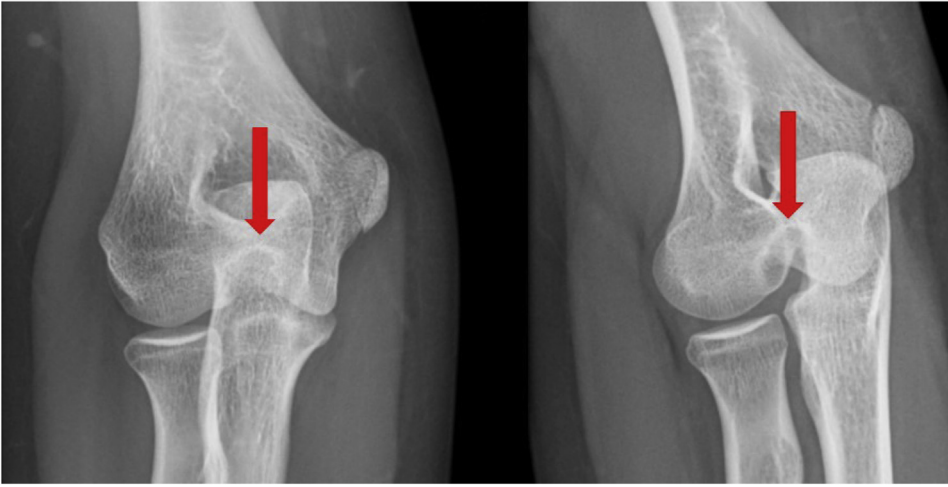


Fig 1. Anteroposterior radiograph demonstrating the “pseudo-intercondylar notch sign” (red arrow) characteristic of a trochlea osteochondritis dissecans.

elbows have at least one additional pathology, with the most common being a concomitant capitellar OCD (21%).² If an associated capitellar OCD is identified, it can be treated through the same portals in a technique similar to that published previously.⁵

Position and Portals

We recommend that the patient be positioned laterally to allow ease of manipulation throughout the case as varus stress and ability to flex and extend the elbow are essential for establishing access to the ulnohumeral joint. The arm is positioned on a Western arm positioner (Smith & Nephew, Watford, UK). Anatomical

landmarks are identified, and the following portals are then marked (Fig 4). The majority of work is done in the posterolateral compartment (posterior radiocapitellar compartment), using portals near the soft spot portal:

1. Soft spot portal (landmark only)
2. Distal soft spot portal (viewing)
3. Proximal soft spot portal (working)

The classic soft spot portal itself is not used during the procedure, but rather a slightly more proximal (proximal soft spot portal) and slightly more distal (distal soft spot portal) are used to avoid instrument

Fig 2. Coronal magnetic resonance imaging demonstrating the appearance and location of a trochlear osteochondritis dissecans, centered just lateral to the apex of the trochlea groove (blue lines). Red arrows demonstrate a coronal dimension of 9 mm.

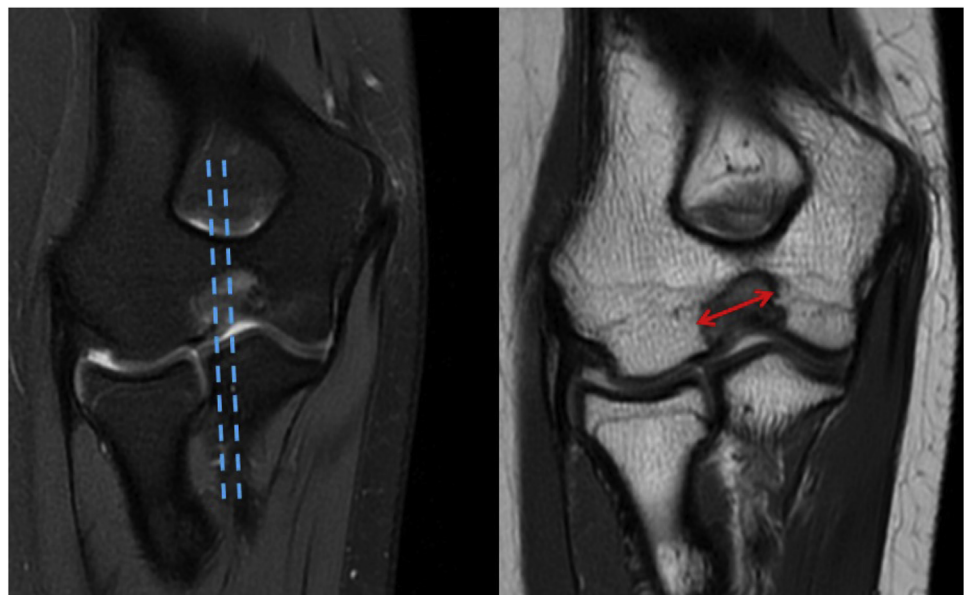
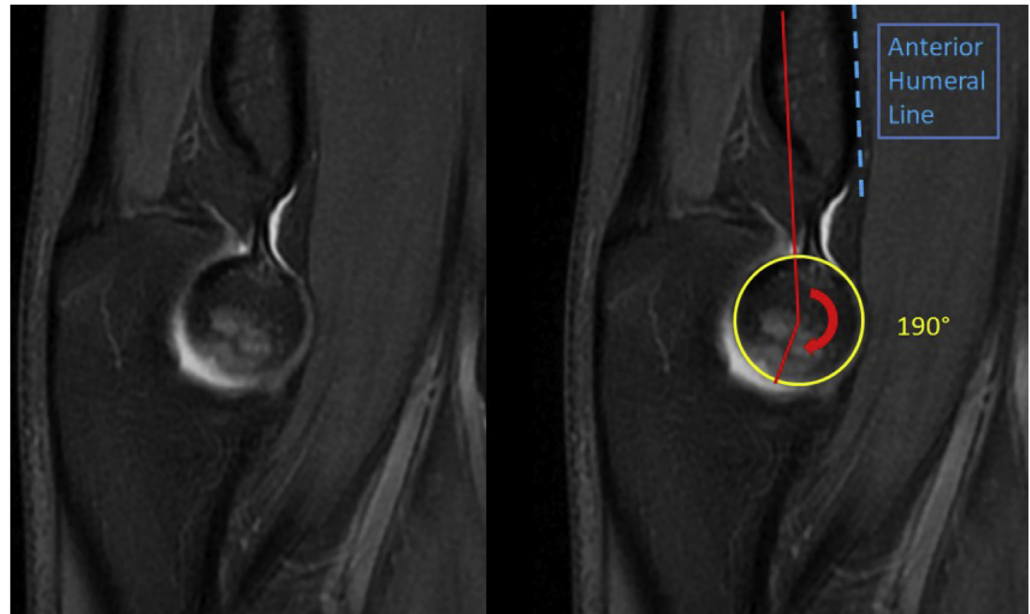


Fig 3. Sagittal magnetic resonance imaging demonstrating sagittal position of a typical trochlear osteochondritis dissecans, which is 190° from the anterior humeral line (blue dotted line) as quantified by the method of Johnson et al.⁴



congestion. Arthroscopy is first commenced in the posterior (olecranon fossa) compartment to identify and remove loose bodies before posterolateral compartment arthroscopy using portals described previously.

Ulnohumeral Joint Arthroscopy and Localizing the OCD

While working in the posterolateral compartment, the assistant applies a varus force to the elbow to hinge open the ulnohumeral joint and expose the distal humeral trochlea (Fig 4). The field of view can be adjusted through flexion and extension of the elbow until the area of interest is presented. Most trochlea OCDs are found through palpation with an angled probe (Table 3). The overlying cartilage can appear superficially intact, but unlike normal cartilage, once the softened area is encountered it can be easily perforated and lifted with the probe (Fig 5). Once overlying cartilage is elevated, one difference between trochlear and capitellar OCDs is that while capitellar OCDs often

have a hard sclerotic subchondral bone layer, trochlear OCDs often have softer underlying bone layer with a greater tendency to bleed.

Debridement and Transolecranon Drilling

Next, the boundaries of the lesion are defined. This step is aided by preoperative measurements and knowledge that the average trochlea OCD is approximately 8 to 9 mm in diameter which approximates to the width of two 4-mm probes.² The cartilage flap is the removed with the shaver and a contained defect is created with small, angled curettes (Fig 5). An abrasion chondroplasty is performed with the shaver before the subchondral bone is perforated with a 1.6-mm K wire passed through the olecranon bare area (Fig 6). Adjustment of trajectory of the k-wire in the sagittal plane is achieved by retrieving the wire back to the olecranon and flexing and extending the elbow. Adjustment of trajectory in the coronal plane can be achieved by using a probe to push and pull on the k-wire, or by repositioning the k-wire through the olecranon. Using a combination of these maneuvers, it is

Table 1. Advantages and Disadvantages

Advantages
1. Minimal morbidity—avoidance of olecranon osteotomy
2. Minimal risk to neurovascular structures
3. Expedient recovery with minimal activity restrictions
Limitations and potential pitfalls
1. Limited access to the medial ulnohumeral joint
2. Potential scuffing of the cartilage with improper technique or portal placement

Table 2. Recommended Equipment

Western arm positioner (Smith & Nephew, Watford, UK)
30° , 4-mm arthroscope
Straight and curved tapered arthroscopic shavers
Small arthroscopic curettes
1.6-mm K wire
Optional biologic augmentation (JointRep; Oligomedic, Quebec, Canada)

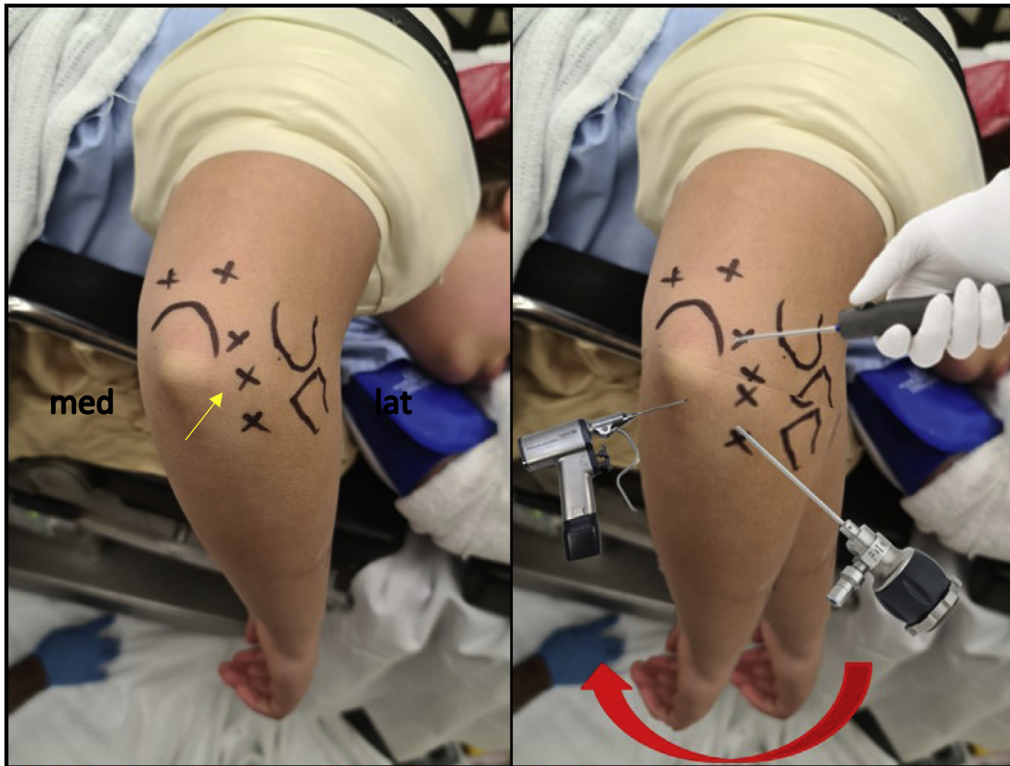


Fig 4. (Left) Positioning and portals used for arthroscopy of the right elbow for treatment of trochlear osteochondritis dissecans. Patient is in lateral decubitus position, with the arm in a Western arm positioner. Note the classic soft spot portal (arrow) is marked for reference but is not used. An accessory portal 2 cm distal to the soft spot is used for viewing and another accessory portal 2 cm proximal to the soft spot is used for instrumentation. This is to avoid instrument congestion. A varus force (red arrow) is used to expose the trochlea osteochondritis dissecans (right). Microfracture is done using a k-wire driven through the olecranon. (Med, medial; Lat, lateral.)

possible to access the entire distal trochlea. Finally, arthroscopy fluid is drained, and biologic augmentation (Fig 7; JointRep; Oligomedic, Quebec, Canada) can be injected at the surgeon's discretion.

Postoperative Rehabilitation

Postoperatively, the patient is placed in a sling for comfort and is permitted to commence gentle early mobilization within limits of comfort for a period of 6 weeks. Gentle loading is commenced thereafter and return to sport is permitted at 3 months postoperatively.

Discussion

Surgical approaches for humeral trochlea OCDs have traditionally been limited to olecranon osteotomy and retroarticular drilling. The former carries significant surgical morbidity while the latter is only suitable for stable lesions. Arthroscopic treatment has been previously reported by several authors, but has thus far been limited to debridement of atypical peripheral lesions without microfracture.^{6,7} As such, the threshold for intervention for symptomatic trochlea OCDs had been high despite the fact that more than one-half of patients remain symptomatic with nonoperative

Table 3. Pearls and Pitfalls

Pearls

1. Careful evaluation of preoperative magnetic resonance imaging to determine lesion location to aid intraoperative identification
2. Preoperative identification of associated intra-articular pathology
3. Use of intraoperative fluoroscopy to help position transolecranon k-wire for microfracture

Pitfalls

1. Chondral injury through forced entry into tight space—avoid through varus stress on elbow, adjustment of working portal trajectory and use of bullet tipped shaver
2. Difficulty identifying lesion—avoid through planning and palpation with blunt, angled probe.
3. Inadequate debridement of lesion—avoid by lifting delaminated cartilage from inside out until adherent cartilage is met

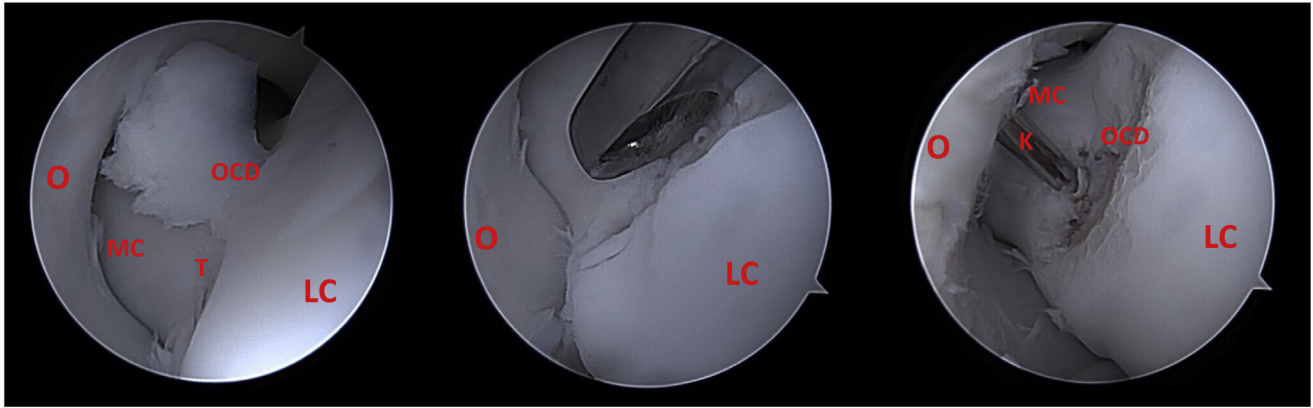


Fig 5. Intraoperative arthroscopy photos of a right elbow, with the camera in the inferior accessory soft spot portal and instrument in the superior accessory soft spot portal, demonstrating the osteochondritis dissecans lesion (left), curettage (middle) and trans-olecranon drilling (right). Note the use of small, angled curette to assist with debridement. (LC, lateral condyle; MC, medial condyle; O, olecranon; OCD, osteochondritis lesion; T, trochlea.)

management.^{1,2} The advantage of our technique is that it facilitates access to the ulnohumeral joint with minimal morbidity and allows for both debridement and microfracture through the same approach.

The main limitation of our technique is that we do not yet have long term follow-up as trochlea OCDs are a rare and recently recognised condition. As such comparative outcomes have not yet been explored. However, our anecdotal experience is that relief of

mechanical symptoms is evident from the first post-operative visit and sustained through to 12 months post-surgery as one would expect from the treatment of unstable cartilage lesions in general.

Finally, though not every surgeon will encounter trochlear OCDs on a regular basis, we hope that the principles presented will empower surgeons to treat other ulnohumeral joint pathologies in a similar manner and potentially mitigate the need for osteotomy.

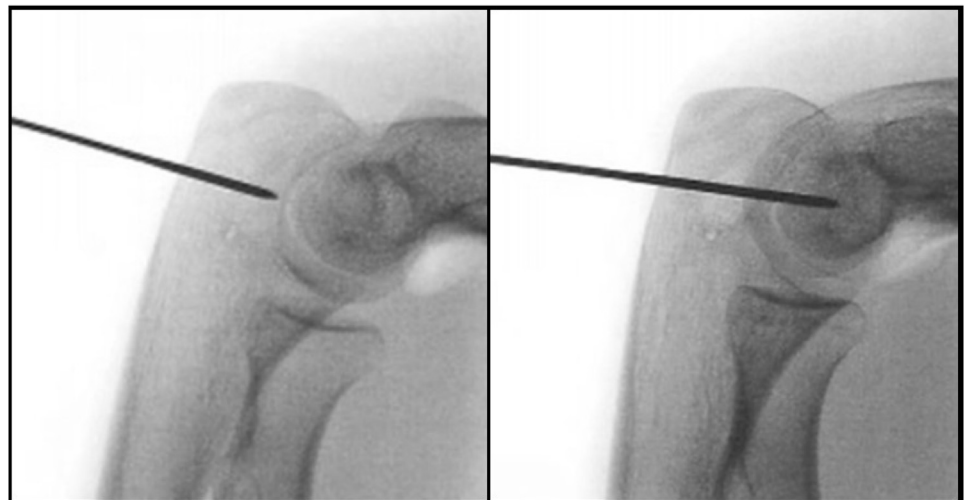


Fig 6. Intraoperative fluoroscopy of trans-olecranon drilling with a 1.6-mm k wire.

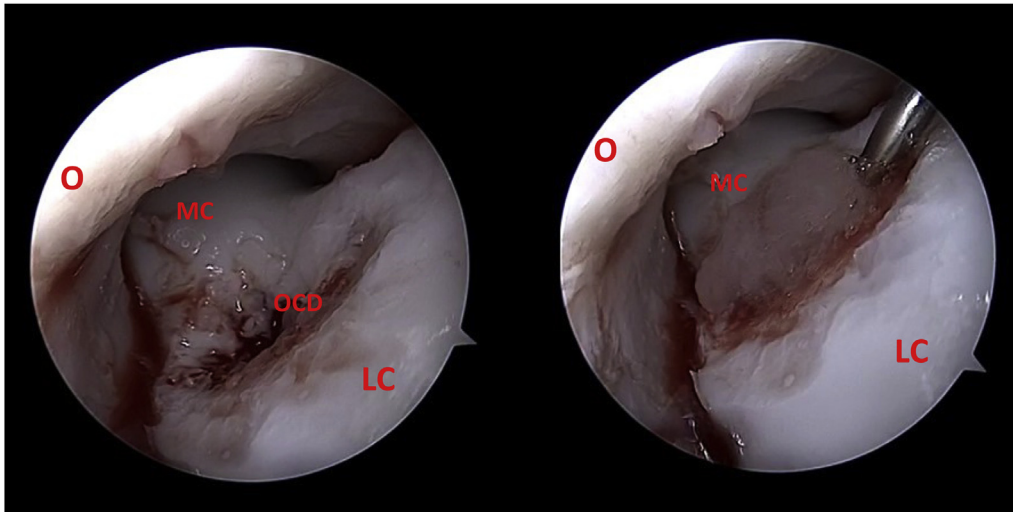


Fig 7. Final appearance of the microfractured osteochondral lesion of a right elbow, with the camera in the inferior accessory soft spot portal and instrument in the superior accessory soft spot portal, demonstrating bleeding subchondral base (left) before biologic augmentation (right). (LC, lateral condyle; MC, medial condyle; O, olecranon; OCD, osteochondritis lesion.)

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