

The Golf Ball Sign: Arthroscopic Localization of an Osteochondritis Dissecans Lesion of the Knee

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Abstract: We report on the arthroscopic treatment of a 12-year-old boy diagnosed with an osteochondral defect of the medial femoral condyle. He underwent arthroscopic fixation of the defect, and during the surgery, a blunt trocar was used to localize the lesion. The trocar created a transient dimpling effect on the cartilage overlying the osteochondral defect that resembled the surface of a golf ball. This “golf ball sign” then served as a visual guide during placement of a chondral dart. When present, it is believed that this sign can benefit arthroscopists by helping to improve intraoperative localization of an osteochondral defect.

Osteochondritis dissecans (OCD) of the knee is an acquired, idiopathic disease that affects the subchondral bone of the femur. The specific etiology remains unknown, but delamination and sequestration of the bone can result depending on the extent of the OCD lesion.¹ The impact this has on the overlying cartilage can range from softening of the articular cartilage to development of an osteochondral flap and/or loose body formation. Depending on the size, location, and extent of articular cartilage involvement, the OCD lesion can cause significant discomfort and morbidity.

Treatment options vary but can involve conservative, restricted weight-bearing options; operative fixation of a stable or unstable lesion; and/or loose body removal. Operative intervention is usually performed arthroscopically. A magnetic resonance imaging (MRI) study is often obtained beforehand during the clinical workup of the patient. The MRI study helps to determine the location of the lesion, which is verified by arthroscopic visualization of the defect. In early stages of the lesion, articular cartilage becomes soft and ballotable before developing overt fibrillations, fissures, or exposed bone.

This particular case involves a 12-year-old boy with an OCD lesion who underwent operative fixation of his type IV lesion. We report about a technique used during the procedure, in which a blunt trocar was used to delineate the borders of the OCD lesion, which would later serve as a guide during the placement of our fixation.

Surgical Technique

The patient was a 12-year-old boy who sustained a recent fall from standing that caused him to have continued left knee pain and swelling. He was unable to play his usual sports because of pain, clicking, and catching of the left knee. Radiographs obtained at the time of presentation showed an osteochondral defect involving the lateral aspect of the left medial femoral condyle. The plan for the patient was to restrict him from any sports, and he was to avoid any impact activities (running, jumping, and so on) for the next month until an MRI study was obtained. At his follow-up visit 5 weeks later, the MRI study showed a 10-mm oval lesion at the previously defined location, as well as the presence of subchondral cysts and fluid between the fragment and underlying bone (Fig 1). The articular cartilage remained free from any defects, and there was no evidence of a loose body within the joint.

Persistent symptoms for greater than 5 weeks after the activity restrictions and MRI findings led us to pursue operative fixation of the unstable lesion. Arthroscopic surgery was performed and visualization of the defect, through the left knee inferolateral anterior portal, was obtained. In the medial compartment with the knee flexed, there was an area of softened cartilage on the lateral aspect of the medial femoral condyle. This involved the weight-bearing portion of the femur, and it

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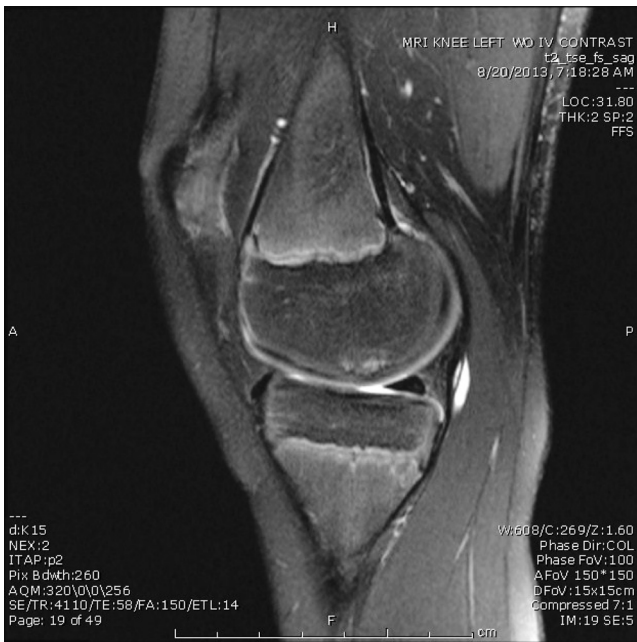


Fig 1. Fat-suppressed T2 sagittal image of left knee in 12-year-old boy. The image shows an osteochondral defect involving the lateral aspect of the medial femoral condyle.

measured approximately 1.5 cm × 1 cm. By use of a Dyonics blunt trocar (Smith & Nephew, London, England), the cartilage was palpated. It was noted during examination with the trocar that the area involving the lesion (correlating with the MRI findings) dimpled with palpation (Fig 2). These dimples were noted to be remarkably similar to those observed on the surface of a golf ball, hence our use of the term “golf ball sign.” The area surrounding the lesion was palpated, but the trocar failed to make an impression in the cartilage overlying nonpathologic subchondral bone (Video 1).

Once the borders of the OCD lesion were delineated with the trocar, a 0.045-inch K-wire was used to drill 2 holes through the tidemark to stimulate bone healing. Next, 2 Arthrex chondral darts (Arthrex, Naples, FL) were placed after an arthroscopic guide was used to

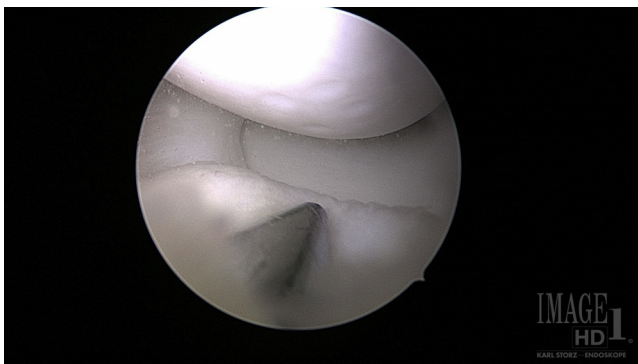


Fig 2. Arthroscopic visualization of medial femoral condyle from inferolateral portal. The golf ball sign overlying the defect can be seen on the femoral condyle above the trocar.

prepare the drill holes. Visual confirmation of the darts within the boundaries of the OCD lesion was confirmed afterward. At the conclusion of the case, resolution of the dimpling was noted.

Discussion

OCD lesions of the knee are treated primarily by 2 methods: nonoperatively or by arthroscopic fixation. First, an attempt at nonoperative treatment is made by limiting the patient’s activities and restricting the weight-bearing status of the involved extremity. Depending on symptom severity and/or response to restricted weight bearing, this may last for several months. Nonoperative treatment can fail in up to 50% of cases, and factors such as increasing patient age, the presence of cyst-like lesions, and lesion size contribute to the high failure rate.² If it fails, then successful healing can usually be achieved by arthroscopic fixation.

An MRI study is a common imaging tool used for diagnosis. The overall sensitivity of MRI for identifying lesions compared with arthroscopy was reported to be between 78% and 91%, and the specificity ranged between 95% and 97.9%.³ Features of a stable, low-grade lesion on MRI include poor definition of the fragment, a low fragment rim signal, absence of articular cartilage breach, and/or softening and thickening of articular cartilage.⁴ These lesions are not as readily discernible on arthroscopy because they lack the definable characteristics of an unstable, high-grade lesion, such as an identifiable fragment, articular cartilage flap, or loose body.⁵

With regard to OCD lesions, even though the primary pathology lies in the subchondral bone, the overlying cartilage can soften because of its compromised support structure. Yonetani et al.¹ biopsied juvenile OCD lesions, and histologic analysis showed an underlying instability at the deeper layers of articular cartilage and poor healing at areas of separation. The golf ball sign is able to be produced likely because of the loss of integrity between cartilage layers and/or the subchondral bone. As a result, a blunt trocar can create a transient dimpling effect on the pathologic cartilage with minimal risk of causing iatrogenic injury to the cartilage.

The main advantage of the technique is that it is a simple maneuver used to localize an osteochondral defect. The equipment required is minimal, and the golf ball sign can help improve accuracy during placement of definitive fixation into the lesion. The risks of using this technique are minimal. A small amount of pressure with the trocar is needed to produce the golf ball sign, and no lasting impression is made. Iatrogenic damage to the cartilage is likely possible but only when a significant amount of force is used to probe the surface, which is not needed to visualize this sign. Key features of the technique are shown in Table 1.

It is reasonable to infer that the golf ball sign will not be reproducible for all OCD lesions. During the early

Table 1. Indications, Key Features, and Pitfalls of Golf Ball Sign

	Description
Indication	Localizing an OCD lesion of the knee when no obvious signs of cartilage damage are evident
Key features	Ease of use, minimal equipment needed, low risk of causing iatrogenic damage to cartilage, and no permanent defect on cartilage
Pitfalls	May not be observed in lesions that are small or underdeveloped; little benefit when obvious cartilage damage is present

OCD, osteochondritis dissecans.

stages of the disease, there may not be enough time for the cartilage to develop the pathologic softening that is evident by the time arthroscopy is performed. Likewise, the size of a lesion might not be large enough to cause softening or be of substantial size to be localized on examination. Moreover, this maneuver would serve little benefit to the arthroscopist when an obvious lesion can be visualized, such as when there is fissuring or a gross defect.

A blunt trocar can be used to localize an OCD defect by dimpling softened cartilage. The dimpling resembles the surface of a golf ball, and so, the golf ball sign can be used to determine the location of an OCD defect when no overt cartilage changes are evident on arthroscopic examination. The dimpling is likely a result of the

pathologic subchondral bone and/or delamination effect on the overlying cartilage, which allows the arthroscopist to differentiate it from healthy, viable cartilage. Although the golf ball sign may not be visualized or be of benefit in all procedures involving an OCD lesion, it is a finding that can be particularly helpful in those cases that do show it.

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