

# Osteochondritis Dissecans of the Knee: Arthroscopic Suture Anchor Fixation



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**Abstract:** Osteochondritis dissecans (OCD) is a subchondral bone abnormality, in which subchondral bone and the overlying articular cartilage detach from the bony bed. Multiple techniques for OCD fixation have been described, including metallic, bioabsorbable implants and biological fixation. We describe a surgical technique for OCD lesions including bony bed preparation with curettage and microfracture, anatomic reduction, and fixation using a suture anchor to provide stability and healing of the lesion.

Osteochondritis dissecans (OCD) is a subchondral bone abnormality that affects the overlying articular cartilage with bony and cartilage fragmentation and may lead to degenerative changes.<sup>1</sup> Although the etiology remains unclear, repetitive microtrauma is the most accepted theory. The prevalence of OCD is approximately 15 to 29 cases per 100,000; male patients are affected more than female patients (5:3). The lesion is most commonly seen in the knee. The lateral aspect of the medial femoral condyle is the classic site of the OCD lesion. Medial femoral condylar involvement occurs in 70% to 80% of cases; lateral femoral condylar involvement, 15% to 20%; and patellar involvement, 5% to 10%.<sup>2</sup>

The presenting symptoms vary depending on the pathologic stage and stability of the lesion. If the lesion is stable, the symptoms are poorly localized. In the advanced stage, if the lesion is unstable, the symptoms are painful, with locking or catching and swelling. A plain radiograph is useful to identify the location of the lesion. Magnetic resonance imaging can be performed

to differentiate between abnormal ossification and OCD lesions; to measure the lesion size and depth, as well as the presence of any loose body; and to assess the stability of the lesion.<sup>1,3</sup> De Smet et al.<sup>4</sup> defined instability based on evaluation on T2 images: (1) high-signal intensity line beneath the lesion, (2) cystic area beneath the lesion, (3) high-signal intensity line through the articular cartilage, and (4) focal articular defect. Moreover, arthroscopy findings are considered the gold standard, with instability defined as a break in the articular cartilage or a mobile flap detected using a probe.<sup>3</sup>

OCD is usually classified as juvenile and adult, based on the maturity of the physis. Juvenile OCD (open growth plates) is often stable and resolves with conservative treatment, and it has a better prognosis than adult OCD. Juvenile OCD with a stable lesion is treated conservatively with medication and activity modification, with immobilization and decreased weight bearing.<sup>1,2,5</sup> Operative treatment is indicated for unstable lesions or lesions unresponsive to conservative treatment. The surgical option is based on the size and location of the lesion, amount of subchondral bone, and quality of articular cartilage. In the case of an unstable, partially detached or large fragment, if the fragment is repairable, the treatment includes drilling and arthroscopic or open reduction and internal fixation. If the fragment is not repairable, with cartilage damage, the treatment is microfracture and osteochondral autograft in small lesions. In large lesions, the treatment includes osteochondral allograft and autologous chondrocyte implantation. Multiple techniques for OCD fixation have been described, including metallic and bioabsorbable implants and biological fixation using an osteochondral plug.<sup>6,7</sup> We describe arthroscopic

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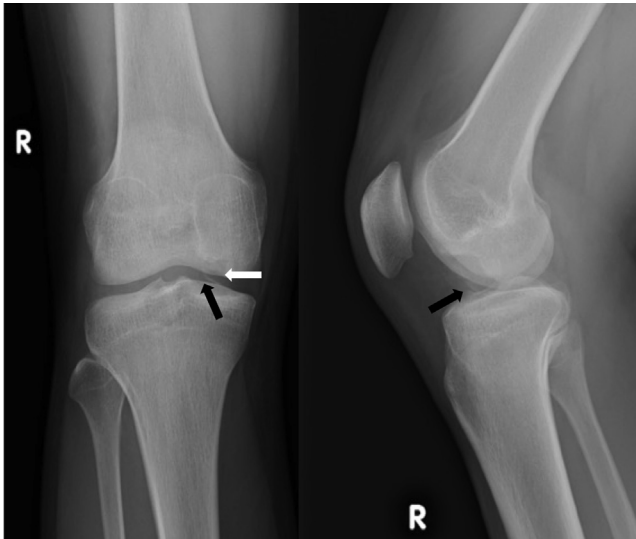
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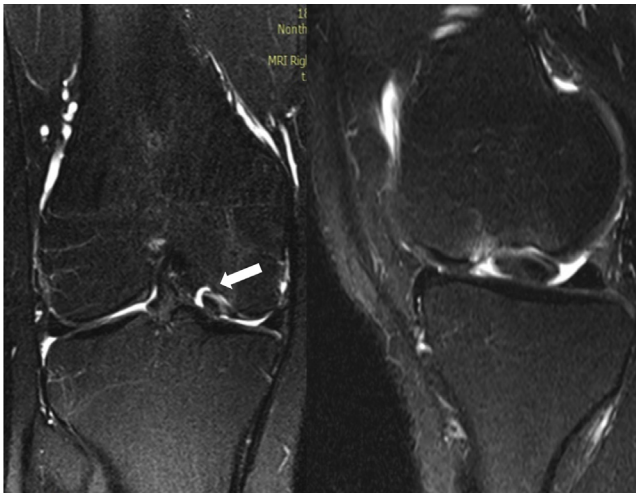
**Fig 1.** Standard anteroposterior and lateral radiographs show a lucent defect on the medial femoral condyle (white arrow) with a small bone fragment in the joint (black arrows). (R, right.)

fixation of an OCD lesion using a suture anchor to ensure the stability and healing of the lesion.

## Technique

### Patient Positioning

Preoperatively, plain radiographs (anteroposterior and lateral views) (Fig 1) and magnetic resonance imaging (Fig 2) of the affected knee are requested to evaluate the OCD lesion. The patient is placed in the supine position with the affected leg hanging over the edge of the operating table, in 90° of flexion. A well-padded high-thigh tourniquet is placed, and the



**Fig 2.** T2-weighted magnetic resonance imaging (MRI) showing discontinuity of subchondral bone with signal intensity of fluid at lesion-fragment-bone interface (arrow).

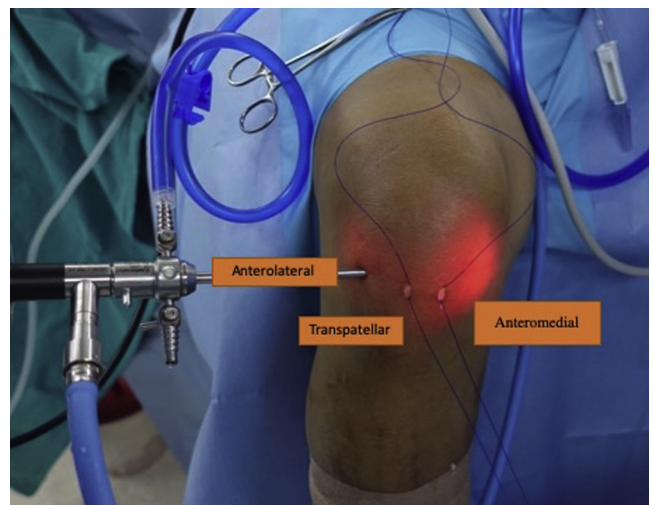


**Fig 3.** Patient positioning with leg hanging over edge of table.

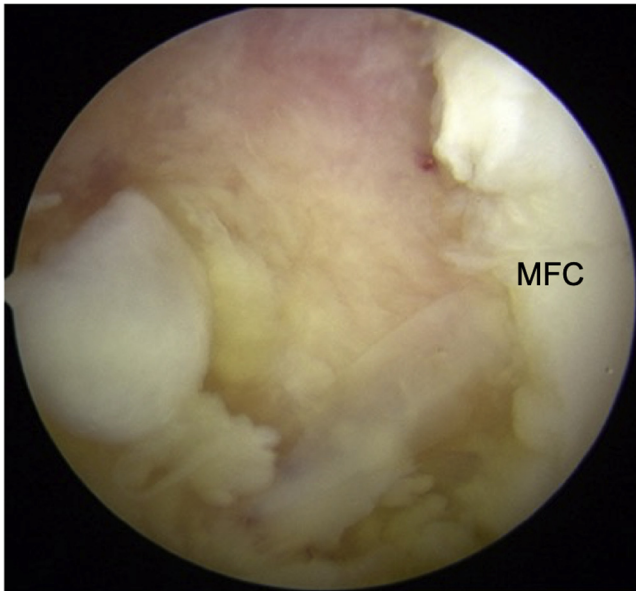
contralateral leg is placed in an abduction stirrup (Fig 3). Spinal or general anesthesia is used according to the patient's preference.

### Arthroscopic Examination

A routine arthroscopic examination is performed through standard anterolateral and anteromedial portals. An accessory transpatellar portal is created (Fig 4). The surgeon removes any fat tissue and assesses any possible loose bodies. The subchondral bone lesion on the lateral aspect of the medial femoral condyle is identified (Fig 5), with the OCD lesion detached from the subchondral bone and lying in the intercondylar notch attached by a few strands of the



**Fig 4.** Portal placement: standard anterolateral and anteromedial portals with addition of transpatellar portal.

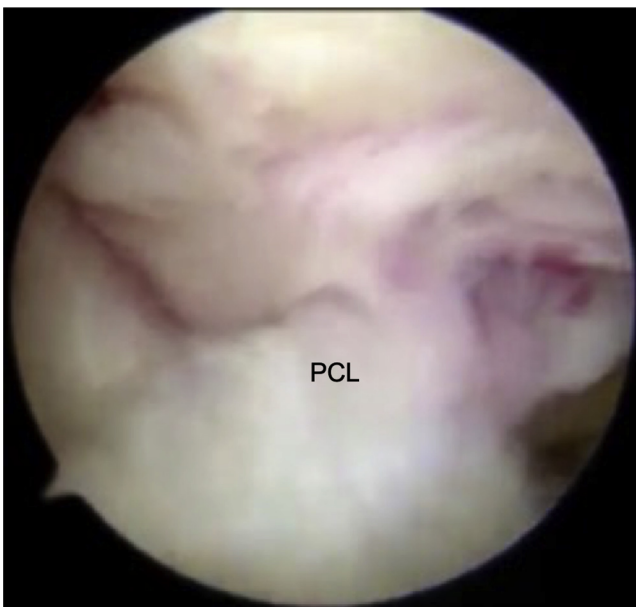


**Fig 5.** Arthroscopic view from anterolateral portal of subchondral bone on lateral aspect of medial femoral condyle (MFC).

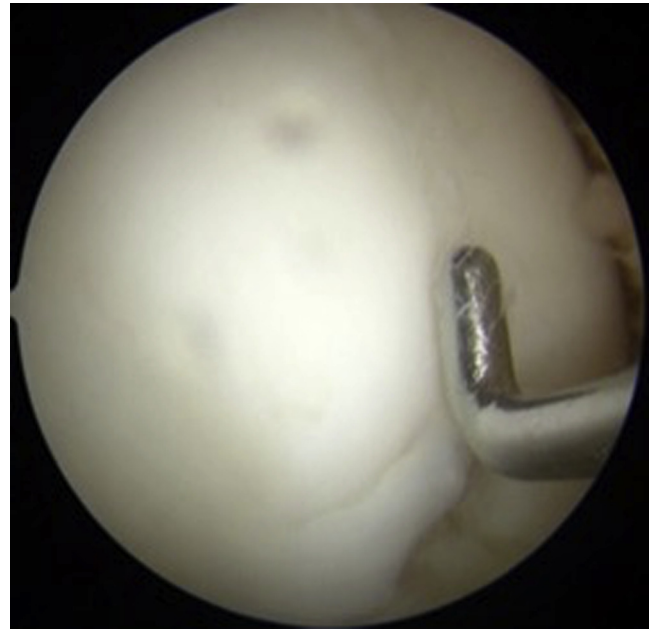
posterior cruciate ligament (PCL) (Fig 6). The fragment is evaluated using a probe (Fig 7); once the osteochondral fragment is reduced to its anatomic position with adequate congruence, fixation preparation is performed.

#### Preparation of Bony Bed

The subchondral bone is prepared using a motorized shaver and curettage to remove fibrous tissue on the



**Fig 6.** Osteochondritis dissecans lesion in intercondylar notch, attached to and hinged on posterior cruciate ligament (PCL).



**Fig 7.** Use of probe to evaluate lesion reducibility.

bony bed of the OCD lesion. Microfracture (Fig 8) is performed with a 1.8-mm Kirschner wire, 4 mm in depth, with spacing 2 to 4 mm apart. Creating bleeding by penetrating the subchondral bone may provide hematoma formation to stimulate the healing process.

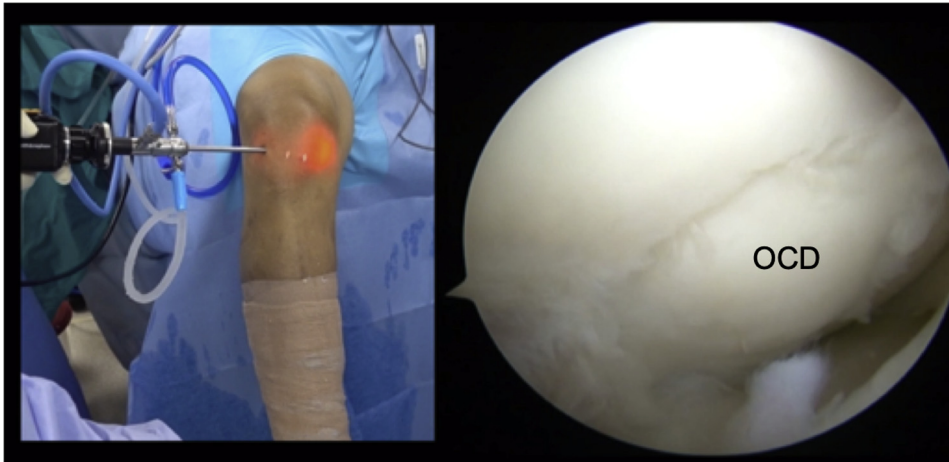
#### Reduction and Fixation of Fragment

After subchondral bony bed preparation, the fragment is reduced using a probe, and the reduction is



**Fig 8.** The subchondral bone base is fully exposed; microfracture is performed to promote the healing process.





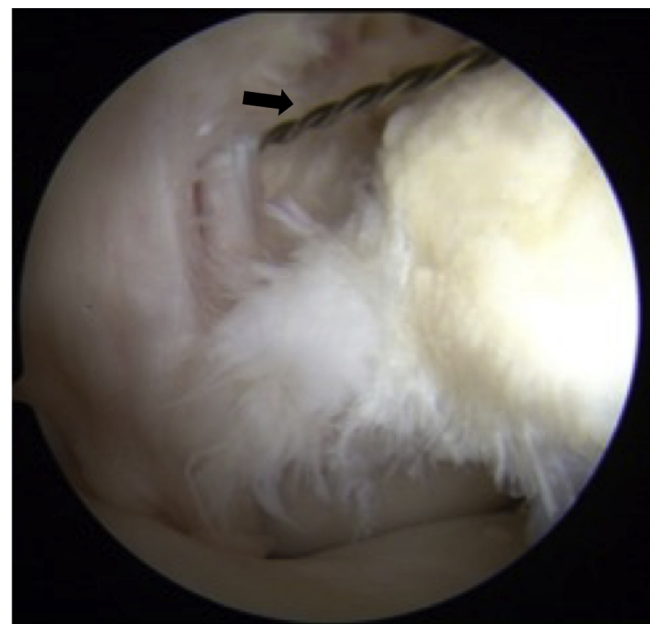
**Fig 9.** Arthroscopic view after osteochondritis dissecans (OCD) fragment reduced with knee in flexion position.

**Fig 10.** Arthroscopic view after fragment reduced with knee in extension position.



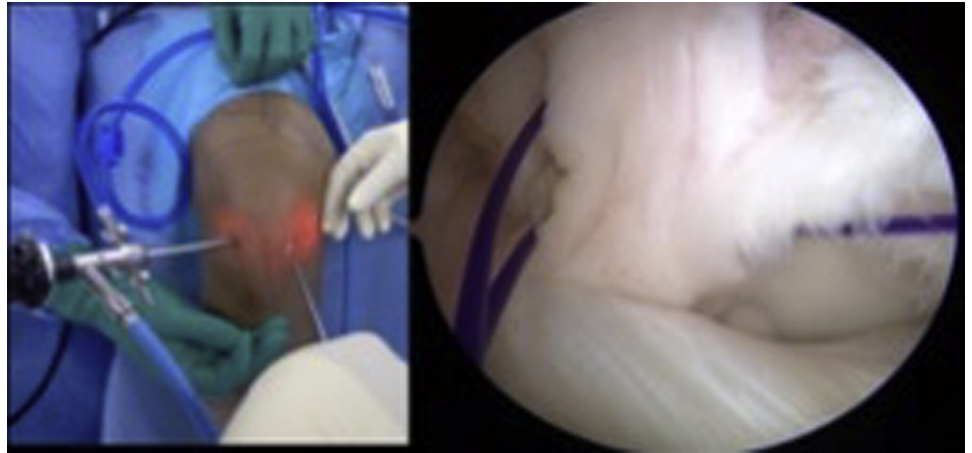
confirmed by flexing and extending the knee under direct visualization of the lesion (Figs 9 and 10). Through an anteromedial portal, a suture passer (Chia Percpasser; DePuy Synthes) loaded with No. 2 polydioxanone (PDS) suture is used to pierce the PCL (Fig 11). Another suture loaded with No. 2 PDS is used to pierce the PCL as the lateral attachment of the lesion; by use of a curved suture passer (Accu-Pass; Smith & Nephew) from the anteromedial portal, the suture is brought to the transpatellar portal (Fig 12). Through the transpatellar portal, an anchor (1.9-mm double-loaded Suturefix; Smith & Nephew) is placed on the medial side of the subchondral bony bed (Fig 13). Suture retrieval is performed in which one limb suture is brought from the anchor with PDS suture to the anteromedial portal and then pulled back with PDS suture as a shuttle to the anterolateral portal. Then, the second suture is shuttled around the PCL by the same technique described earlier, whereas the other 2 sutures are left free.

The fragment is reduced by using a probe and temporarily fixed with a 1.2-mm Kirschner wire



**Fig 11.** A suture passer (Chia Percpasser) (arrow) pierces the posterior cruciate ligament as the lateral attachment of the lesion.

**Fig 12.** Via a curved suture passer (Accu-Pass) from the anteromedial portal, the suture is brought to the transpatellar portal.



(Fig 14). Next, 2 pairs of free suture limbs from anchors are tied together to secure the reduced fragment. The knots from each pair should be placed at the periphery, on the lateral side of the fragment (Fig 15). The Kirschner wire is then removed, and the stability is confirmed by flexing and extending the knee (Figs 16 and 17). The affected knee is immobilized with a cylindrical cast in full extension to compress the fragment.

#### Postoperative Rehabilitation

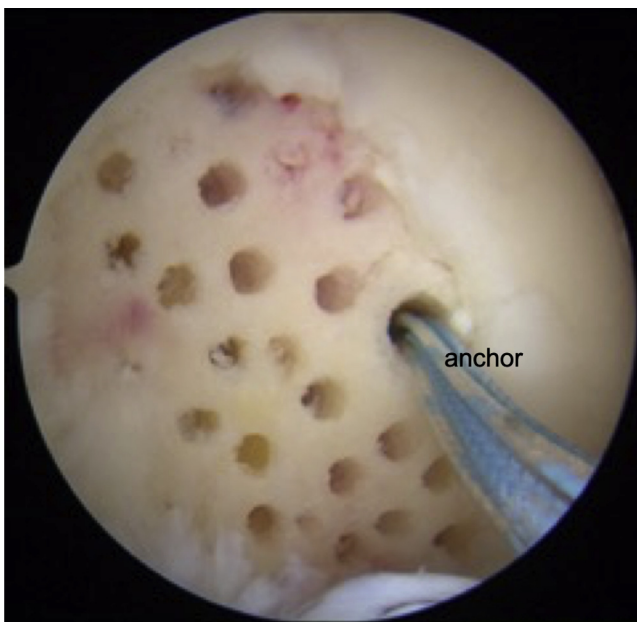
Postoperatively, the patient is allowed full weight bearing with the knee immobilized in full extension. Passive motion begins after 2 weeks. Isometric exercises

begin immediately. Repeated radiographs are obtained at 12 weeks postoperatively (Fig 18).

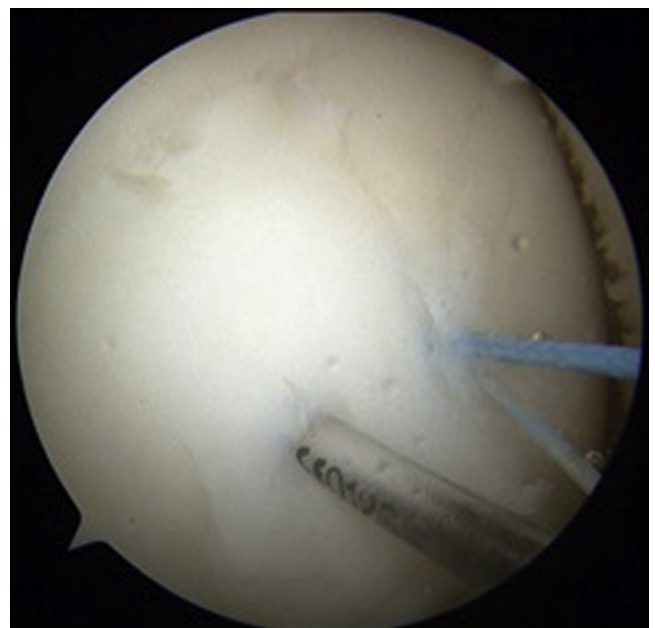
#### Discussion

Unstable OCD has been treated with several approaches to fixation, with the aim to promote healing and provide joint congruity.<sup>3,8</sup> Microfracture allows pluripotent stem cells from marrow into the defect site, forming a clot. It also allows differentiation and results in the production of fibrocartilage.<sup>7,9</sup>

The disadvantages of metallic devices are lack of compression, need for removal, and increased risk of cartilage damage (Table 1).<sup>9,10</sup> Lefort et al.<sup>11</sup> reported a

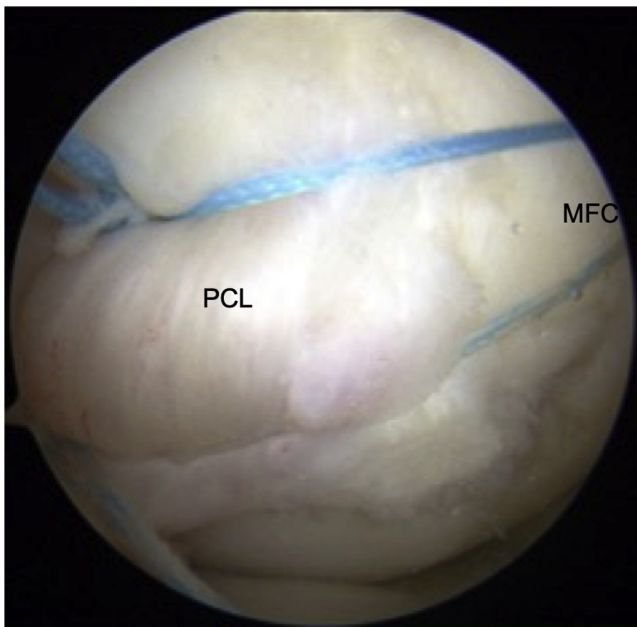


**Fig 13.** An anchor (1.9-mm double-loaded Suturefix) is placed on the medial side of the subchondral bony bed.



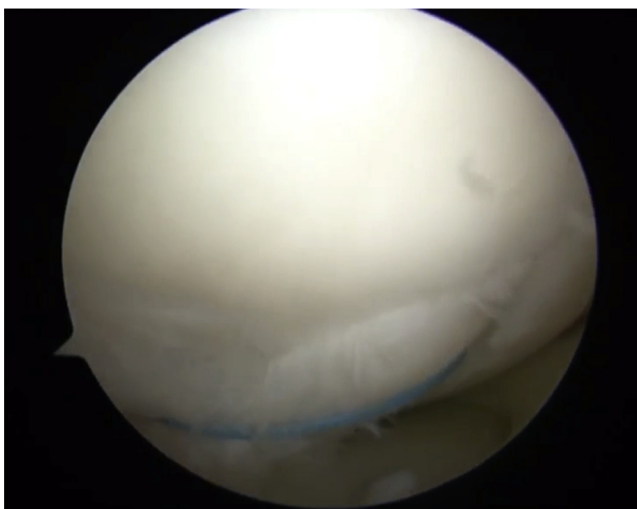
**Fig 14.** Anchor placement from transpatellar portal.



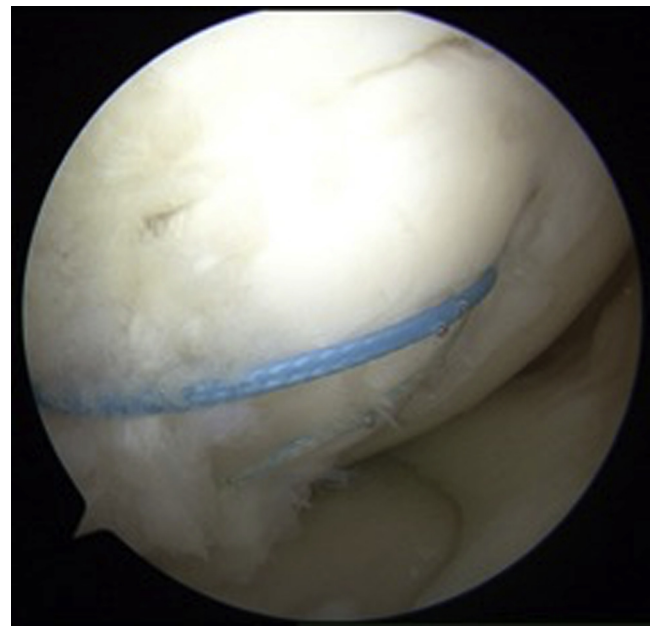


**Fig 15.** Temporary fixation using 1.2-mm Kirschner wire. (MFC, medial femoral condyle; PCL, posterior cruciate ligament.)

failure rate of 53% with isolated screw fixation in adult OCD patients. However, this failure rate decreased to 23% in skeletally immature or juvenile OCD patients. Bioabsorbable screws would have the advantage of obtaining compression, but these implants do not degrade quickly and there is a risk of breakage, followed by loss of fixation.<sup>12,13</sup> Mosaicplasty is a more invasive procedure. In addition, there are more technical difficulties in reconstructing joint congruity and an open approach is almost always needed.<sup>14,15</sup>

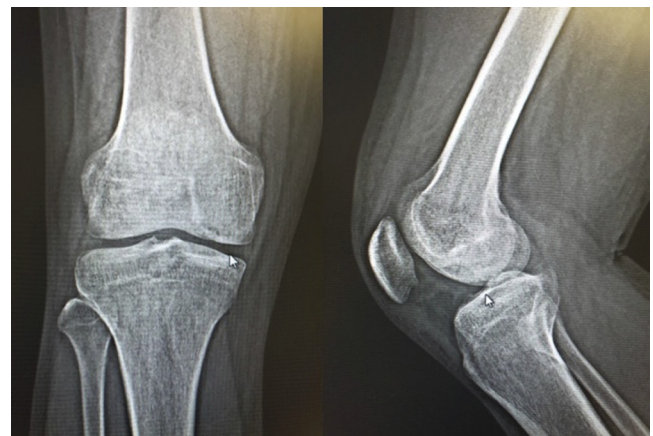


**Fig 16.** The suture is tied to secure the fragment; the Kirschner wire is then removed. Suture bridge fixation from the anchor secures the medial femoral condyle fragment with attachment of the posterior cruciate ligament.



**Fig 17.** The stability of fixation and joint congruity are confirmed.

We describe an arthroscopic technique using a suture anchor ([Video 1](#)) to treat OCD lesions, preparation of the subchondral bony bed, reduction of the fragment, and fixation using a suture anchor to the lateral hinge attachment with the PCL ([Table 2](#)). Performing this technique in an all-arthroscopic manner is reliable, without any risk of cartilage damage from implant breakage, reducing the risk of fixation loss and eliminating the need for removal. This technique provides a wider pressure distribution of fixation from the suture bridge configuration and preserve a vascular channel to the fragment from the attachment with the PCL strands. No long-term results are available, and comparison with another technique may be required.



**Fig 18.** Radiographs of knee at 12 weeks postoperatively showing restoration of articular surfaces (arrow).

**Table 1.** Advantages and Disadvantages of Arthroscopic Suture Anchor Fixation of OCD of Knee

Advantages	No need for hardware removal Wider pressure distribution of fixation from suture bridge fixation No risk of cartilage damage Preservation of vascular channel to fragment from attachment to posterior cruciate ligament
Disadvantages	No direct fixation of fragment into bony bed Need for postoperative immobilization
OCD, osteochondritis dissecans.	

**Table 2.** Pearls and Pitfalls of Arthroscopic Suture Anchor Fixation of OCD of Knee

	Pearls	Pitfalls
Arthroscopic examination	The osteochondral fragment is evaluated using a probe, and any loose bodies are assessed.	The lesion must be attached to the PCL.
Bony bed preparation	A motorized shaver and curettage are used to remove fibrous tissue on the bony bed of the OCD lesion; microfracture is performed using a 1.8-mm Kirschner wire, 4 mm in depth, with spacing 2-4 mm apart.	The surgeon should avoid bone loss when removing fibrous tissue and avoid injury to the articular cartilage when inserting the Kirschner wire.
Fragment reduction	The fragment is reduced using a probe, the reduction is confirmed by flexing and extending the knee, and then, temporary fixation is achieved using a Kirschner wire.	The surgeon should ensure that the reduction is stable before temporary fixation with the Kirschner wire.
Fragment fixation	An accessory transpatellar portal is created to obtain perpendicular anchor insertion and to manage the sutures.	The surgeon should ensure that the suture spreads into the PCL strand, the anchor is placed on the medial side of the subchondral lesion, and the knot is placed on the lateral side of the fragment to make a suture bridge configuration.

OCD, osteochondritis dissecans; PCL, posterior cruciate ligament.

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