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Wolters Kluwer

## Management of osteochondritis dissecans (OCD)

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### INTRODUCTION

OCD refers to osteonecrosis of subchondral bone and most often occurs in the knee, elbow, or ankle of school-age and adolescent children where it causes pain. Plain radiographs are frequently diagnostic. Sports medicine and orthopedic specialists usually determine the staging and stability of OCD lesions by magnetic resonance imaging. Initial treatment of stable lesions typically consists of rest, nonsteroidal antiinflammatory drugs, avoidance of high intensity activities, and physical therapy. Patients who are skeletally immature frequently do well with nonoperative therapy. Patients who have large lesions or develop intraarticular foreign bodies usually need surgery.

This topic will discuss the management of OCD. The clinical manifestations and diagnosis of OCD and other causes of knee, elbow, or ankle pain in the young athlete are discussed separately:

- (See "[Osteochondritis dissecans \(OCD\): Clinical manifestations and diagnosis](#)".)
- (See "[Approach to acute knee pain and injury in children and skeletally immature adolescents](#)".)
- (See "[Approach to chronic knee pain or injury in children or skeletally immature adolescents](#)".)
- (See "[Elbow injuries in active children or skeletally immature adolescents: Approach](#)".)

- (See "[Ankle pain in the active child or skeletally immature adolescent: Overview of causes](#)".)

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## INDICATIONS FOR SUBSPECIALTY REFERRAL OR CONSULTATION

The need for sports medicine or orthopedic specialty referral primarily depends upon the likelihood that the OCD lesion will not heal with nonoperative therapy. Healing is largely determined by skeletal maturity, characteristics of the OCD lesion (ie, size or stability), and the joint affected [1].

The following patients with OCD warrant referral to a sports medicine or orthopedic specialist:

- Skeletally immature patients (ie, open growth plates) with unstable (ie, partially or completely detached) OCD lesions of the knee or elbow (Stage II, III, or IV, ( [table 1](#))) based upon on plain radiographs, magnetic resonance imaging (MRI), or both.
- Skeletally immature patients with large, stable (Stage 1) lesions (parameters for the knee include >2 cm in length, >6 percent scaled surface area on MRI, or >200 mm<sup>2</sup> surface area on MRI; for the elbow lesions affecting >50 percent of the capitellum surface) [1-4].
- Skeletally immature patients with clinical findings of a loose foreign body in the joint (eg, locking or catching).
- Skeletally mature patients (ie, closed growth plates) regardless of affected joint, lesion size, or stage.
- Patients who have persistent or worsening signs and symptoms despite nonoperative management.
- All patients with OCD of the joints other than the knee or elbow.

Skeletally immature children with stable lesions that are small (parameters for the knee are <2 cm in length, <6 percent scaled surface area or <200 mm<sup>2</sup> on MRI; for the elbow lesions affecting <50 percent of the capitellum surface) and located in the knee or elbow often do well with nonoperative therapy alone and can frequently be treated by a knowledgeable primary care provider who is comfortable with overseeing the selected form of immobilization (casting, splinting, or brace) and ordering the necessary follow-up imaging to determine healing.

## NONOPERATIVE TREATMENT

The nonoperative management of OCD is based upon case series and expert opinion and consists of restriction of activities, immobilization, and physical therapy [3]. We suggest that children with Stage I, II, or III juvenile OCD of the knee, elbow, or ankle ( [table 1](#)) initially undergo nonoperative therapy rather than surgical repair [1,3]. Skeletally immature patients with an intraarticular foreign body (Stage IV lesion) warrant timely surgery to prevent permanent joint damage. (See '[Surgical treatment](#)' below.)

Depending upon the disease stage , healing rates with nonoperative management of juvenile OCD vary from approximately 50 to more than 90 percent for lesions in the knee or elbow and approximately 45 to 60 percent for the talus (ankle) with the highest healing rates occurring in patients with Stage I OCD [2,3,5-9].

Nonoperative treatment is a reasonable first option for patients with adult OCD who have small, stable (Stage I or II) lesions ( [table 1](#)) although the likelihood of healing is approximately 50 percent or less.

Resolution of pain and documented healing of the subchondral bone guide the duration of nonoperative treatment and determine when the athlete can resume activities.

**Restriction of activities** — Limitation of activity during nonoperative treatment is of critical importance. Once diagnosed, the athlete should be removed from sports and should not return until resolution of symptoms and evidence of healing on imaging has occurred. Rest is initially enforced through immobilization for four to six weeks. The duration of immobilization depends upon clinical response. (See '[Immobilization](#)' below.)

For OCD of the knee or ankle, once immobilization has occurred and healing is evident, the patient should begin ambulation and receive physical therapy (PT) designed to increase strength and mobility at the joint. Swimming and cycling are additional activities that can help build strength and mobility while putting less impact on the knee or ankle. Slow return to sports may begin once the patient is asymptomatic, has completed PT, and has no pain with running, sprinting or cutting (sudden change in direction while running), which typically takes six months [10]. (See '[Physical therapy](#)' below.)

Rest for OCD of the elbow includes no throwing, repetitive overhead movements, or elbow impact sports (eg, gymnastics) along with immobilization and PT [4]. Timing for return to play depends upon the response of the lesion to nonoperative therapy and, as for OCD of the

knee or ankle, typically occurs at six months.

**Immobilization** — Children with juvenile OCD who are undergoing nonoperative treatment typically receive immobilization by cast, splint or knee immobilizer, hinged brace (knee or elbow), or a controlled ankle motion (CAM) walker boot until pain and radiographic evidence of healing is present. Casting may be preferred when adherence to immobilization in a very active athlete is **not** assured. The typical duration of initial immobilization is four to six weeks. If symptoms are not resolved or radiographic healing is not evident by six weeks, some experts suggest one week of cast or splint removal with physical therapy to decrease the potential for contractions and atrophy followed by a second four to six week period of casting or splinting.

Initial immobilization varies based upon the joint involved:

- **Knee** – Hinged knee brace, nonweightbearing cast or long leg knee immobilizer with partial weight bearing with crutch assistance
- **Elbow** – Long arm cast, splint, or hinged elbow brace locked into slight flexion
- **Ankle** – Stage I lesions ( [table 1](#)): splint or brace, stage II and III lesions: cast (preferred for stage III lesions) or below the knee controlled ankle motion (CAM) walker boot

Once initial immobilization has resulted in healing, we continue bracing during recovery and physical therapy.

**Physical therapy** — Physical therapy (PT) improves strength, mobility, and flexibility of the affected joint and is also important to counteract atrophy and contractions associated with immobilization [5,6,10]. PT should improve both active and passive range of motion of the affected joint and should commence once the patient has resolution of pain and evidence of bony healing on imaging.

PT should be continued until the patient is pain free, has full range of motion, and can show equal strength, power, and agility during functional testing of the affected extremity.

Joint-specific goals of PT include:

- **Knee** – Stretching of the quadriceps and hamstring muscles, improved quadriceps and core abdominal muscle strength, including the multifidus, transverse abdominis, and gluteus medius
- **Elbow** – Scapulothoracic stabilization and strengthening (eg, conditioning of the

rhomboid; upper, mid, and lower trapezius; levator scapulae, and serratus anterior muscles) and rotator cuff muscle strengthening to help decrease the valgus load at the elbow during repetitive overhead and throwing motions

- **Ankle** – Strengthening of the ankle stabilizers (eg, conditioning of the tibialis anterior, peroneus longus, peroneus brevis, and tibialis posterior muscles, and the gastrocnemius and soleus complex) and improved proprioception (eg, balancing exercises and strengthening of core and gluteus medius muscles)

**Nonsteroidal antiinflammatory drugs** — Rest and immobilization are the primary treatments for pain caused by OCD. Nonsteroidal antiinflammatory drugs (NSAIDs; eg, [ibuprofen](#)) may be used for short-term pain relief during the first three days of treatment.

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## SURGICAL TREATMENT

Surgical management is warranted for children with juvenile OCD that have a loose foreign body (Stage IV) or have not responded to four to six months of nonoperative therapy. A significant proportion of OCD lesions in children and adolescents require surgical management. As an example, in a retrospective observational study of over 300 children 2 to 19 years of age with OCD, approximately 35 percent of patients received surgical treatment including approximately one third of patients with knee or ankle lesions and just over half of patients with elbow lesions [[11](#)]. Older patients (12 to 19 years of age) were much more likely to progress to surgical intervention than younger patients (6 to 11 years of age) based upon adjusted analysis. Patient sex was not associated with progression to surgical management.

Nonoperative treatment is a reasonable first option for patients with adult OCD who have small, stable (Stage I or II) lesions ( [table 1](#)) although the likelihood of healing is approximately 50 percent or less [[2,5](#)]. Thus, most patients with adult OCD warrant surgical repair. (See '[Nonoperative treatment](#)' above.)

The operative management of OCD is based upon case series and expert opinion [[3](#)]. Evidence that compares outcomes among the different types of operative treatment is lacking. There are multiple surgical techniques for OCD that include arthroscopic drilling, metallic screw fixation, bioabsorbable fixation, microfracture, and chondrocyte transplantation [[5,6,10,12-17](#)]. The choice of technique depends upon the patient's skeletal maturity, the stage of the OCD fragment ( [table 1](#)), and the size of the lesion [[3](#)].

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## FOLLOW-UP

Patients receiving nonoperative treatment typically undergo clinical evaluation every two weeks while being immobilized. We obtain plain radiographs at 6 weeks and 12 weeks to assess for bony healing. Patients with radiographic improvement at 12 weeks should undergo clinical evaluation and follow-up radiographs every three months until full healing is documented. Patients who do not show radiographic evidence of healing at 12 weeks warrant referral to an orthopedic surgeon [1,3].

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## RETURN TO ACTIVITY

Before returning to competition, the patient should be pain free with return of full active range of motion, strength, and endurance. The patient should gradually return to running, sprinting, cutting, and sport-specific exercises. A gradual return to sport with increasing intensity is allowed as long as there are no symptoms. The timing for return to play varies by lesion location, lesion stage ( [table 1](#)), rate of improvement, and type of treatment [5]. Patients who rapidly respond to nonoperative treatment may return to activity as early as 12 weeks. However, return to play may be delayed as long as six months or longer in other patients in whom healing is delayed [7].

In our experience, patients with complete healing after surgical treatment typically can return to play within six months to one year of diagnosis.

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## PROGNOSIS

Patients with complete healing of OCD should have full recovery of joint function. Complete healing is most commonly seen in skeletally immature patients with Stage I or II lesions of the knee or elbow ( [table 1](#)). These lesions have rates of healing that approach 95 percent [2,3,5,6,18,19].

In contrast, skeletally mature patients and patients with Stage III or IV lesions are less likely to have complete healing and approximately 50 percent of these patients are at risk for chronic pain, mechanical symptoms, and arthritis [1,3,18,20,21].

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## SUMMARY AND RECOMMENDATIONS

- The need for specialty referral primarily depends upon the likelihood that the OCD lesion will not heal with nonoperative therapy. Healing is largely determined by skeletal maturity, characteristics of the OCD lesion (ie, size or stability), and the joint affected. Specific indications for specialty referral are presented. (See ['Indications for subspecialty referral or consultation'](#) above.)
- We suggest that children with Stage I, II, or III juvenile OCD of the knee, elbow, or ankle initially undergo nonoperative therapy consisting of rest, immobilization, and physical therapy rather than surgical repair ( [table 1](#)) (**Grade 2C**). Nonoperative treatment is also a reasonable first option for patients with adult OCD who have small, stable (Stage I or II) lesions. (See ['Nonoperative treatment'](#) above.)
- Children with juvenile OCD that have a loose foreign body (Stage IV) or have not responded to four to six months of nonoperative therapy and most patients with adult OCD warrant surgical repair. (See ['Surgical treatment'](#) above.)

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## GRAPHICS

### Classification of osteochondritis dissecans

Stage	Plain radiograph findings	Magnetic resonance imaging findings	Arthroscopic findings
I	Depressed osteochondral fragment	Articular cartilage thickening and low signal changes	Irregular and softened articular cartilage with no fragment
II	Osteochondral fragment attached by an osseous bridge	Articular cartilage breached, low signal rim behind fragment representing fibrous attachment	Articular cartilage breached with definable fragment that is not displaceable
III	Detached, nondisplaced fragment	Articular cartilage breached, high signal changes behind fragment indicating synovial fluid between fragment and subchondral bone	Articular cartilage breached with definable fragment that is displaceable but attached by overlying articular cartilage
IV	Displaced fragment	Loose foreign body	Loose foreign body

*Data from:*

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