

Children and Adolescents with Knee Pain Need Diagnostics for Osteochondritis Dissecans

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Osteochondritis dissecans (OCD) of the knee is the most common osteochondral lesion. We see this disease particularly in children and adolescents. Patients usually present with unspecific knee pain. The cause of this condition is not completely known. Undiagnosed it can lead to early secondary arthritis.

OCD is a spatially limited pathology of the subchondral bone. An osteochondral fragment demarcates from the adjacent bone and becomes unstable. In the further course of the disease we find a demarcation on the cartilage surface. In end stage the osteochondral fragment dissecates and becomes a loose body in the joint. It can promote mechanical symptoms like joint blockage [1].

In the 16th century Ambroise Paré firstly described loose bodies in knee joints. In 1887 the German surgeon Franz König introduced the designation “osteochondritis dissecans” [2].

Although the etiology ultimately remains unclear, experts believe causes for OCD might be insufficient perfusion of the subchondral bone and repetitive microtraumata [3,4]. Studies in twins suggest a genetic component in etiology [5].

OCD can occur in different joints. Almost always it appears on convex joint surfaces. In 75% of cases with OCD the knee is involved; followed by ankle, elbow, hip, and shoulder [6,7]. It's prevalence for the knee in the western population is 6/10,000 inhabitants with a peak age between ten and 20. In up to 80 % of cases with OCD in the knee joint, the pathology is located in the lateral part of the medial femoral condyle; in 15 to 20% the pathology is located in the lateral femoral condyle [8]. In ten to five percent of all cases with involvement of the knee, OCD is found in the femoral trochlea or patella. Those atypical locations have a worse prognosis than OCD of the medial femoral condyle [9,10]. In up to 40 % the pathology involves both knees [11]. According to open or closed growth plates, we differentiate between juvenile or adult OCD; the juvenile form has a better prognosis [12].

Based on experience in our orthopaedic center and due to its unique pathoanatomic course, we recommend to distinguish OCD from other osteochondral lesions like flake fractures [13,14]. Classification of OCD is possible on the basis of x-rays, MRI, arthroscopy, or a combination of these [15-18]. In daily practice differentiation between stable or unstable lesions and between intact or broken cartilage surface is important. Synopsis of the mentioned diagnostic instruments with special emphasis on MRI is reasonable respecting the pathoanatomic course. For classification and treatment planning see Tables 1 and 2.

Stable OCD - stage 1 and 2- can be treated by physical conservation [19,20]. Non-operative treatment of stage 2 is sometimes unsuccessful, even in young patients with open growth plates. A failure rate of up to 50% was reported [21]. Then retrograde drilling is indicated in order to improve subchondral perfusion. In unstable OCD - stage 3 and 4- regularly operative treatment is indicated.

Crucial differentiation between stage 2 and 3 is possible in T2-weighted MRI: a hyperintense line under the dissecate indicates an unstable lesion. An additional instability criterium is discontinuity of the cartilage surface [22]. Figure 1 illustrates such a case, where

operative treatment is indicated: (1) debridement of the delimiting sclerosis, (2) cancellous bone grafting from the tibial head, and (3) refixation of the osteochondral fragment in one procedure.

Especially in children and adolescents suffering knee pain without trauma, we need to exclude OCD. After taking history and performing standard clinical examination, MRI is the best non-invasive diagnostic instrument. Its sensitivity and specificity (up to 100%) are very good and better than x-rays. There is no radiation exposure to the patient.

| Stage | X-rays | MRI | Arthroscopy |
|------------------|--|--|--|
| I | normal | cartilage intact, normal signal change subchondral | normal |
| II | radiolucency and sclerosis | hypointense dissecate demarcation | cartilage on OCD-border softened, not demarcated |
| III _D | sclerosis, demarcated dissecate in situ | cartilage demarcation in T1 and hyperintense line in T2 under the dissecate in situ | dissecate demarcated, cartilage on OCD-border partially or completely interrupted |
| III _M | sclerosis, demarcated fragmented dissecate in situ | cartilage demarcation in T1 and hyperintense line in T2 under the fragmented dissecate | dissecate demarcated and fragmented, cartilage on OCD-border partially or completely interrupted |
| IV _D | empty dissecate bed, loose body | empty dissecate bed, loose body | empty dissecate bed, loose body, dissecate fixable |
| IV _M | empty dissecate bed, loose body | empty dissecate bed, loose body | empty dissecate bed, loose body, dissecate destroyed |

D Dissecans; M Malacia, multi-fragmented

Table 1: Classification of osteochondritis dissecans [19].

| Stage | Stability | Therapy |
|------------------|-----------|---|
| I | stable | conservative |
| II | stable | retrograde drilling |
| III _D | Unstable | bone grafting and refixation |
| III _M | Unstable | bone grafting and refixation (partially) or debridement/partial debridement, bone grafting, cartilage therapy |
| IV _D | Unstable | bone grafting and refixation |
| IV _M | Unstable | debridement, bone grafting, cartilage therapy |

D Dissecans; M Malacia, multi-fragmented

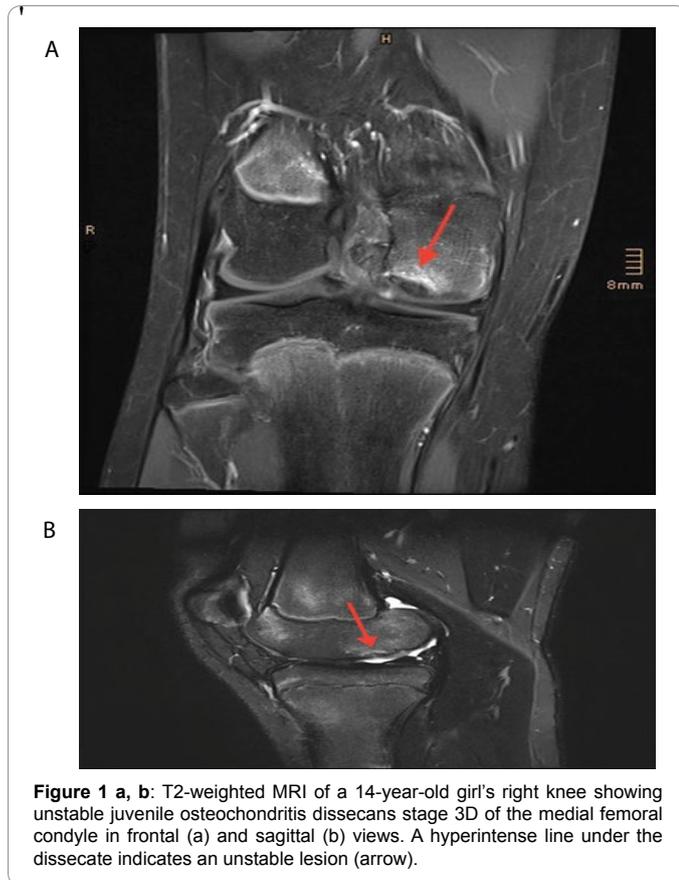
Table 2: Stage oriented therapy of osteochondritis dissecans of the knee [14].

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Classification and stage depending orthopaedic treatment is important for a good outcome. Untreated OCD can progress leading to severe local joint damage and secondary joint destruction [23].

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