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Review Paper

Treatment Outcomes of Osteochondritis Dissecans of the Talus in Pediatric Patients: A Mini-review

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ABSTRACT

Osteochondritis dissecans (OCD) of the talus is a rare but clinically significant condition in children and adolescents. Management strategies include both conservative and surgical approaches, and choice of treatment depends on lesion stability, skeletal maturity, and symptom severity. Conservative management is generally effective for stable lesions, while surgery is reserved for unstable or refractory cases. Pediatric patients demonstrate favorable outcomes overall, with younger age and open growth plates associated with better healing potential. This mini-review summarizes current evidence on treatment strategies, outcomes, and prognostic factors in pediatric talar OCD, highlighting considerations for clinical decision-making.

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Introduction

Osteochondritis dissecans (OCD) of the talus is a focal disorder of the subchondral bone and overlying articular cartilage, primarily affecting children and adolescents. Although less common than OCD of the knee, talar OCD is increasingly recognized due to advancements in imaging modalities and heightened clinical awareness [1]. The condition is often associated with repetitive microtrauma, acute ankle injuries, or localized vascular insufficiency, and can lead to pain, swelling, stiffness, or mechanical symptoms, such as catching and locking of the ankle [2, 3].

In pediatric patients, the presence of open growth plates provides a higher potential for spontaneous healing compared with adults, making early diagnosis and lesion characterization crucial for optimal management [4, 5]. Conservative treatment is generally effective for stable, non-displaced lesions, whereas surgical intervention is indicated for unstable, detached, or refractory lesions [6, 7]. Despite these established principles, there is no universal consensus on the optimal treatment strategy for pediatric talar OCD, and outcomes may vary depending on lesion size, skeletal maturity, and patient-specific factors. These considerations underscore the importance of reviewing the current evidence regarding treatment modalities, clinical outcomes, and prognostic factors in this population.

Pathophysiology and diagnosis

The etiology of talar OCD is multifactorial. Repetitive microtrauma, acute or chronic ankle sprains, ischemic episodes, and localized vascular insufficiency have all been implicated in the development of the condition [8]. In pediatric patients, trauma—whether acute or repetitive—is considered the predominant contributing factor, particularly in physically active children and adolescents [1, 2].

Pathologically, OCD lesions involve separation of a fragment of subchondral bone and its overlying articular cartilage, which can range from being stable and attached to fully detached fragments. The lesion typically affects the medial or lateral talar dome, with medial lesions more common than lateral [5, 9].

Clinically, patients often present with anterior or deep ankle pain, swelling, stiffness, or mechanical symptoms, such as catching, locking, or giving way of the ankle joint [1]. Physical examination may reveal tenderness over the talar dome, decreased range of motion, or effusion.

Magnetic resonance imaging (MRI) is the modality of choice for evaluating lesion size, cartilage integrity, and subchondral bone involvement, and it is crucial for assessing lesion stability, which guides the choice of conservative versus surgical management [3, 10]. MRI findings, such as the presence of high-signal lines beneath the lesion or cystic changes, can predict healing potential and help stratify treatment strategies [10, 11].

Treatment options

Nonoperative strategies are first-line for skeletally immature patients with stable lesions. Conservative measures include: activity modification, limited weight-bearing, immobilization using casts or braces, and regular clinical and radiographic follow-up. Studies report high rates of symptom improvement and lesion healing in children with stable OCD lesions. Early detection and adherence to follow-up protocols are key determinants of success [8]. Surgery is indicated for unstable, displaced, or symptomatic lesions unresponsive to conservative care. Techniques include drilling (transchondral or retrograde), internal fixation of osteochondral fragments, microfracture, and osteochondral autograft or allograft transplantation. Surgical treatment in pediatric and adolescent populations leads to significant pain relief, improved function, and high rates of return to sport [1, 2].

Treatment outcomes

In pediatric cohorts, 96% of patients experienced symptom reduction or resolution following conservative and/or surgical management [2]. Conservative management alone is often sufficient for younger patients with stable lesions. Surgical intervention yields high functional recovery and return-to-sport rates, particularly in adolescents. Time to return to activity varies depending on procedure and lesion severity [2]. Favorable outcomes are associated with younger age, lower BMI, open growth plates, and early diagnosis and intervention; delayed treatment, skeletal maturity, and larger or unstable lesions negatively impact outcomes [5].

Staging systems

Several staging systems have been proposed for osteochondral lesions of the talus, with the Berndt and Harty classification being the most widely used and clinically relevant, particularly for guiding treatment decisions. MRI-based classifications have further refined lesion assessment by incorporating cartilage integrity and lesion stability (Table 1) [12].

Table 1. Berndt and Harty classification (radiographic/MRI-based)

Stage	Description	Recommended Treatment
Stage I	Subchondral bone compression with intact cartilage	Conservative
Stage II	Partially detached osteochondral fragment	Conservative ± drilling
Stage III	Completely detached but nondisplaced fragment	Surgical
Stage IV	Displaced osteochondral fragment	Surgical

*In pediatric patients, lesion stability and skeletal maturity are critical modifiers of treatment choice.

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Stage-based treatment strategies

Treatment strategies for osteochondritis dissecans of the talus in pediatric patients are primarily guided by lesion stage, stability, and skeletal maturity. In skeletally immature patients with Stage I and stable Stage II lesions, nonoperative management is considered the first-line treatment. Conservative management typically includes activity modification, avoidance of high-impact sports, temporary restriction of weight bearing, and immobilization using casting or removable walking boots, accompanied by regular clinical and radiographic or magnetic resonance imaging follow-up. High rates of symptom resolution and radiographic healing have been reported in children with open physes, which is attributed to the superior reparative capacity of the subchondral bone and overlying cartilage in this population. Favorable prognostic factors for successful conservative treatment include younger age, open growth plates, and smaller lesion size, all of which are consistently associated with improved healing potential and clinical outcomes [13-15].

For unstable stage II lesions and stage III lesions, or in cases where conservative treatment fails to achieve symptom resolution or radiographic improvement, surgical intervention is recommended. Among surgical options, drilling techniques are commonly employed to stimulate revascularization and promote fibrocartilaginous repair of the subchondral defect. Transchondral drilling is performed through the articular cartilage and is technically straightforward; however, it involves deliberate cartilage penetration. In contrast, retrograde drilling allows decompression of the subchondral lesion while preserving an intact cartilage surface, and is therefore considered particularly advantageous in pediatric patients when the cartilage cap remains stable. Retrograde techniques are favored in this population due to their cartilage-sparing nature and satisfactory clinical outcomes reported in the literature [16].

Stage III and stage IV lesions, characterized by detached or displaced osteochondral fragments, generally require operative fixation or reconstructive procedures. When fragment viability is preserved, internal fixation using bioabsorbable pins or screws is preferred, as it allows restoration of the native osteochondral unit and promotes healing of hyaline cartilage. In cases where the fragment is nonviable or cannot be salvaged, marrow stimulation techniques, such as microfracture may be utilized, particularly for small lesions. Although microfracture results in fibrocartilage formation, which is biomechanically inferior to native hyaline cartilage, it may provide acceptable short- to mid-term outcomes in low-demand pediatric patients. Osteochondral autograft or allograft transplantation is generally reserved for large, cystic, or recurrent lesions that fail previous interventions and is typically avoided as a first-line option in children due to concerns regarding donor-site morbidity and long-term graft integration [17].

Conclusion

Talar OCD in pediatric patients can be effectively managed with individualized approaches. Conservative management remains appropriate for stable lesions, while surgical intervention is effective for unstable or refractory cases. Current literature, however, is limited by small sample sizes and retrospective designs. Future multicenter prospective studies focusing exclusively on pediatric populations are needed to refine treatment algorithms, identify optimal surgical techniques, and assess long-term functional outcomes.

Ethical Considerations

Compliance with ethical guidelines

There were no ethical considerations to be considered in this research.

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Authors' contributions

All authors contributed equally to the conception and design of the study, data collection and analysis, interception of the results and drafting of the manuscript. Each author approved the final version of the manuscript for submission.

Conflict of interest

The authors declared no conflict of interest.

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