Isolated Osteochondritis Dissecans of the Radial Head Without Radial Head Subluxation in Young Throwers: A Report of Two Cases and a Review of the Literature

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Introduction:
Osteochondritis dissecans (OCD) is characterized by focal subchondral bone necrosis that may secondarily involve overlying articular surfaces. This rare pathology primarily affects pediatric athletes. The objective of this novel case-series and review of literature is to describe a case of operative and a case of nonoperative management of isolated OCD of the radial head without evidence of radial head subluxation in two pediatric baseball pitchers along with each patient's postoperative course. In addition, we present a discussion on the etiology and pathophysiology of OCD, review the biomechanics of the radiocapitellar joint, and summarize previous reports of OCD in the elbow. This case-series highlights the rarity of OCD of the radial head without subluxation as well as the importance of patient and provider education, early identification, and efficient management of this condition to optimize functional outcomes.

Methods:
The first case was an 11 year and 4-month-old male baseball pitcher presenting with a three-month history of an inability to fully extend the elbow. Imaging confirmed avascular necrosis of the radial head without evidence of subluxation. This patient was treated conservatively including a progressive physical therapy course and gradual return to play protocol.

The second case was a 13 year and 1-month-old male baseball pitcher presenting with pain and decreased range of motion (ROM) after pitching at a baseball showcase. Imaging confirmed osteochondral defects of the radial head without evidence of subluxation and a 5-mm loose body located anterior to the radiocapitellar joint. Arthroscopic debridement and removal of loose bodies in addition to an abrasion arthroplasty was performed under general anesthesia.

An extensive review of literature was performed with the following goals: to delineate the suggested etiology and risk factors of OCD development; to understand the biomechanics of the radiocapitellar joint and its predisposition to microtrauma with regards to throwing athletes; to summarize previous reports of OCD affecting the elbow.

Results:
The first patient, treated conservatively, was fitted for a lateral unloading brace and began passive exercises, increasing ROM during the first 8 weeks. Weight bearing activities were slowly introduced over the subsequent 6 weeks. At 4 months, the patient began batting again, and at 6 months he began pitching again utilizing an interval throwing program. At the last follow-up visit, the patient remained asymptomatic with full ROM. Plain radiographic imaging showed less fragmentation of the radial head and follow up MRI revealed sclerosis and mild fragmentation of the radial head with no loose bodies.

The second patient, treated surgically, began physical therapy on post-operative day 10, and full ROM of the elbow was achieved by week 6. Batting practice began at 4 months and return to pitching was achieved at 5.5 months. Radiographs at 8 months revealed absence of loose bodies, partial closure of the radial head growth plate, interval closure of the lateral epicondylar region, and flattening of the radial head. At 2 years, the patient was throwing at full velocity without pain. Plain radiographs at that time revealed a sclerotic radial head while MRI revealed chondrosis and remodeling of the radial articular surface.

Discussion:
The exact etiology of OCD remains unknown, but various theories have been proposed. Repetitive microtrauma remains the most supported etiology given the high prevalence of OCD in pediatric athletes. With regards to OCD development isolated to the radial head, the cumulative effect of axial, shearing, and valgus-directed forces across the radiocapitellar articulation in skeletally immature patients is thought to compromise the tenuous vascular supply and bone remodeling capacity, thereby promoting OCD lesion formation. Open growth plates with developing subchondral bone are thought to be less resistant to these forces in pediatric patients, further increasing the risk of OCD development. Previous reports have identified near identical lesion development in fraternal and maternal twins, suggesting a genetic susceptibility to OCD development. Additionally, osteonecrosis is closely associated with the pathogenesis of OCD, therefore, risks for osteonecrosis such as certain pharmacotherapies and traumatic injuries have been suggested to be coincident risks for OCD development.

The radiocapitellar joint plays a role in maintaining joint stability and managing axial and valgus loads across the elbow. The radial head acts as a secondary stabilizer to valgus stress, particularly when the medial ulnar collateral ligament (MUCL) is compromised, a role especially relevant in throwing athletes. Previous studies have independently confirmed the following biomechanical properties of the radiocapitellar joint: 57–58% of axial elbow load is transmitted through the radiocapitellar joint; In full extension, the radiocapitellar joint bears approximately 60% of compressive axial loads; A 21% increase in radiocapitellar contact area occurs during forearm pronation. When considering the motion of a typical overhead throw, the convergence of these forces during repetitive throwing motions may explain the predisposition of radial head OCD lesions in baseball pitchers and other throwing athletes.

Previous case reports and series in the existing literature have described OCD lesions of the elbow joint in athletic and nonathletic contexts affecting both pediatric and adult patients. To our knowledge, no previous case reports or series have explicitly described the treatment and outcomes of isolated radial head OCD lesions without radiographic evidence of subluxation.

Significance/Clinical Relevance:
Osteochondritis dissecans is an important but potentially underdiagnosed and under-researched cause of elbow pain in young throwing athletes. Early recognition through focused physical examination and advanced imaging may allow for successful treatment and efficient return to sporting activities. Clinicians should maintain a high index of suspicion, broaden their diagnostic focus, and prioritize early detection and patient education to preserve joint health and athletic longevity for this vulnerable population.

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