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Developmental Hip Dysplasia Presenting as Bilateral Osteochondritis Dissecans Perthes-like Lesions Treated with Triple Pelvic Osteotomies: A Case Report

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Learning Point of the Article:

The article's learning point is that orthopedic surgeons must consider hip dysplasia in their differential diagnosis when treating Perthes-like lesions in pediatric patients.

Abstract

Introduction: Osteochondritis dissecans (OCD) of the femoral head accounts for approximately 2% of all OCD cases. Most of the OCD lesions affecting the femoral head are secondary to pathologies concerning the femoral component of the hip joint, such as Legg-Calvé-Perthes (LCP) disease. Although there are reports of OCD secondary to hip dysplasia, to our knowledge, there is no report of bilateral OCD lesions being treated successfully with bilateral triple pelvic osteotomies (PAO) in a pediatric patient.

Case Report: In this report, we present the case of an 8-year-old Hispanic male who presented with bilateral hip pain unresponsive to conservative treatment and initially managed with the presumptive diagnosis of LCP disease. Due to his persistent hip pain and no improvement on follow-up X-rays and magnetic resonance imaging (MRI), the patient was referred to our hip preservation clinic for further work-up and management recommendations. MRI revealed bilateral OCD lesions of the femoral head secondary to developmental hip dysplasia. The patient underwent bilateral triple PAO for correction of the patient's bilateral hip dysplasia, which resulted in the proper resolution of the femoral head lesions on imaging and eventually resolved the patient's hip pain.

Conclusion: This report aims to recognize the association between untreated developmental hip dysplasia and femoral head Perthes-like lesions in the pediatric population. Orthopedic surgeons must consider developmental hip dysplasia when determining the etiology of Perthes-like lesions in pediatric patients.

Keywords: Case report, developmental dysplasia of the hip, femoral head lesions, osteochondral defects, Legg-Calvé-Perthes disease, pelvic osteotomies.

Introduction

Developmental dysplasia of the hip (DDH) is the most common abnormality in skeletal development encountered in the pediatric population [1]. The prevalence of DDH among infants is approximately one in 100 and is on an upward trend [2]. The hallmark of this disorder is hip instability that arises secondary to improper congruence and constraint between the femoral head and acetabulum, with painful symptoms presenting after years of damage potentiated by altered biomechanics [3]. In addition, DDH can affect femoral head development due to the altered microenvironment produced at the hip joint [1]. However, the association between DDH and other pathologies that lead to

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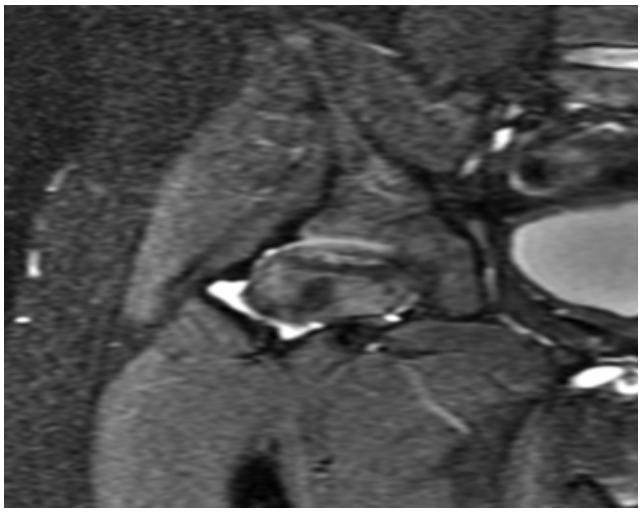

Figure 1: Coronal T2-weighted magnetic resonance imaging of the right hip demonstrating an osteochondral lesion over the anterolateral aspect of the femoral head, with a mild effusion along the femoral neck.

aspherical lesions of the femoral head, such as Legg-Calvé-Perthes (LCP) disease and osteochondritis dissecans (OCD), is poorly understood.

OCD is a condition that affects the articular surface of a joint and is characterized by the separation of an osteochondral fragment. Still, it is rarely confined to the hip joint [4]. While generally considered an idiopathic phenomenon, femoral head OCD can present as a complication of LCP disease [4-7]. Although its association with LCP is well documented, to our knowledge, only one case report in the literature presents an association between hip dysplasia and OCD [8]. The goal of this report is to emphasize the need to rule out DDH in pediatric patients presenting with Perthes-like lesions on imaging. To our knowledge, this is the first documented case of bilateral OCD of the femoral head secondary to DDH reported in the literature.

Case Report

An 8-year-old Hispanic male with no significant medical history presented with bilateral hip pain of eight out of ten on the visual analog scale. He had been followed at a pediatric orthopedic clinic for nearly a year for magnetic resonance imaging (MRI) findings suggestive of bilateral LCP disease at the early fragmentation stage. Lesions were somewhat symmetrical, so a rule out of Meyer's dysplasia and genetic counseling was done accordingly. Imaging showed 10–15% non-enhancement in the left hip and 10% in the right hip, with more severe avascular necrosis on the right. Scant effusions were noted, without signs of arthrosis or collapse. Given his age and benign diffusion-weighted MRI findings, he was managed conservatively with non-steroidal anti-inflammatory drugs, activity modification, and rest for over a year.

Due to persistent pain and unchanged imaging findings, he was referred to our Hip Preservation Clinic. On examination, a functional waddling gait was noted. Bilateral hip flexion was 0–100°, with pain on pure flexion. Internal rotation with flexed hips measured 15° with pain, and external rotation was 40° bilaterally. Anterior impingement and apprehension tests were positive bilaterally. A mucopolysaccharidosis and Sickle Cell

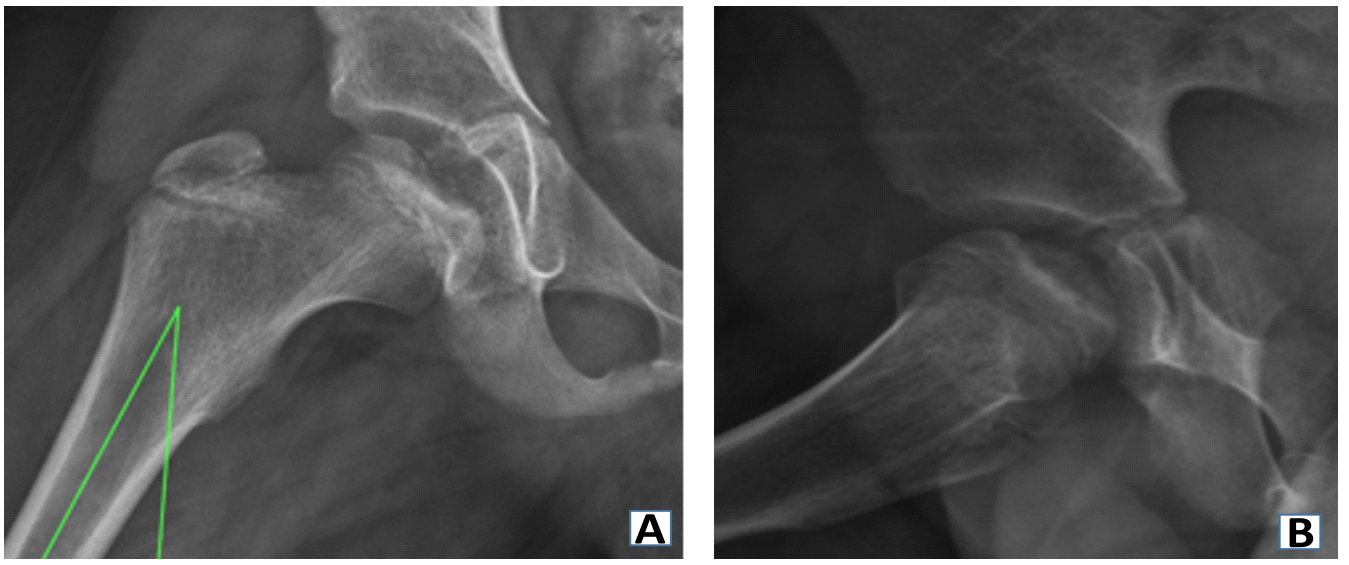

Figure 2: Pre-operative radiographs of the right hip joint demonstrate complete consolidation of osteotomy cuts and anterior and lateral acetabular coverage correction. As noted, the epiphyseal height has improved. Reossification of the ossific nucleus is evident. Some residual coxa breva is still apparent. (a): Von Rosen (A specialized anteroposterior pelvic radiograph used primarily in infants and young children to detect developmental dysplasia of the hip. It is obtained with the infant's hips in approximately 45° abduction and 90° flexion, often using a splint or positioning device. (b): Lequesne false profile (A standardized oblique radiographic projection of the hip obtained with the patient standing and the pelvis rotated 65° relative to the image receptor. This view is commonly used to assess anterior acetabular coverage, especially in cases of hip dysplasia).

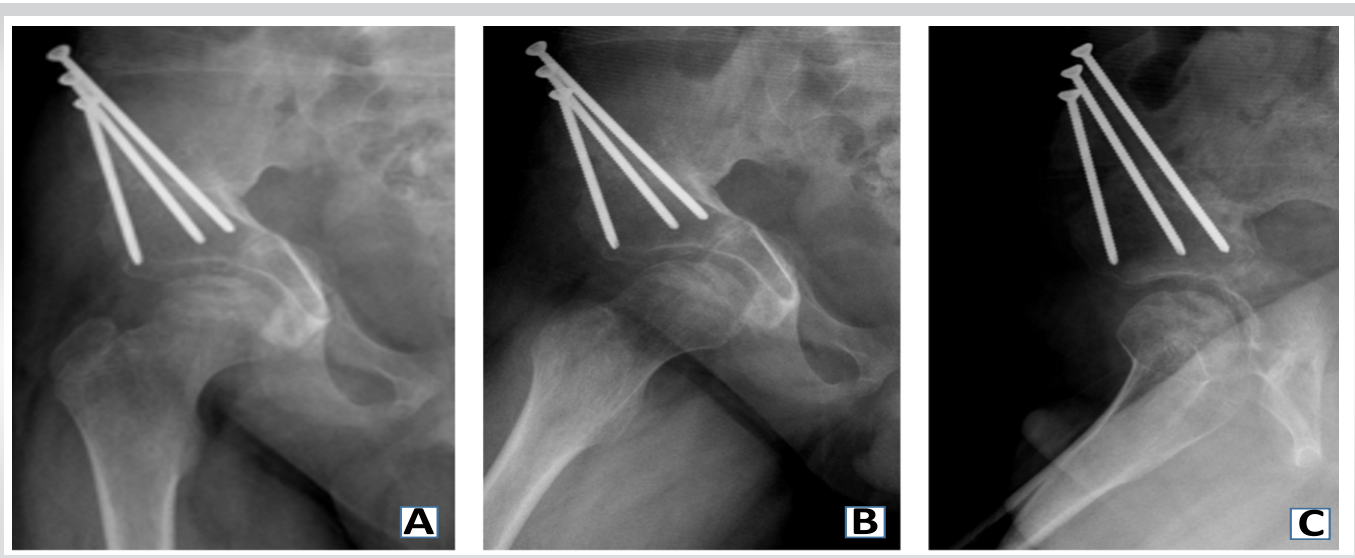

Figure 3: Radiographs of the right hip at the 3-month post-operative visit. (A): Anteroposterior, (B): Frog, (C): Lequesne false profile (A) standardized oblique radiographic projection of the hip obtained with the patient standing and the pelvis rotated 65° relative to the image receptor. This view is commonly used to assess anterior acetabular coverage, especially in cases of hip dysplasia).

panel was ordered and returned negative. Given the benign clinical picture, conservative management continued, including close observation and a 2-month course of physical therapy.

At a 4-month follow-up, the patient reported no improvement in pain, and his physical exam remained unchanged. Repeat MRI revealed an under-covered femoral head with a chondral defect partially covered by functional cartilage (Kerboul Grade II) (Fig. 1). A full radiographic workup showed findings consistent with borderline hip dysplasia (Fig. 2), prompting the recommendation for bilateral triple pelvic osteotomies (PAO).

The triple pelvic osteotomy is a procedure where the ischium, superior pubic ramus, and the ilium superior to the acetabulum are divided to allow repositioning of the acetabulum to achieve a concentric reduction of the dysplastic hip (15864035). It is typically performed in older children or younger adolescents with open triradiate cartilage and is indicated for the treatment of hip dysplasia, acetabular dysplasia, and LCP.

After obtaining parental consent, a right-sided triple pelvic osteotomy was performed 6 months after initial evaluation. The right hip had a full, painless passive range of motion 3 months post-operatively. Radiographs showed a well-healing osteotomy with abundant callus (Fig. 3). At 1-year post-operative, the patient remained pain-free on the right, with radiographs demonstrating a healed osteotomy and re-ossification of the femoral head. With improved sphericity and acetabular coverage, the femoroacetabular relationship is more adequate, and his waddle gait almost disappeared completely. However, he continued to experience activity-related pain in the left hip, particularly with deep flexion. At that time, a left-sided triple pelvic osteotomy was scheduled along with the removal of hardware from the right hip.

The left-sided procedure followed a similar course. At 1-year follow-up, the patient had full, painless bilateral hip motion. By 2 years post-operatively, final radiographs showed completely healed bilateral osteotomies and re-ossified femoral heads (Fig. 4).

Discussion

Our case contributes to the limited literature describing an association between hip OCD and DDH. This case is particularly novel due to the bilateral presentation and the patient's normal femoral neck-shaft angle, distinguishing it from previously reported cases. The most comparable case involved an early-adolescent boy with a unilateral OCD lesion of the left femoral head associated with acetabular dysplasia and coxa valga [8]. The diagnostic challenge related to our case, which included ruling out bilateral LCP and identifying borderline dysplasia, allows us to argue the importance of considering developmental hip dysplasia in the setting of Perthes-like lesions on imaging.

Most OCD lesions of the femoral head occur as complications of LCP disease [4,5,9]. LCP is characterized by avascular necrosis of the femoral head, leading to subchondral bone resorption and potential detachment of osteochondral fragments [10]. These changes are often subtle or delayed on radiographs, making MRI the preferred imaging modality to differentiate Perthes-like lesions. For instance, in avascular necrosis due to LCP, the overlying cartilage typically remains intact, whereas it is often disrupted in OCD [11,12]. Although

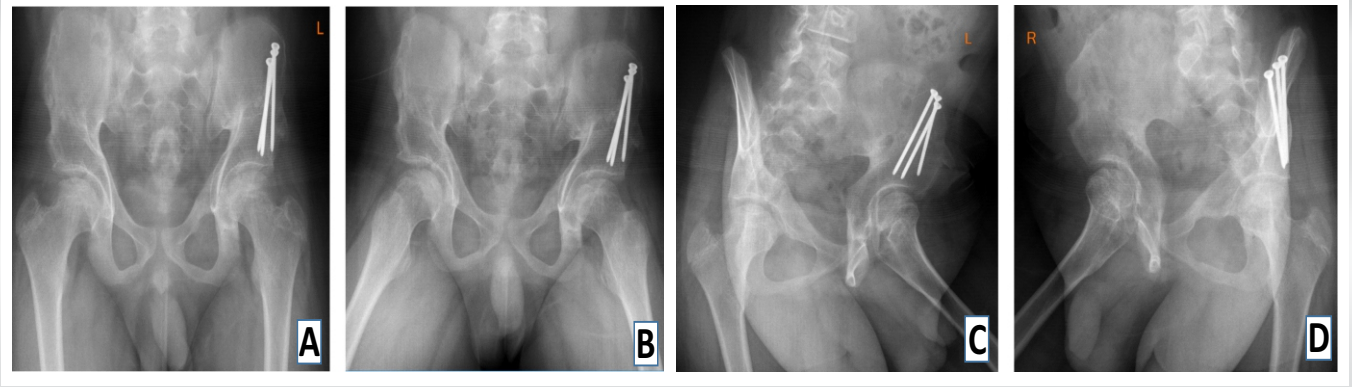

Figure 4: Radiographs at 1.5 years follow-up post-triple pelvic osteotomy of the left hip. (A) Anteroposterior, (B) Frog, (C and D) Bilateral lequesne false profile (a standardized oblique radiographic projection of the hip obtained with the patient standing and the pelvis rotated 65° relative to the image receptor. This view is commonly used to assess anterior acetabular coverage, especially in cases of hip dysplasia).

MRI is not essential for diagnosing DDH, it plays a critical role in evaluating OCD, particularly in assessing lesion stability, which directly influences the choice between non-operative and surgical treatment.

The pathogenesis of femoral head OCD remains debated, but the most widely accepted theory involves repetitive microtrauma, which is amplified in dysplastic hip joints [4,13]. DDH is commonly associated with increased femoral anteversion and coxa valga, which alter proximal femoral anatomy without directly affecting the femoral head [14]. Taking into consideration the recent literature, DDH may also impact femoral head anatomy through an association with OCD, yet further investigations are warranted to uncover whether the association is true. With this case, we hope to provide evidence that OCD secondary to DDH follows a different pathophysiological mechanism from that of OCD secondary to LCP and, thus, warrants a different surgical treatment approach.

In cases where OCD of the femoral head occurs secondary to LCP, surgical options for symptomatic lesions include osteochondral autograft transfer, fresh osteochondral allograft, arthroscopic fragment resection, and surgical hip dislocation with ORIF [5,6,15]. However, when OCD occurs in the context of DDH, management strategies differ. To address the dysplasia, the surgeon must surgically fix either the femoral or acetabular side to offload the diseased joint and achieve a concentric hip. In a previously reported case, OCD associated with hip dysplasia was addressed using an isolated proximal femoral varus osteotomy to correct coxa valga [8]. To our knowledge, this is the first reported case of bilateral femoral head OCD secondary to DDH treated successfully with bilateral triple PAO.

The triple pelvic osteotomy is indicated in skeletally immature patients with open triradiate cartilage and is a well-established treatment for both DDH and LCP [16,17]. Compared to other PAO, the advantages of this procedure are increased coverage of the femoral head by articular cartilage of the acetabulum, better hip joint stability for earlier weight bearing, and no need for spica cast immobilization (15864035) [18]. Other approaches, such as the Salter osteotomy and femoral varus osteotomies, are at increased risk of excessive varus deformity, which may increase pain post-operatively secondary to altered gait biomechanics [19]. In our case, the early weight-bearing (achieved by 10 weeks post-operatively), patient demographics, radiographic assessment of the femoral head lesions, and bilateral nature of the disease led to our decision to pursue triple PAO over other surgical treatment options.

Conclusion

Perthes-like lesions of the femoral head are often associated with proximal femoral pathologies, such as LCP. We describe a rare case of an 8-year-old boy with bilateral femoral head OCD lesions successfully treated with bilateral triple PAO. Although this association is infrequently reported, orthopedic surgeons should consider DDH in diagnosing aspherical femoral head lesions in pediatric patients.

Clinical Message

Orthopedic specialists should consider developmental hip dysplasia as a potential treatable cause when evaluating femoral head osteochondral lesions in the pediatric population.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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