CASE REPORT

Pediatric Hip Dislocation with Posterior Wall Acetabular Fracture: A Case Report

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Introduction

Traumatic hip dislocations with associated posterior wall fractures in children are injuries that can result in severe morbidity if not recognized and treated appropriately. Open reduction and internal fixation is recommended if the hip remains unstable after relocation or if there is significant incongruity of the articular surface of the hip after reduction. Hearty et al. recently published two cases of a posterior wall fracture in a skeletally immature patient showing how plain radiographs and CT scans were inadequate in determining the extent of the injury and that MRI was a much more reliable indication of what was seen at surgery [1].

In this case report, we describe an unusual case of a skeletally immature patient who sustained a traumatic hip dislocation with an associated posterior wall fracture. With similarity to the experience already reported [1], both CT and plain x-ray imaging failed to completely illustrate the joint injury. MRI provided better imaging of the true extent of the injury. Additionally, this patient, after having undergone a surgical procedure to remove intra-articular incarcerated fragments, was indicated for a second surgery based on an MRI done 2 weeks after the original surgery.

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Case Report

The patient is an 8-year-old male with an unremarkable birth and medical history. Prior to his presentation for this acute injury the only medical diagnosis he carried was that of seasonal allergies.

The patient was in his usual state of health when he was engaged in a football scrimmage. While carrying the ball, the patient was tackled from behind. Per witness report, the patient's left knee struck the ground at 90° of flexion. Immediately after he was tackled, the patient complained of buttock and high thigh pain. He was unable to bear weight and his left lower extremity was shortened and internally rotated. The patient's parents immediately transported him to the local emergency room where radiographs revealed a superior posterior left hip dislocation (Fig. 1). The patient was sedated and relocated in the emergency room. Following closed reduction, the patient had a CT scan. The scan was read as showing the left femoral head reduced in the acetabulum, but there was evidence of a posterior wall fracture. Additionally, the CT suggested the presence of an intra-articular osseous fragment (Fig. 2). The patient was admitted to the hospital and an MRI was scheduled for the following day. On the MRI images the posterior wall fracture was identified and in addition it was noted that a section of the posterior labrum appeared to be torn and incarcerated in the joint. Based on the findings of the CT and MRI, the patient was indicated for an open exploration of his left hip and removal of the incarcerated labral fragment. He was taken to the operating room the following evening. A posterior approach to the hip was taken and treatment of the incarcerated labrum was attempted with no mention of treating the acetabular fragment or removing intra-articular pathology.

The patient recovered uneventfully from the operation and underwent a repeat CT scan. The CT was read as showing evidence of post-operative air and soft tissue

Fig. 1. Injury radiographs taken at initial hospital including anteroposterior (AP) and lateral x-rays of the left hip.

swelling around the left hip joint. There was still evidence of a tiny acetabular fracture fragment. Additionally, there was

mild widening of the left hip joint compared to the right side, which was thought to be secondary to soft tissue swelling and fluid in the left hip joint. There was evidence of a “high attenuation density postero medially” which was of “uncertain etiology” and assessed as uncertain significance. The patient was discharged home, toe-touch weight bearing, and completed physical therapy at home for 11 days. The patient returned for follow-up 12 days after surgery. Repeat imaging taken in the office again showed asymmetry in the patient’s hips. Based on these results, the patient was scheduled to undergo an arthrogram in 1 week. The patient’s parents called their pediatrician who advised them to seek out a second opinion. At this evaluation, an AP pelvis x-ray documented that the space between the tear drop and the femoral head was wider on the left when compared with the right which was read as being consistent with incomplete reduction of the left hip suggesting the presence of an intra-articular fragment (Fig. 3). There were no radiopaque loose

Fig. 2. Axial, coronal, and sagittal CT scan imaging reveal the triradiate cartilage of the skeletally immature hip with the arrow pointing to presence of an intra-articular fragment within the left hip joint.

Fig. 3. AP and frog leg lateral radiographs at time of presentation to our institution demonstrate increased left hip joint space and suggest the possibility of an intra-articular fragment.

bodies seen in the joint. Based on these findings, the patient underwent an immediate MRI. The MRI of the left hip was read as showing an acute high-grade disruption of the posterior and posterior inferior joint capsule, which was seen to be attached to an avulsed and displaced non-ossified and adjacent bony posterior and posterior inferior acetabular rim. This resulted in a gap of up to 1.3 cm. In addition, there was a prominent regional extracapsular soft tissue edema, without a focal or discrete fluid collection. There was evidence of displacement of the posterior and posterior inferior labrum, as well as posterior margin of the transverse ligament, into the posterior margin of the hip joint, interposed between the posterior medial margin of the femoral head and posterior medial acetabular margin. These were seen to course along the posterior inferior margin of the ligamentum teres and were continuous with the anatomically situated anterior margin of the transverse ligament. The MRI also showed a focal small high-grade partial to full thickness chondral defect over the posterior parafoveal margin of the femoral head. The cartilage over the remaining femoral head and acetabular dome was otherwise preserved. Additionally, the MRI showed an elongated 9-mm intra-articular focus of intermediate signal intensity consistent with chondral debris within the anterior joint recess. There was a large joint effusion, post-traumatic in nature as well as diffuse

thickening, and high signal intensity of the ligamentum teres at its attachment to the femoral head, reflecting effects of high-grade disruption. Partial disruption of the inferior joint capsule was seen as well as a non-displaced tear of the degenerated anterior superior labrum. There was no evidence of acute fracture or osteonecrosis affecting the remaining pelvis or right hip (Fig. 4).

Based on these findings, the patient was indicated for an immediate re-exploration of his left hip joint and removal of incarcerated labral and fracture fragments.

The patient was taken to the operating room. He was placed under general anesthesia and placed on a flat radiolucent table. He was placed in the right lateral decubitus position on a beanbag with adequate padding. His entire left lower extremity was prepped and draped in the standard sterile fashion. The prior incision was incorporated and extended into a full Kocher-Langenbeck approach. The fibers of the gluteus maximus were taken down and the sciatic nerve identified and explored. The short external rotators were taken down and tagged. A rent in the hip capsule was identified and used to formally enter the hip joint. A femoral distractor was applied (Fig. 5a, b) allowing excellent exposure of the hip. The incarcerated chondral fragments were identified and removed and the labral fragment identified. The labrum was debrided and reattached utilizing three

Fig. 4. MRI imaging further delineates the osseous and soft tissue injuries and the arrow points to the significant size of the 9-mm intra-articular fragment. The 1.3-cm gap in the left hip joint is best seen on the coronal MRI.

Fig. 5. Intra operative photographs with *arrow* pointing to the incarcerated cartilaginous acetabular fragment and labrum.

mini-Mitek suture anchors and two Mitek GII suture anchors which were placed in the outer rim of the acetabulum. After the labrum was repaired, inspection of the hip joint revealed no further incarcerated or loose fragments, and the hip was satisfactorily relocated into the acetabulum. The distractor was removed and the external rotators and gluteus maximus were repaired back to the greater trochanter. The tensor fascia lata was closed as well as the subcutaneous tissue and skin. A sterile dressing was applied and the patient

awoke from anesthesia. Estimated blood loss for the procedure was 100 mL and there were no complications. The patient had an uneventful recovery and was discharged home post-operative day 1 in a knee immobilizer with directions to be toe–touch weight bearing and with posterior hip precautions in place.

The patient has 1 year follow-up since surgery. The first follow-up visit was 10 days after surgery at which point his wound was determined to be healing well and

Fig. 6. Follow-up radiographs at 1 year following injury reveals excellent radiographic results including a healed fracture and maintenance of reduction and hip joint space.

Fig. 7. At 1 year, the patient has fully returned to pre-injury sports without limitation or pain.

his range of motion restrictions lessened. He was allowed to flex his hip up to 70° in neutral rotation and was freed to work on internal and external rotation with the hip in full extension. At his next follow-up visit, 4 weeks post-operatively, he was allowed to weight bear as tolerated and was taken out of the knee immobilizer. His wound was found to have fully healed. The patient continued to return for regular follow-up and at 1 year following surgery, he presented with excellent clinical and radiographic results including a healed acetabular fracture, full pain-free hip motion, and a full return to all pre-injury activities including sports (Figs. 6 and 7).

Discussion

Traumatic hip dislocation with a posterior wall acetabular fracture in children is rare. This phenomenon can occur with a low-energy mechanism [6]. Possible impediments to reduction include the labrum, capsule, and osteochondral fragments. Patients who have an irreducible hip dislocation, an unstable hip after reduction, or incongruent reduction may require open reduction, and in some cases internal fixation. Recently, Mormor described surgical treatment of a pediatric

acetabular fracture with a concomitant labral tear, which was repaired with suture anchors and described good results [3]. This was our treatment of choice and confirms Mormor's technique in this patient population. We have previously described the utility of MRI in diagnosing soft tissue injuries related to acetabular fractures. MRI is especially helpful in diagnosing injury to the sciatic nerve [4]. Numerous case reports and series have shown that in the pediatric population, MRI may be a preferred modality to CT and plain XR in determining the extent of posterior wall fracture in skeletally immature patients who suffer a traumatic hip dislocation with an associated posterior wall acetabulum fracture [1, 2, 5, 6]. Case series have also highlighted the inability of CT to adequately diagnose the extent of the skeletally immature posterior wall fracture. That determination is extremely important in determining hip stability. We present the case of a child who after surgical intervention was examined with CT only and re-presented to our institution 2 weeks later with MRI evidence of incarcerated chondral fragments in the joint as well as an incarcerated, non-reduced labrum, and an unreduced transverse acetabular ligament. This case suggests that visual inspection of the joint during open surgical exposure is limited making it possible to miss critical retained or unreduced pathology that can lead to incomplete

reduction of the hip joint if left alone. CT scans cannot provide detail regarding the adequacy of reduction of surrounding connective and stabilizing soft tissues. In this case, MRI played a crucial role in determining the extent of untreated injury and also gave us an excellent picture of what to expect in the operating room. We recommend the use of MRI in these patients not only to examine the extent of the bony injury and the potential need for a formal open reduction, but also to evaluate the soft tissues surrounding the hip, which, if sufficiently damaged, could lead to significant articular pathology in the future.

Disclosures

Conflict of Interest: Michael M. Khair, MD, Christopher S. Smith, MD and David L. Helfet, MD have declared that they have no conflict of interest.

Human/Animal Rights: All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

Informed Consent: Informed consent was waived from all patients for being included in the study. Additional informed consent was obtained from all patients for whom identifying information is included in this article.

Required Author Forms Disclosure forms provided by the authors are available with the online version of this article.

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