Iatrogenic Physeal Separation During Attempted Reduction of an Obturator Hip Dislocation

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Abstract: Obturator hip dislocations are exceedingly rare, comprising <5% of hip dislocations,[1] with an even smaller percentage of these dislocations penetrating the obturator foramen. There are no reports of this in the pediatric population. We report a case of a 16-year-old male who presented with a trans-obturator hip dislocation which was irreducible by closed means and underwent open reduction. The open reduction was complicated by intraoperative acute physeal separation. This was managed with reduction of the epiphysis and fixation with a fully threaded screw, followed by reduction and capsular repair. Our report and focused review of the relevant literature suggest that a better approach might have included prophylactic femoral physis pinning prior to open reduction.

Key Concepts:

- Obturator hip dislocations are rare and are difficult to reduce by closed methods.
- In adolescent patients with a trans-obturator hip dislocation, consider placement of transphyseal fixation prior to reduction to prevent acute epiphysiolysis.

Introduction

Pediatric hip dislocations can present after both high and low energy trauma and are associated with a 3-15% incidence of avascular necrosis of the femoral head (AVN).[2-4] These dislocations are posterior 90-95% of the time.[2] Pediatric hip dislocations with concurrent proximal femoral physeal injuries are associated with severe trauma and a poor prognosis with high rates of complications, including AVN, premature physeal arrest, and nonunion.[3–6] In 2016, Kennon et al. published a series of 12 patients who had hip dislocations associated with proximal femoral physeal fractures or epiphysiolysis, 11 of whom developed ischemic necrosis of the femoral head.[3] Herrera-Soto et al. in 2006, described a series of five patients who underwent closed reductions of posterior hip dislocations and who suffered iatrogenic epiphysiolysis of the femoral head during reduction.[7] All five of the patients in that series developed AVN.

The injury pattern described in this case report is exceedingly rare. The authors were able to find only four other mentions of obturator dislocations where the femoral head had penetrated the foramen, and all four were adult patients.[8–11] There are no reports of an obturator dislocation with an intrapelvic femoral head in the pediatric population, and no reports of intraoperative acute physeal separation with retained capital femoral epiphysis after reduction of an obturator dislocation.

Our report of an intrapelvic obturator hip dislocation highlights the risk of epiphysiolysis during attempted reduction and should prompt strong consideration of stabilization of the epiphysis prior to reduction in the setting of hip dislocations in patients with open growth plates.

Case Report

A 16-year-old male sustained a 20-foot fall from a cliff. He was found to have a left hip dislocation (Figure 1) at a nearby local hospital where multiple attempts at closed reduction failed. He was flown by helicopter to our Level 1 Trauma center, where he was found to have a left hip trans-obturator dislocation (Figure 2), as well as pneumomediastinum, pelvic hematomas and an APC 2 pelvic ring injury, right distal radius fracture, right metatarsal fractures, and lumbar compression fractures. After he was resuscitated and deemed stable by the general surgery trauma team, he went to the operating room for reduction of his left hip. Despite paralytics administered by the anesthesia team, closed reduction continued to be unsuccessful. An anterior approach to the left hip was performed. A capsulotomy was made, and the femoral neck was identified. A bone hook was placed around the medial inferior neck and a Cobb elevator was placed superior to the head. An acute physeal separation occurred as the head was dislodged from the obturator foramen (Figure 3). The epiphysis was extracted from the pelvis, reduced to the neck, and a 7.3mm fully threaded cannulated screw was placed through the fovea down the femoral neck. The femur was then relocated (Figure 4). His other orthopaedic injuries were then managed in standard fashion. The patient was discharged to his home out of state. Multiple attempts to contact this patient for follow-up have proven unsuccessful.

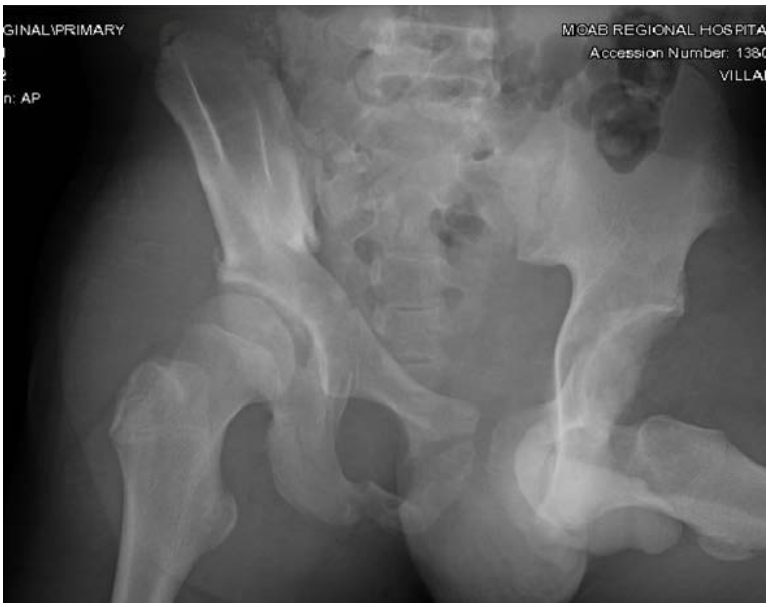

Figure 1. *AP pelvis radiograph taken at outside hospital*

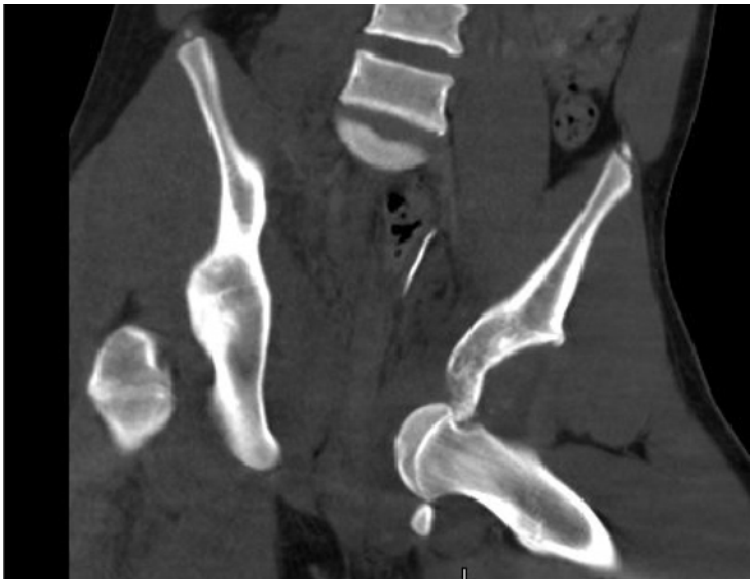

Figure 2*. Coronal CT slice demonstrating the intrapelvic femoral head*

Discussion

Traumatic hip dislocation is a rare injury in the pediatric population, making up less than 5% of all pediatric dislocations.[12] Hip dislocations are sometimes associated with minor trauma in younger children, but as age increases towards adolescence, major trauma is almost always required.[13] Similar to adults, nearly all traumatic hip dislocations in children and adolescents are posterior dislocations. Obturator dislocations have been reported very rarely.[14,15] The overall rate of avascular necrosis of the femoral head following traumatic hip dislocation in the pediatric population is 3-15%.[6,16,17]

Figure 3*. Intraoperative fluoroscopy demonstrating acute physeal separation*

There are a few reports of adolescent patients with traumatic hip dislocations who also present with physeal separation (epiphysiolysis) of the proximal femur. The rate of AVN in these patients approaches 100%. Epiphysiolysis has been reported both at the time of injury,[3,5,18] and also as a complication of attempted reduction.[4,5,7] Most of the patients in these series had posterior dislocations. None had an obturator dislocation, as we describe in the patient presented here.

For adolescents with hip dislocations, in order to prevent iatrogenic epiphysiolysis, many agree that there may be a role for reduction with complete muscle relaxation. Use of general anesthesia and gentle intraoperative reduction can help reduce undue force on the growth and thus decrease the likelihood of epiphysiolysis.[4,13] Expanding on this, Herrera-Soto et al. also recommend performing reduction under fluoroscopy, so that any early evidence of physeal instability can be identified and the epiphysis stabilized before proceeding.[7,13]

The patient described in our report had an extremely rare injury (irreducible trans-obturator hip dislocation), which has previously only been described in adults.[8–11] He underwent multiple reduction attempts at an outside facility prior to transfer, as well as an attempt at closed reduction under general anesthesia at our facility. The previous attempts may have destabilized the proximal femoral physis. Interestingly, all reports of epiphysiolysis during reduction of a dislocated hip occurred during attempts at closed reduction, while our patient's epiphysis displaced during open reduction. Based upon this case and prior reports, and regardless of the direction of the dislocation, clinicians should be alert to the possibility of epiphysiolysis during any difficult reduction of a traumatic hip dislocation in an adolescent patient. These should be reduced under general anesthesia with fluoroscopic guidance. If there is any fluoroscopic evidence of physeal instability or when the reduction is difficult, surgical stabilization of the epiphysis should be considered before attempts at reduction. There may be a role for a prereduction CT scan of adolescents with obturator hip dislocations when the position of the femoral head is difficult to determine on plain radiographs. If the femoral head is intrapelvic, transphyseal fixation should be considered prior to closed or possible open reduction.

Figure 4. *Postoperative AP pelvis radiograph*

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