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Case Report

Posterior hip fracture dislocation from a non-contact injury while playing soccer. “A Case Report”[☆]Jared A. Nowell^{a,*}, Stefan Coombs^a, Abhishek Tippabhatla^b, Basilia O. Nwankwo^a^a Howard University Hospital, Department of Orthopaedic Surgery and Rehabilitation, Washington, DC 20060, United States of America^b Howard University College of Medicine, Washington, DC 20060, United States of America

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ABSTRACT

Case: 35-Year old male presented with acute right hip pain after a pivoting motion while playing soccer. This was a non-contact injury. Imaging revealed a posterior hip dislocation with an associated posterior wall acetabular fracture. He was treated with closed reduction of the hip followed by subsequent open reduction internal fixation of the acetabular fracture.

Conclusion: Posterior hip fracture dislocations can occur in adults following low energy non-contact injuries. Successful outcomes can be achieved if they are treated in a timely fashion, but unrecognized injuries can lead to devastating consequences.

Introduction

Native hip dislocations are most commonly seen following high energy trauma, with 62–93 % of all hip dislocations following motor vehicle crashes [1]. Posterior hip dislocations make up 90 % of dislocations in native hips [2] with 70 % having an associated acetabular fracture, the most common of which is the posterior wall fracture comprising 25% [3]. Similar to hip dislocations, motor vehicle collisions account for 60–90 % of all acetabular fractures [2], 20 % of which have a concomitant posterior hip dislocation [3].

Literature on hip dislocations related to sports is sparse but a review article in 2002 noted that 2–5 % of all hip dislocations occur during sports [4]. Published case reports have presented posterior hip fracture dislocations in sports such as football, rugby, gymnastics and soccer. In soccer specifically, these injuries are associated with high energy contact, whether with another player or the playing surface [5]. Our case is a unique presentation of a posterior hip fracture dislocation from a non-contact injury while playing soccer. Understanding of this scenario and investigation of the mechanism will help prevent the devastating consequences of unrecognized hip dislocations.

Case report

Patient RO is a 35 year old male with no past medical history or history of prior lower extremity injury. While playing soccer and sprinting, he pivoted on his right foot and experienced severe pain with a buckling sensation in his right hip. He lowered himself to the ground. There was no contact with other players or direct fall onto the soccer field. He presented to the emergency department and, given the low energy mechanism, evaluation by a physician was 4 h after presentation. The patient reported right hip pain, inability to

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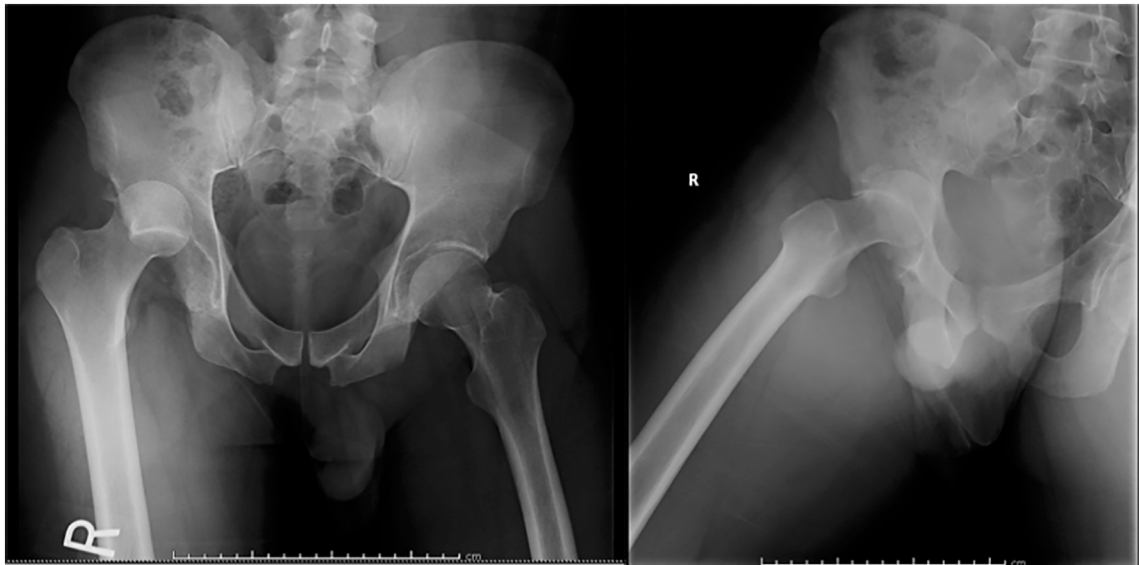


Fig. 1. AP of the pelvis(left) and lateral of the right hip(right) demonstrating posterior hip dislocation with associated posterior acetabulum wall fracture.

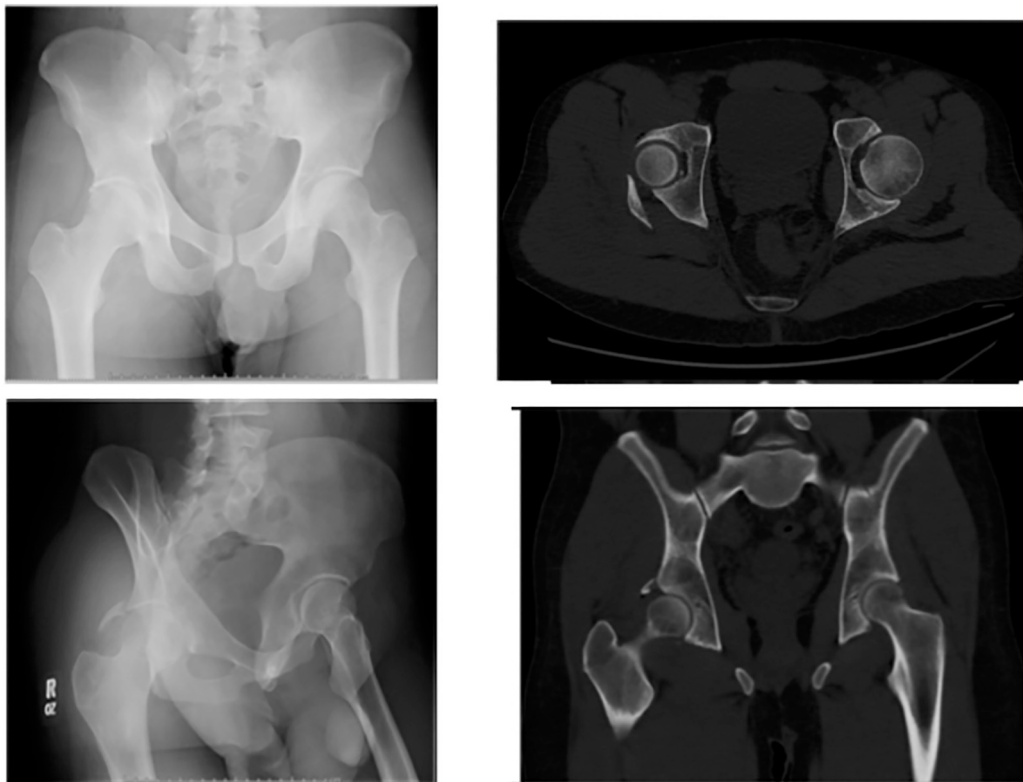


Fig. 2. AP of the pelvis (top left), obturator oblique (bottom left), axial CT (top right) and coronal CT (bottom right) cuts of pelvis after closed reduction illustrating reduction with osteochondral fragments in joint on axial cut as well as further details of displaced posterior wall fracture.

bear weight and denied numbness or tingling of the extremity. On examination the right limb was shortened, internally rotated and slightly adducted. There was tenderness over the right groin and the patient was neurovascularly intact throughout the extremity. Radiographs of the hip and pelvis revealed a posterior hip dislocation (Fig. 1). Closed reduction was performed with conscious

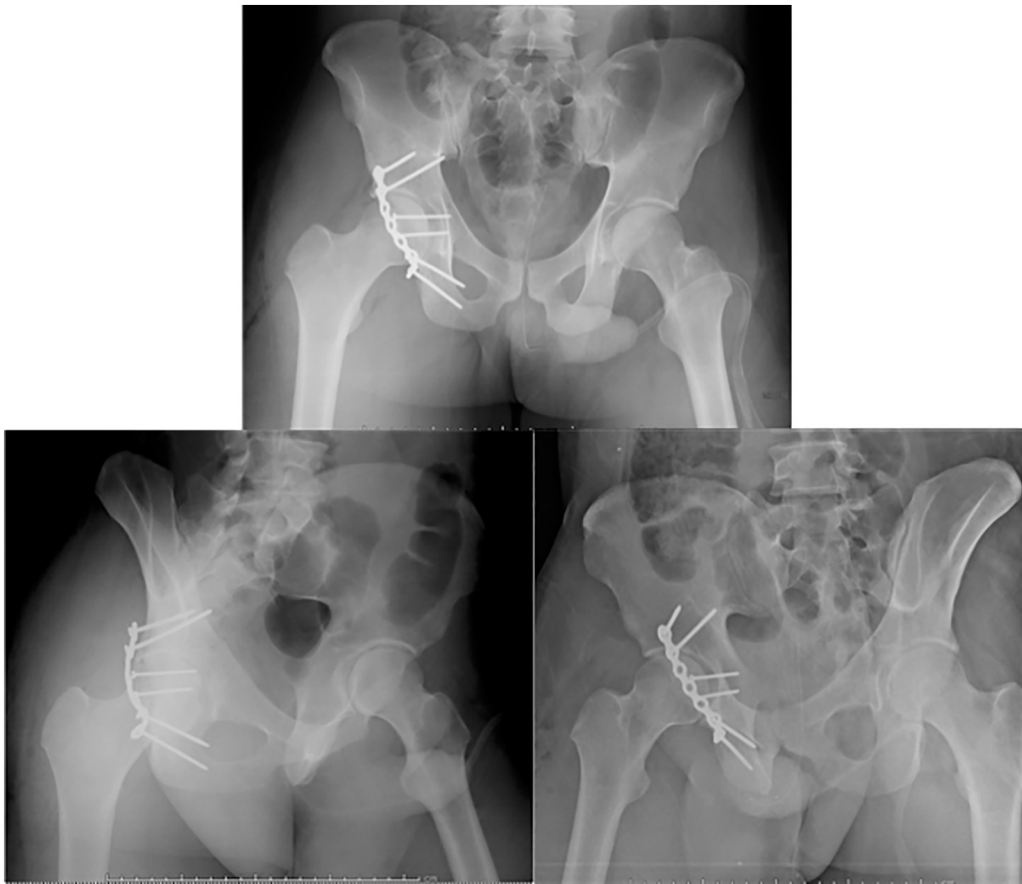


Fig. 3. Immediate postoperative AP pelvis(top), obturator oblique (bottom left) and iliac oblique (bottom right) views following open reduction and internal fixation.

sedation. Post reduction radiographs showed a concentrically reduced right hip with an associated posterior acetabular wall fracture with CT scan of the pelvis demonstrating osteochondral fragments within the joint (Fig. 2). He was admitted and on hospital day 2, underwent open reduction and internal fixation of the posterior acetabular wall fracture through a Kocher-Langenbeck approach using two Synthes 2.7 mm interfragmentary screws and a Synthes 7-hole low profile reconstruction plate (Fig. 3). Five thin fragments were removed from the supero-lateral and medial aspects of the joint and deemed unrepairable. Post-fixation assessment showed a well-reduced fracture and femoral head that was concentric with the acetabular contour. Postoperatively he was non-weight bearing on the right lower extremity with posterior hip precautions and underwent physical therapy. On post-operative day two, he underwent one radiation treatment of 700 cGy to decrease heterotopic ossification risk. He was discharged on hospital day 4 on Lovenox 30 mg twice daily for 30 days. Two weeks post operatively he was progressing well and maintaining non-weight bearing status. At three months the posterior hip precautions were removed and he was advanced to weight bearing as tolerated. Radiographs showed maintenance of the reduction and healed fracture with no evidence of avascular necrosis. At six months patient reported being “near normal” with activities and work. One year follow up showed return to normal activities with occasional nonpainful right hip popping. Imaging showed concentric acetabulofemoral joint with no evidence of avascular necrosis (Fig. 4).

Discussion

Our case highlights that while posterior hip fracture dislocations typically occur following high energy mechanisms, these injuries can occur in low energy non-contact settings. RO, an adult male, sustained this injury while pivoting to change direction resulting in an extended and acutely internally rotated hip along with an extended knee which contrasts the typical flexion of the hip and knee seen during traumatic dislocations. The hip joint capsule is tighter in hip extension than flexion and internal rotation of the hip may emphasize stretch to the posterior capsule [6]. Our patient increased the strain on his posterior capsule through both extension and internal rotation of his hip. It is possible the rotational force exerted traveled from his planted foot up through his lower extremity to his hip joint, which was on tension given his limb positioning, and exited posteriorly resulting in the posterior hip fracture dislocation described. On average 400 N of force is required to cause hip joint separation [7]. Having not witnessed our patient's injury, it is unclear how much force he exerted in the moment but we acknowledge it is unlikely that he reached that energy threshold while



Fig. 4. One-year AP pelvis(top), obturator oblique (bottom left) and iliac oblique (bottom right) views without evidence of avascular necrosis or post traumatic arthritis.

running and turning. However, this case report highlights the importance of considering hip dislocation or acetabular fracture in low energy mechanisms.

Hypermobility and hypermobility syndromes may account for increased risk of dislocations. Such was the focus of a recent study showing ligamentous laxity may be the cause of 11.1 % of post hip arthroscopy dislocations [8], and another in which individuals with Ehlers Danlos had a periprosthetic dislocation rate of 4.2 % compared to 1.7 % of controls in the first 90 days after total hip arthroplasty [9]. However, no study to date has investigated the association of hypermobility syndromes with dislocation rates in fracture such as RO's. Assessment of RO yielded no family history of ligamentous laxity, a Beighton score of 0 and was negative for any Brighton criteria [10,11] making it unlikely he has a hypermobility disorder.

The most common complications after posterior hip dislocation with or without associated acetabular fracture are post traumatic arthritis and avascular necrosis (AVN) of the femoral head. A meta-analysis by Kellam et al. [12] reported post traumatic arthritis rates of 19.4–58.6 % and AVN of 10.6–43 % after posterior hip dislocation. A meta-analysis by Ahmed et al. [13] illustrated time to reduction is a better indicator of risk for AVN than energy of dislocation. Hougaard and Thomsen [14] found AVN was 4.8 % if hips were reduced within 6 h and 52.9 % if reduction was performed more than 6 h after injury. The impact of these complications is illustrated in a case study of a 36 year old male with a hip fracture dislocation after a slide tackle during soccer that spontaneously reduced and was initially misdiagnosed as a hip contusion. Due to delayed identification, over two years he developed avascular necrosis of the femoral head and eventually osteoarthritis [5].

Our case report highlights the importance of timely and thorough evaluation of non-contact injuries in athletes to prevent complications such as avascular necrosis. The physician's evaluation of patient RO occurred 4 h after presentation due to his low energy mechanism. However, prompt closed reduction and treatment occurred once the injury was recognized. Furthermore, our case shows

there can be a favorable prognosis if this type of injury is addressed appropriately as after six months RO was near normal with his daily activities of living and at one year had returned to normal activities and work without limitations.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- [1] J.C. Mandell, R.A. Marshall, M.J. Weaver, M.B. Harris, A.D. Sodickson, B. Khurana, Traumatic hip dislocation: what the orthopedic surgeon wants to know, *Radiographics* 37 (2017) 2181–2201.
- [2] T.E. Clegg, C.S. Roberts, J.W. Greene, B.A. Prather, Hip dislocations—epidemiology, treatment, and outcomes, *Injury* 41 (2010) 329–334.
- [3] M. Ahmed, Y. Abuodeh, A. Alhammoud, M. Salameh, K. Hasan, G. Ahmed, Epidemiology of acetabular fractures in Qatar, *Int. Orthop.* 42 (2018) 2211–2217.
- [4] C. Steven, Answorth Allen, Victor Lopez, Russell Warren, Hip dislocations in athletes, *Sports Med. Arthrosc. Rev.* 10 (2002) 123–133.
- [5] F. Liska, R. Von Eisenhart-Rothe, S. Waldt, et al., Avascular necrosis following fracture-dislocation of the hip and spontaneous relocation, *Hip Int.* 21 (2011) 122–124.
- [6] M.P. Reiman, J.W. Matheson, Restricted hip mobility: clinical suggestions for self-mobilization and muscle re-education, *Int. J. Sports Phys. Ther.* 8 (2013) 729–740.
- [7] J. Xiao, J.A. Hamera, C.H. Hutchinson, D.A. Berger, Bilateral posterior native hip dislocations after fall from standing, *Clin. Pract. Cases Emerg. Med.* 1 (2017) 329–332.
- [8] I.M. Clapp, K.M. Paul, E.C. Beck, S.J. Nho, Hypermobility disorders and their effects on the hip joint, *Front. Surg.* 8 (2021), 596971.
- [9] H.G. Moore, P.J. Burroughs, L.E. Rubin, D.B. Frumberg, P.K. Sculco, J.N. Grauer, Patients with Ehlers-Danlos syndromes experience higher rates of prosthetic dislocation after total hip arthroplasty and worse implant survival at 5 years, *J. Am. Acad. Orthop. Surg.* 30 (2022) 177–183.
- [10] P. Beighton, A. De Paepe, B. Steinmann, P. Tsipouras, R.J. Wenstrup, Ehlers-Danlos syndromes: revised nosology, Villefranche, 1997. Ehlers-Danlos National Foundation (USA) and Ehlers-Danlos Support Group (UK), *Am. J. Med. Genet.* (77) (1998) 31–37.
- [11] R. Grahame, H.A. Bird, A. Child, The revised (Brighton 1998) criteria for the diagnosis of benign joint hypermobility syndrome (BJHS), *J. Rheumatol.* 27 (2000) 1777–1779.
- [12] P. Kellam, R.F. Ostrum, Systematic review and meta-analysis of avascular necrosis and posttraumatic arthritis after traumatic hip dislocation, *J. Orthop. Trauma* 30 (2016) 10–16.
- [13] G. Ahmed, S. Shiraz, M. Riaz, T. Ibrahim, Late versus early reduction in traumatic hip dislocations: a meta-analysis, *Eur. J. Orthop. Surg. Traumatol.* 27 (2017) 1109–1116.
- [14] K. Hougaard, P.B. Thomsen, Traumatic posterior dislocation of the hip—prognostic factors influencing the incidence of avascular necrosis of the femoral head, *Arch. Orthop. Trauma Surg.* 106 (1986) 32–35.