Triple Blow Injury to a Limb: Ipsilateral Hip and Knee Dislocation with Vascular Occlusion

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Abstract

Ipsilateral hip and knee dislocation (double blow) occurring simultaneously during trauma are rare occurrences that are associated with secondary complications. These are high energy injuries that warrant acute emergency management more so if associated with vascular compromise. We encountered a poly trauma patient having a combined right anterior hip and ipsilateral knee dislocation with vascular occlusion at popliteus level apart from associated segmental radius fracture of the left upper limb. This young patient presented after 22 h being referred form elsewhere making the situation critical to the surgical team. An attempted thrombolysis was done but as gangrenous changes started, we ended up in a below knee amputation. This case highlights a typical scenario in a developing country where facilities involving super specialty services are scarce and even patients are complacent about need for emergent referral. All this adds to surgical dilemma as guidelines are unclear for the best treatment.

Keywords: Amputation, delayed, hip dislocation, knee dislocation, vessel occlusion

Introduction

Hip and knee dislocation occurring in the same limb is a rare form of injury that has been sparsely described in the literature.[1-6] The majority of the hip are posteriorly dislocated, and patients were fortunate enough to escape a vascular insult that can be catastrophic to knee dislocation. The vessel injury or occlusion is an immediate limb-threatening situation.[7] These dual dislocations (double blow) itself is an acute emergency which if delayed, could lead to late complications. However, a vascular injury amplies the situation making it a complex challenge where the salvage of limb is difficult. The authors have reported no sequelae to amputation.[1,2,7] We present a unique case of a polytrauma patient having fractures in radius but, more importantly, a dual dislocation with vascular occlusion at popliteus presenting after a delay of 22 h of the accident that ended up in amputation.

Case Report

A 28-year-old man was admitted to the emergency after being referred to our hospital following a motor vehicle accident 22 h earlier. He was pedestrian when a four-wheeler hit him from the back. At admission, the vitals were stable, and the right leg was shortened and cooler than the left limb. There was no external wound except for bruises over his right knee. The hip was in abduction and external rotation while the knee was sagging posteriorly. His distal pulses, including popliteal, dorsalis pedis, and posterior tibial pulses were not felt though femoral was palpable. Plain radiography showed an anterior dislocation of the right hip without any acetabular fracture but a posterior dislocation of the knee [Figure 1]. He also had a closed segmental fracture of radius in the opposite upper limb. The other trauma series X-ray was normal. We did an urgent color Doppler that showed complete occlusion of the knee’s popliteal artery level, and we called our vascular surgeon for help. A computed tomography angiography confirmed the Doppler findings [Figure 2]. His blood parameters showed an increased total leukocyte count, and the urea, creatinine, or myoglobin levels were normal. The patient was informed...
about the counseled about prognosis as a trial of limb salvage was attempted. Under general anesthesia, two operating teams simultaneously operated. One team lead by the vascular surgeon exposed the femoral artery and removed the Fogarty catheter’s 2 cm of the clot while another group had fixed the upper limb. Next knee spanning fixator in 30° flexion was applied with knee reduced, and finally, the hip was pulled in using the upper femoral schanz pins a for traction while the assistant gave a lateral and another counter traction. The reduction was confirmed under the image intensifier [Figure 3].

The patient was shifted to the intensive care unit with heparin and other anti-coagulants as we waited for progress. Unfortunately, by the next 2 days, there was gradual blackening and an increase in limb swelling extending up to the knee. The patient relatives were informed, and color doppler confirmed no revascularization. Hence, an above-knee amputation was done.

**Discussion**

Hip dislocations are high-velocity trauma with the majority as posterior type occurring with dashboard injury.\(^1\)\(^-\)\(^3\) The anterior hip dislocations are rare form, which occurs with blow in hip extension.\(^7\) An associated ipsilateral knee dislocation is a double blow injury that has only sparsely been described in the literature.\(^1\)\(^-\)\(^8\) In reported double blow injuries, all hips dislocation were reported are posterior except for a single case by Ali et al., who found an anterior hip as well as knee dislocation.\(^7\) Damage to the popliteal artery in such a double blow was noted only in one patient, as seen by Motsis et al.\(^9\) even though the danger of vascular injury in isolated knee dislocation is reported to be 26%.\(^9\) Compounding and direct trauma to the vessel were seen in their case; hence, the patient ended up in a through knee amputation. Our patient was unique in having a dual dislocation with a thrombus causing complete occlusion at popliteal, added to a delayed presentation. The situation was tricky and we did remove the clot, but revascularization failed. Revascularization is dependent on the timing of intervention, which is preferably in the golden hour period. Perumal et al. salvaged a double blow injury that had weak signals in color Doppler over posterior tibial and dorsalis pedis artery with an initial knee spanning fixator who had presented well in time.\(^2\) Such patients are can be associated with hemodynamical instability and other life-threatening injuries and hence a damage control orthopedics is priority.\(^2\)\(^,\)\(^10\)

The most accurate investigation for vascular investigation is matter of debate with the magnetic resonance imaging angiographic studies added to the existing armamentarium.\(^2\) However, the color doppler is most handy and appropriate for a bedside evaluation. The management of multiligamentous injury in knee can be delayed with better outcomes as compared to nonsurgical and arguably similar to early reconstruction.\(^10\)

For hip dislocation with instability, surgery is contemplated with acetabular wall fractures or femoral head fractures.\(^10\) Overall, revascularization is paramount to limb salvage which is dependent on the duration of ischemia. Prolonged kinking of the vessel may be lead to thrombosis as in our case. We searched the literature for a possible guideline but was lacking. As the patient was young with no skin changes and blood parameters were normal, we attempted a salvage. After 24 h of injury, the rate of amputation has been reported by
Usually, the expectant patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

References
1. Sharma G, Chahar D, Sreenevasan R, Verma N, Pankaj A. Ipsilateral hip and knee dislocation: Case report and review of literature. J Clin Orthop Trauma 2016;7:115-2.
2. Perumal R, Sundararajan SR, Vasudeva J, Rajasekaran S. Ipsilateral hip and knee dislocation with open tibial fracture: A case report of a limb threatening injury. J Orthop Case Rep 2016;6:47-50.
3. Freedman DM, Freedman EL, Shapiro MS. Ipsilateral hip and knee dislocation. J Orthop Trauma 1994;8:177-80.
4. Malimson PD. Triple fracture-dislocation of the lower limb. Injury 1984;16:11-2.
5. Kreibich DN, Moran CG, Pinder IM. Ipsilateral hip and knee dislocation. A case report. Acta Orthop Scand 1990;61:90-1.
6. Tsai IT, Hsu CJ, Fong YC, Hsu HC, Chang CH, Tsai CH. Simultaneous ipsilateral hip and knee fracture-dislocations. Formosan J Musculoskeletal Disord 2011;2:66-70.
7. Ali C, Malkus T, Podskubka A. Ipsilateral traumatic dislocation of hip and knee joints. Case report. Acta chir Orthop Traumatol Cech 2009;6:329-34.
8. Motsis EK, Pakos EE, Zaharis K, Korompilias AV, Xenakis TA. Concomitant ipsilateral traumatic dislocation of the hip and knee following high-energy trauma: A case report. J Orthop Surg (Hong Kong) 2006;14:322-4.
9. Peter J, Armstrong LT, Franklin DP. Treatment of vascular injuries in the multiple-ligament-injured knee. Oper Tech Sports Med 2003;11:199-207.
10. Sen RK, Tripathy SK, Krishnan V, Goyal T, Jagadeshv V. Ipsilateral fracture dislocations of the hip and knee joints with contralateral open fracture of the leg: A rare case and its management principles. Chin J Traumatol. 2011;14:183-87.
11. Ramdass MJ, Muddeen A, Haranarayan P, Spence R, Milne D. Risk factors associated with amputation in civilian popliteal artery trauma. Injury 2018;49:1188-92.
12. Wagner WH, Calkins ER, Weaver FA, Goodwin JA, Myles RA, Yellin AE. Blunt popliteal artery trauma: One hundred consecutive injuries. J Vasc Surg 1988;7:736-43.
13. Kumar LS, Kumar D, Agrawal S. Simultaneous traumatic dislocation of the hip knee and ankle joints in an ipsilateral limb, does it happen? A case report. Int Surg J 2018;5:2600-63.
14. Goitz RJ, Tomaino MM. Management of peroneal nerve injuries associated with knee dislocations. Am J Orthop (Belle Mead NJ) 2003;32:1-4.
15. Waterman BR, Banerjee R. Management of simultaneous ipsilateral dislocation of hip, knee, and ankle. Am J Orthop (Belle Mead NJ) 2011;40:301-4.

Figure 3: Femoral vessel exposure for clot removal, black arrow mark showing the main femoral and yellow arrow showing the profunda branch (a) the retrieved clot is shown in (b), the limb after external fixator application (c), the radiograph after fixation of radius (d) and amputation, shown in red arrow. Note the reduction of hip (e) up to 60%-80%.[7,11,12] Since, the swelling and color changes were extending up-to knee, an above-knee amputation was a feasible option.

Double dislocation (hip and knee) reflect a specific mechanism of trauma pattern wherein forces to knee are transferred directly to hip. Nevertheless, there are high (42%-5 in 12 cases) chances of associated limb fractures.[1] Kumar et al. reported a case of triple dislocation (hip, knee, and ankle) in one patient.[13] Early complications mainly include the neurovascular injuries.[1,10] Among the nerves the common peroneal particularly is at high risk due to stretching at either location (hip or knee) seen in 25% (3/12 cases) even as isolated knee dislocation can produce neuropaxia in 10%-40% of times.[1] Usually, the expectant treatment is good postreduction of hip, yet some surgeon’s advice for neurolysis particularly in setting of the postcruciate ligament reconstruction.[14] The most devastating complication however remains the popliteal artery injury. Waterman and Banerjee have a successful repair in their case where as Motsis et al. could not salvage the limb.[8,15] Late complication might include avascular necrosis, heterotrophic ossification, stiffness, and degeneration of joints.[10]

The purpose of the article is to highlight this rare form of injury and sensitize the readers about a situation that, in all ways, is urgent of all emergencies. The most crucial prognostic factor however is the time duration. As aptly said “a stich in time save nine.”

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given