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Case Report

Simultaneous ipsilateral knee dislocation and hip fracture: A case report

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ABSTRACT

Hip fracture is one of the main causes of medical attendance in trauma centers. By contrast, knee dislocation is a challenging and limb-threatening injury. We report a case of a 68-year-old male who sustained a simultaneous ipsilateral hip fracture and knee dislocation after a low-energy fall. Popliteal artery and common peroneal nerve injuries were associated. Knee dislocation treatment included closed reduction, external fixation and popliteal artery repair. Hip hemiarthroplasty was performed using a direct anterior approach. Revision multiligament knee reconstruction surgery was not considered. A rehabilitation program achieved a good long-term functional outcome. Simultaneous ipsilateral knee dislocation and associated proximal femoral injuries are rare and challenging, potentially requiring long-term staged management. The direct anterior approach to the hip is worth consideration when additional lower limb injuries are present, especially in the setting of a knee spanning external fixator.

Introduction

Hip fracture is one of the main causes of medical attendance in trauma centers. By contrast, knee dislocation is a rare, complex, challenging and limb-threatening injury. Knee dislocation is often associated with vascular and nerve lesions with an incidence that ranges from 1.6 % to 64 % and from 14 % to 45 %, respectively [1]. Ipsilateral proximal femur and knee injuries are uncommon, consisting of simultaneous hip and knee dislocations [2,3]. We have not identified any report of simultaneous ipsilateral hip fracture and knee dislocation in the English literature. Herein, we describe the clinical and surgical management of a 68-year-old male presenting at our institution with simultaneous ipsilateral femoral neck fracture and knee dislocation.

The patient was informed that data concerning the case would be submitted for publication and he agreed.

Case report

A 68-year-old male with a BMI of 27.6 was admitted to our trauma emergency department after sustaining a low-energy fall while trekking. He had a past medical history of multiligament right knee injury, treated five years earlier by repair of the medial meniscus and lateral collateral ligament (LCL), as well as reconstruction of anterior and posterior cruciate ligaments.

Knee instability, swelling and effusion were evident. His right foot was cold and pulseless (dorsalis pedis and posterior tibialis). He

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also had dorsum of the foot hypoesthesia and dorsiflexion weakness.

The patient's radiographs showed a displaced right femoral neck fracture (Fig. 1) and an asymmetric joint space of the right knee, suggesting spontaneous reduction of knee dislocation (Fig. 2).

Due to high suspicion of popliteal artery injury, computed tomography angiography (CTA) was performed, and Vascular Surgery Team was consulted. CTA showed popliteal artery transection at the adductor hiatus, with active bleeding and expanding hematoma at the popliteal fossa (Fig. 3).

The patient underwent knee-spanning external fixation, followed by a femoropopliteal bypass using a cephalic vein autograft. Dorsalis pedis and posterior tibialis pulses were recovered. Prophylactic four-compartment fasciotomy with vacuum assisted closure (VAC) was used due to limited overlying skin for direct wound closure.

To diminish the risk of infection, the patient returned to the operating room for repeat fasciotomy, irrigation and debridement within the first week. The ankle was also placed in neutral position by extending the knee-spanning external fixation to the first metatarsal bone to avoid *equinus* deformity. Hip replacement was delayed due to rhabdomyolysis and acute severe kidney failure without a need for dialysis.

Three weeks post injury, the patient underwent soft tissue coverage with a Split-thickness skin autograft from lateral thigh,

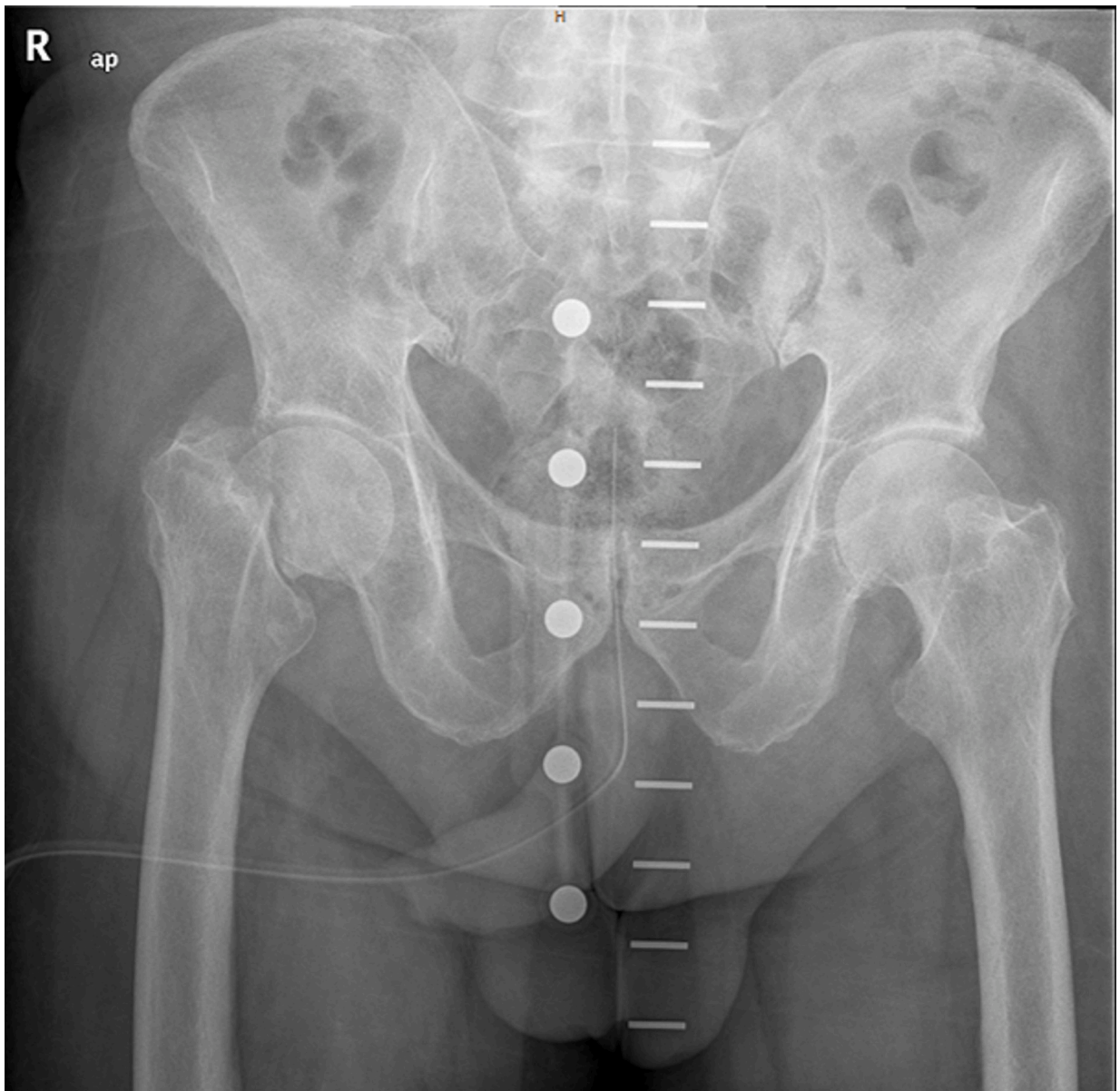


Fig. 1. Anteroposterior pelvic radiograph showing right femoral neck fracture.



Fig. 2. Anteroposterior and lateral right knee radiographs suggesting minimal external dislocation without obvious deformity.

performed by the Plastic Surgery Team.

Six weeks after hospital admission a direct anterior approach (DAA) for hip hemiarthroplasty was performed in supine position and without traction table (Fig. 4). At the same surgical time, external fixation was removed to test knee stability, facilitate proper dressing, and diminish risk of infection. Testing for knee stability showed persisting unstable joint, requiring a provisional long-leg posterior splint thereafter.

The Knee Surgery Team was consulted to assess management of the knee instability. Magnetic resonance imaging (MRI) showed a hematoma at the surgical site of the lateral fasciotomy adjacent to the biceps femoris muscle; failure of the prior anterior cruciate ligament (ACL) and posterior cruciate ligament (PCL) reconstructions and LCL repair (KDIIII: Knee Dislocation III by Schenck, with lateral-side injury) [4]; chronic injuries of the medial collateral ligament (MCL), and residual hematoma adjacent to the femoropopliteal bypass. Due to patient age, functional status and MRI results, conservative treatment was chosen: a hinged knee brace and ankle-foot orthosis.

The patient began a rehabilitation and physical therapy program after being bed-bound NWB (Non-Weight-Bearing) for six weeks until hip hemiarthroplasty. Early rehab focused on active and passive knee motion for range of motion (ROM) improvement and immediate weight bearing. The initial articular range of motion was 0–60°. The patient reached 0–120° of knee ROM after two months. At that time, he began using a front-wheeled walker, hinged knee brace and ankle-foot orthosis. At six-months follow-up the patient began using a single crutch for gait assistance, and use of the knee brace was discontinued. Common peroneal nerve injury with persisting paresthesia and dorsiflexion weakness was defined by the patient as the most limiting sequela. Electromyography after six

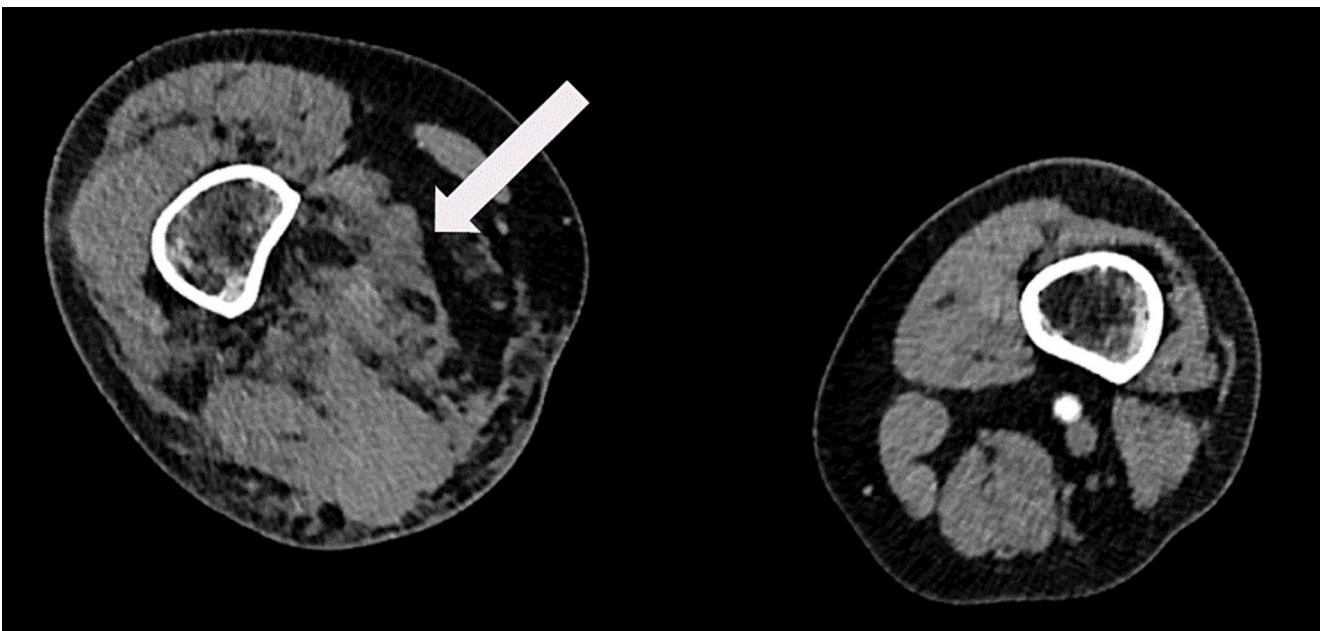


Fig. 3. Axial computed tomography angiography of the lower extremities demonstrating right popliteal artery transection at the adductor hiatus with active bleeding and expanding hematoma (arrow).

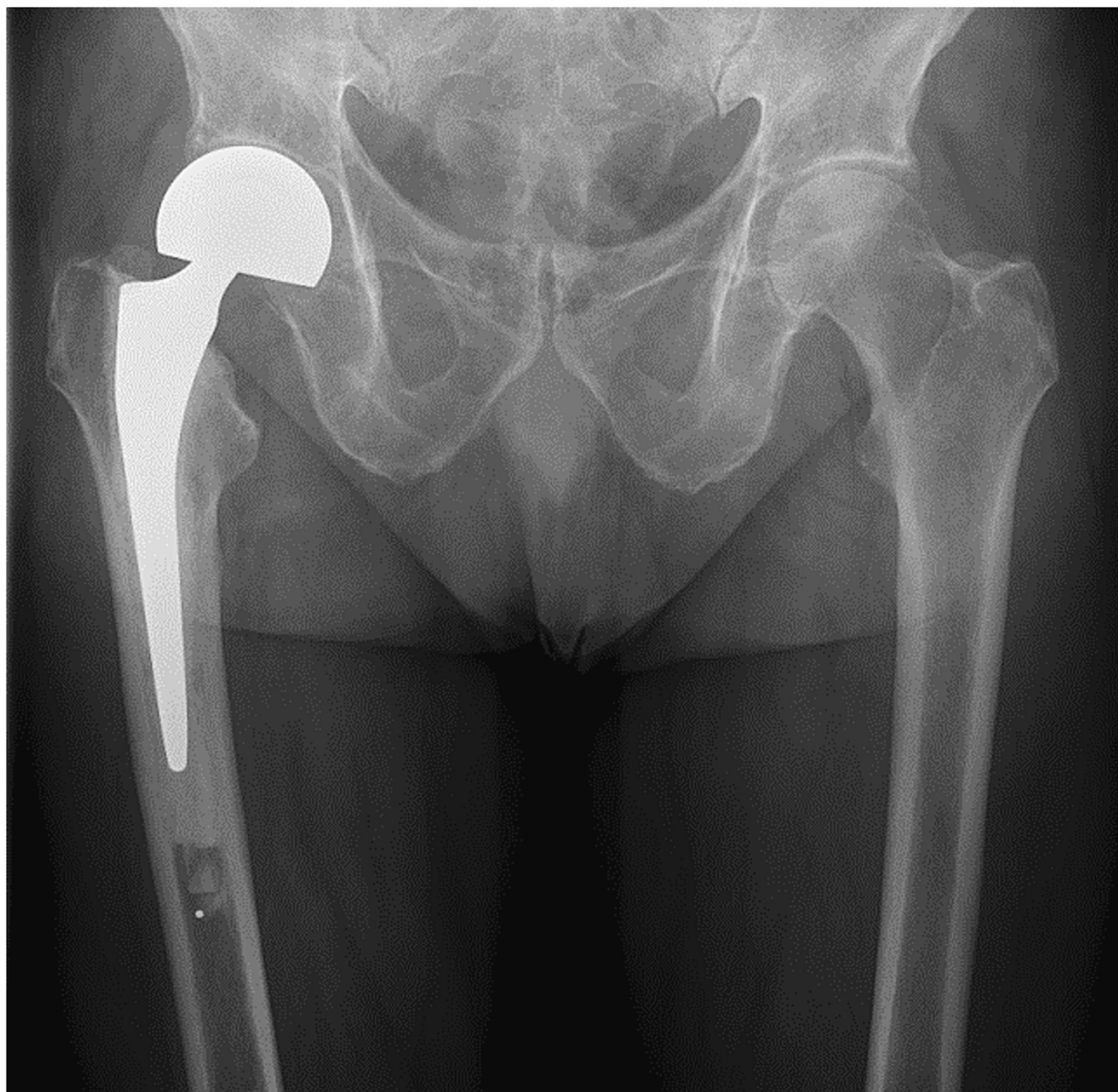


Fig. 4. Anteroposterior pelvic radiograph showing right hip hemiarthroplasty.

months showed axonotmesis of the common peroneal nerve. Treatment of the nerve injury was conservative, with an ankle-foot orthosis. At one-year follow-up, the patient had no symptoms of knee instability and walked without assistive devices and returned to sporting activities such as swimming and cycling.

Discussion

High-energy knee dislocations are often associated with distal femur and proximal tibia fractures [2]. Our case differs from the usual pattern, as the injury mechanism was a low-energy trauma despite patient was not obese, and that the associated fracture was in the proximal femur. To date, only a few cases of ipsilateral simultaneous hip and knee dislocation have been reported, but to our knowledge this is the first case report on ipsilateral simultaneous proximal femoral fracture and knee dislocation [3].

Knee dislocation and associated vascular injury must be suspected with any clinical knee instability, as up to 50 % can self-reduce. The patient presented with his right foot cold and pulseless, hence we immediately employed (CTA), surgical exploration, revascularization, prophylactic fasciotomies and external fixation, in accordance with published literature [1].

Surgical management of ligamentous injury after knee dislocation can improve functional outcomes, instability, and return to the activities of daily living. Best surgical timing for reconstruction (early, staged or delayed) is still a matter of debate [5]. In this case

delayed reconstruction would have been mandatory to achieve acceptable soft-tissue conditions as the patient was suffering from compartment syndrome, requiring fasciotomies and multiple debridements.

Revision multiligament reconstruction was discussed once soft-tissue conditions were acceptable. Yet, conservative management with bracing and a directed rehabilitation program was considered the best option based on identified predictors of poor functional outcomes with surgery (age over 50, associated fracture, popliteal injury, and compartment syndrome) as reported by Woodmass et al. [6].

Hip fracture guidelines recommend performing surgery within 48 h after admission [7]. Patient clinical status (rhabdomyolysis and acute severe kidney failure) together with the ipsilateral knee injury and required fasciotomies discouraged early surgery until optimization of patient medical and lower limb soft tissue conditions [8]. Direct anterior approach has demonstrated lower rates of hip dislocation compared with the posterior approach and better early functional outcomes than posterior or direct lateral approaches [9]. Therefore, we decided upon the direct anterior approach. Although the patient had external fixation removed at the operation room right before his hip surgery, we believe this is the best approach for hip replacement when the knee is externally fixated because it is performed in supine decubitus position and flexion of the knee is not needed. Adduction and external rotation for stem implantation can be facilitated by surgical assistants.

Hip hemiarthroplasty or total hip arthroplasty are the surgical options for displaced femoral neck fractures in the elderly. Results from the Hip Fracture Evaluation with Alternatives to Total Hip Arthroplasty versus Hemi-Arthroplasty (HEALTH) trial showed that total hip arthroplasty provided a clinically unimportant improvement over hemiarthroplasty in function and quality of life, but with a higher incidence of serious adverse events. In our patient, hip hemiarthroplasty was chosen after considering his functional status expectations, as supported by the HEALTH trial results [10].

In conclusion, knee dislocation and associated proximal femur injuries are rare and challenging. Long-term, staged management may be required. Reported outcomes of revision multiligament knee reconstruction surgery are bad when associated with poor prognostic factors; therefore, intensive rehabilitation programs must be considered when they are present. The direct anterior approach to the hip is worth consideration when additional lower limb injuries are present, especially in the setting of a knee spanning external fixator.

Consent to participate and publication

Patient was informed that data concerning the case might be submitted for publication, and gave their consent.

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CRedit authorship contribution statement

All authors contributed equally to this work. All authors contributed to the writing of the manuscript. All authors read and approved the final manuscript.

Conflict of interest

The authors have no conflict of interests to declare.

References

- [1] A. Maslaris, O. Brinkmann, M. Bungartz, C. Krettek, M. Jagodzinski, E. Liodakis, Management of knee dislocation prior to ligament reconstruction: What is the current evidence? Update of a universal treatment algorithm, *Eur J Orthop Surg Traumatol.* 28 (2018) 1001–1015, <https://doi.org/10.1007/s00590-018-2148-4>.
- [2] Null Good, Null Johnson, The dislocated knee, *J Am Acad Orthop Surg.* 3 (1995) 284–292, <https://doi.org/10.5435/00124635-199509000-00004>.
- [3] A. Arenas Miquelez, F. Familiari, L. Arbeloa, A. D'Arrigo Azzarelli, Simultaneous ipsilateral dislocation of the hip and the knee: a case report, *JBJS caseConnect* 7 (2017), e85, <https://doi.org/10.2106/JBJS.CC.17.00036>.
- [4] R.C. Schenck, Classification of knee dislocations, in: G.C. Fanelli (Ed.), *The multiple ligament injured knee: a practical guide to management*, Springer, New York, NY, 2004, pp. 37–49.
- [5] C.J. Peskun, D.B. Whelan, Outcomes of operative and nonoperative treatment of multiligament knee injuries: an evidence-based review, *Sports Med. Arthrosc. Rev.* 19 (2011) 167–173, <https://doi.org/10.1097/JSA.0b013e3182107d5f>.
- [6] J.M. Woodmass, M.P. O'Malley, A.J. Krych, P.J. Reardon, N.R. Johnson, M.J. Stuart, B.A. Levy, Revision multiligament knee reconstruction: clinical outcomes and proposed treatment algorithm, *Arthroscopy* 34 (2018) 736–744.e3, <https://doi.org/10.1016/j.arthro.2017.09.022>.
- [7] K.C. Roberts, W.T. Brox, D.S. Jevsevar, K. Sevarino, Management of hip fractures in the elderly, *J. Am. Acad. Orthop. Surg.* 23 (2015) 131–137, <https://doi.org/10.5435/JAAOS-D-14-00432>.
- [8] A. Lizaur-Utrilla, B. Gonzalez-Navarro, M.F. Vizcaya-Moreno, F.A. Miralles Muñoz, S. Gonzalez-Parreño, F.A. Lopez-Prats, Reasons for delaying surgery following hip fractures and its impact on one year mortality, *Int. Orthop.* 43 (2019) 441–448, <https://doi.org/10.1007/s00264-018-3936-5>.
- [9] D. Sheth, G. Cafri, M.C.S. Inacio, E.W. Paxton, R.S. Namba, Anterior and anterolateral approaches for THA are associated with lower dislocation risk without higher revision risk, *Clin. Orthop. Relat. Res.* 473 (2015) 3401–3408, <https://doi.org/10.1007/s11999-015-4230-0>.
- [10] HEALTH Investigators, M. Bhandari, T.A. Einhorn, G. Guyatt, E.H. Schemitsch, R.D. Zura, S. Sprague, F. Frihagen, E. Guerra-Farfán, Y.V. Kleinlugtenbelt, R. W. Poolman, A. Rangan, S. Bzovsky, D. Heels-Andsell, L. Thabane, S.D. Walter, P.J. Devereaux, Total hip arthroplasty or hemiarthroplasty for hip fracture, *N Engl J Med.* 381 (2019) 2199–2208, <https://doi.org/10.1056/NEJMoa1906190>.