Open Journal of Clinical & Medical Images

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Case Report

Open Access, Volume 2

The importance of multidisciplinary treatment of popliteal artery injury after knee dislocation with rupture of both cruciate ligaments and both collateral ligaments: A case report

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Received: Sep 16, 2022
Accepted: Oct 31, 2022
Published: Nov 08, 2022
Archived: www.jclinmedimages.org

Introduction

We present the case of a young patient who was admitted with a dislocation of the right knee with multiligament injury (Table 1). Further examination revealed a rupture of the popliteal artery after a torsion trauma. The purpose of this report is to underline the importance of a timely diagnosis and how teamwork can lead to excellent results.

Popliteal artery injury is a rare and subtle complication of post traumatic knee dislocation. Rupture of the popliteal artery complicates knee dislocation in 2 to 11% of cases [1]. In case of an acute knee dislocation, the anatomical site of the popliteal artery is unfavorable. In particular, the antero-posterior tibial displacement leads to the elongation of the involved popliteal artery with intima tears, dissection and sometimes acute thrombosis [2,3]. In 65% of cases, high-energy trauma is the cause of popliteal artery injury following knee dislocation [4,5].

A correct diagnosis requires an accurate physical examination, an adequate timing in the choice of the appropriate radiological examination as well as structured teamwork between trauma surgeons and vascular surgeons.

Case report

A 26-year-old woman presented in the emergency room with a traumatic dislocation of the right knee. She reported to have suffered a torsion trauma while jumping on a trampoline. On physical examination the right lower limb and foot were swollen and cold without palpable pedal pulses. Further findings included hematoma in the popliteal space and instability of the knee joint. Furthermore, the sensitivity of the lower limb was reduced.

The first performed plain radiograph showed an anterior dislocation of the tibia (Figure 1).

Citation: Scaratti R, Meurer G, Dietz B, Dargel J, Trenner M. The importance of multidisciplinary treatment of popliteal artery injury after knee dislocation with Rupture of both Cruciate Ligaments and both Collateral Ligaments: A Case Report. Open J Clin Med Images. 2022; 2(2): 1070.

Table 1: Description of Schenck classification criteria for knee dislocation (KD).

Classification	Description
KD I	Rupture of the anterior or posterior cruciate ligament
KD II	Rupture of the anterior and posterior cruciate ligament
KD III	Type III medial: rupture of medial collateral ligament, anterior and posterior Type III lateral: Rupture of lateral collateral ligament, anterior and posterior cruciate ligament
KD IV	Rupture of the medial and lateral collateral ligament as well as the anterior and posterior cruciate ligament
KD V	Fracture-dislocation
Classification	**Description**
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KD IV	Rupture of the medial and lateral collateral ligament as well as the anterior and posterior cruciate ligament
KD V	Fracture-dislocation

Figure 1: Radiographic Image of the anterior dislocation of the right knee.

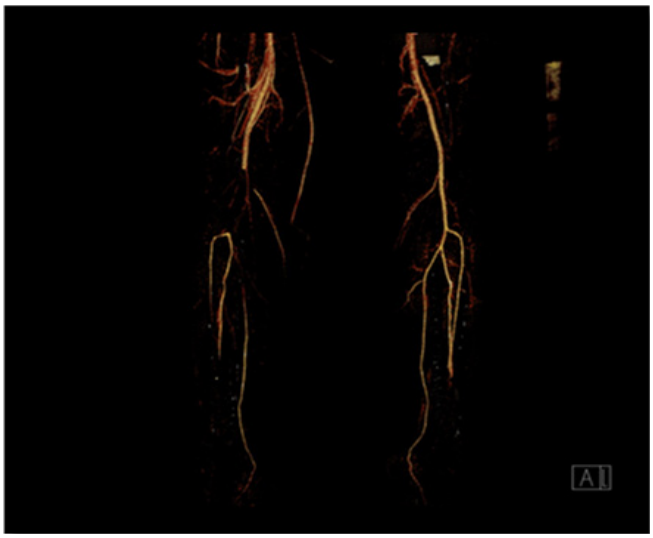

Figure 2: 3D VRT Reconstruction after removal of the bone structure showing Interruption of the right popliteal artery at the height of the knee joint.

A closed reposition of the dislocated knee was performed under general anesthesia and then the patient underwent an angiographic CT scan. The CT scan showed an interruption of the popliteal artery at the height of the knee joint. In the late arterial phase, the anterior tibial artery, the fibular trunk and the fibular artery appeared patent (Figure 2). The results of the radiological examinations confirmed the indication for an emergency procedure of revascularization of the lower limb through reconstruction of the popliteal artery.

The patient received a popliteo-popliteal bypass procedure (above knee to below knee) with an autologous saphenous vein graft, extra-anatomically in non-reversed technique.

Intraoperatively the hematoma in the hollow of the knee was removed and rupture of the popliteal artery was revealed (Figure 3).

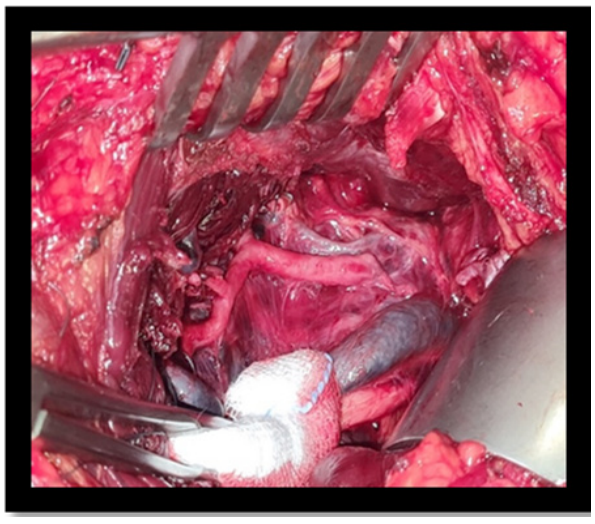

Figure 3: Intraoperative image showing the rupture of the popliteal artery.

At the end of the procedure, an intraoperative angiographic control showed an interruption of the contrast at the level of the distal segment of the anterior tibial artery. For this reason, the patient underwent a selective embolectomy of the anterior tibial artery with removal of two clots.

After revascularization, knee reposition was repeated and an external fixator was inserted. Due to long ischemia-time, a fasciotomy of the lower leg and an application of a medial and lateral Vacuum-Assisted Closure (VAC) system were performed.

At the end of the surgical procedure, the foot was warm with good microcirculation and recapilarization. The dorsalis pedis and posterior tibial pulses were palpable. After nine days of regular wound checks and regular bandage changes, the removal of the VAC-system was possible as well as the suture of the fasciotomy wounds. Subsequently, the patient underwent a new orthopedic intervention for mobilization, reposition and new insertion of the external fixator (Hofmann III) under general anesthesia.

To complete the joint reconstruction, the patient underwent the following orthopedic surgery: posterior cruciate ligament plastic with quadriceps tendon with hybrid fixation using swivelock anchors, trans osseous tibial anterior cruciate ligament suture with hybrid fixation using swivelock anchors and reconstruction of the inner ligament using corkscrew refixation.

In further course, the patient recovered well and was able to resume her work.

Discussion

Popliteal artery rupture is a rare and dangerous complication of anterior knee dislocations that can lead to limb loss. It is therefore crucial to carry out a careful physical examination, an examination with color duplex ultrasound, and if these examinations are suspicious or leave doubt, an urgent CT scan.

Once the diagnosis is assured, it is important to evaluate the time of ischemia to initiate further surgical treatment. Works in literature consider one-hour cut-offs: within an hour from the ischemic event, orthopedic surgery can be performed first, whilst after an hour, it is mostly preferable reestablish perfusion first [6,7].

In our clinical case it was indispensable to perform an intraoperative angiography to detect the presence of peripheral emboli. The complexity of the injury caused by dislocation subsequently required several orthopedic procedures that allow to gradually recover the functionality of the lower limb.

The patient spent a first period in the vascular surgery department and then in orthopedics and was followed by both from the beginning until discharge from the hospital, with constant interdisciplinary updates on the clinical course.

In the past, the absence or delay of diagnostic procedures and, consequently, the lack of adequate surgical procedures resulted in amputation of the limb in 57% of cases [8]. Today, with the advance of diagnostics and the subsequent improvement in prescribing targeted surgical procedures, the limbs amputation rate dropped to 19% [9]. Interdisciplinary treatment is inalienable to achieve the best possible results for patients with these complex injuries.

References

1. Robertson A, Nutton RW, Keating JF. Dislocation of the knee. J Bone Joint Surg Br. 2006; 88: 706e11.
2. Kauvar D, Kraiss L. Vascular trauma: extremity. In: Ruther- ford's Vascular Surgery. 8th ed. 2014; 2485e502.
3. Kirby L, Abbas J, Brophy C. Recanalization of an occluded popliteal artery following posterior knee dislocation. Ann Vasc Surg. 1999; 13: 622e4.
4. Rihn JA, Groff YJ, Harner CD, Cha PS. The acutely dislocated knee: evaluation and management. J Am Acad Orthop Surg. 2004; 12: 334e46.
5. Moatshe G, Dornan GJ, Løken S, Ludvigsen TC, LaPrade RF, et al. Demographics and injuries associated with knee dislocation a prospective re- view of 303 patients. Orthop J Sports Med. 2017; 5: 2325967117706521.
6. Xu YQ, Li Q, Shen TG, Su P-H, Zhu Y-Z, et al. Early diagnosis and treatment of trauma in knee joints accompanied with popliteal vascular injury. Int J Clin Exp Med. 2015; 8: 9421e9.
7. Massara M, Prunella R, Caridi GD, Cito D, Serra R, et al. Traumatic Anterior Knee Dislocation with Popliteal Artery Injury: The Importance of a Prompt Diagnosis and Treatment to Obtain Lower Limb Salvage. Ann Vasc Surg. 2017; 43: 309.e1-309.e3.
8. Edward A, Lefrak MD. Knee Dislocation, An Illusive Cause of Critical arterial Occlusion. Clinical Notes Arch Surg. 1976; 111: 1021-1024.
9. Teissier V, Tresson P, Gaudric J, Davaine JM, Scemama C, et al. Importance of Early Diagnosis and Care in Knee Dislocations Associated with Vascular Injuries. Ann Vasc Surg. 2019; 61: 238-245.