Case Report
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Huge leg hematoma due to vascular disruption following femur fracture: An industrial accident catastrophe

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Lower extremity injuries represent one of the most common injury patterns observed in the daily practice of trauma surgery. Trauma to the long bones of the lower extremity may cause a vascular trauma involving either arterial or venous system or both. Additional vascular involvement worsens the clinical status and prognosis of the trauma patient with a potential limb loss. In this paper, an industry worker with a gross trauma causing proximal femur fracture with femoral artery and vein disruption and his surgical management was reported.

Keywords: femoral fractures, vascular system injuries, hematoma

Introduction

Limb loss after lower extremity long bone fractures has been generally ascribed to the extent of tissue damage, arterial involvement and the duration of ischemia before revascularization [1]. Associated venous injury and development of compartment syndrome are other factors affecting the prognosis [2,3]. Open femur fractures accompanied by limb-threatening vascular disruptions often present with complex management problems. Available literature about this issue is not satisfactory and affords insufficient assistance [4]. As most of the western world surgeons deal with relatively less number of these cases during their daily practice, management usually depends on the experience of others [5]. In this paper, the surgical experience of a massive industrial accident leading huge leg hematoma of the thigh and scrotum due to femoral artery disruption after femur shaft fracture was presented.

Case Report

A 29-year-old male construction worker arrived to the emergency department after an industrial accident with a huge right leg injury due to a femur shaft fracture. He was semiconscious with a blood pressure of 70/40 mmHg and heart rate of 121 bpm. He had a 3 cm skin wound of lateral thigh due to the laterally displaced fractured femur shaft perforation. According to his anamnesis, two tons of steel plate was dropped on his leg during working in the construction. Physical examination revealed a massively swollen right thigh with a huge scrotum indicating a massive bleeding and huge hematoma due to the vascular disruption (Fig. 1A). Laterally, there was a fractured bone tip exit skin lesion. Palpation of the peripheral pulses revealed absolute pulse deficit on his right leg over the popliteal artery as well as the distal posterior and anterior tibial arteries. The Mangled Extremity Severity Score (MESS) was determined as 9. Direct roentgenogram demonstrated laterally displaced proximal part of the fractured right femur shaft and a huge right leg diameter. (Fig. 1B). The Computerized Tomography (CT) Angiography of the right lower extremity demonstrated the femoral artery cut (Fig. 2A) and the presence of a massive scrotal hematoma with a contrast extravasation consistent with the vascular disruption (Fig. 2B). On the left leg, no abnormality was seen radiologically (Fig. 1B).

The patient was taken to the operating room for an emergency surgery. He was positioned in supine position under general anesthesia. Femoral sheet exploration was

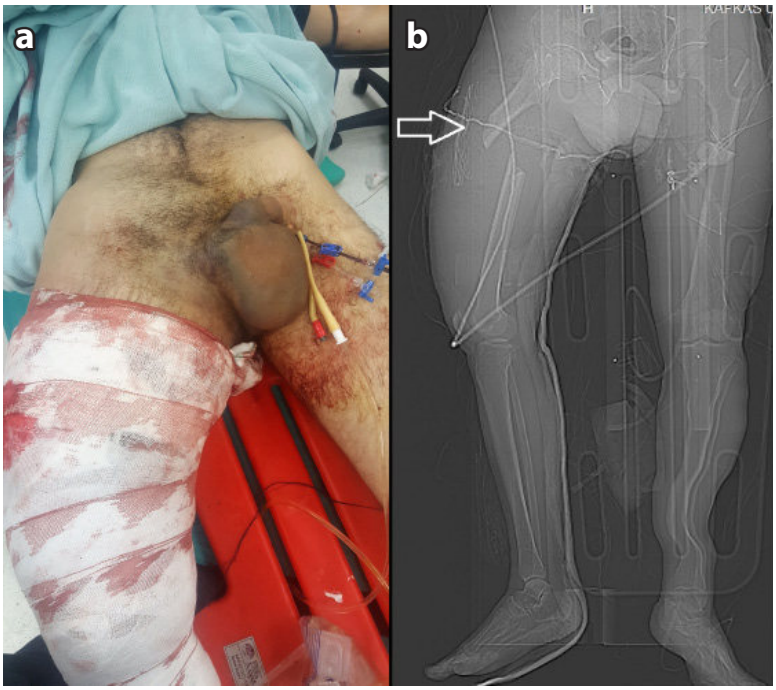

Figure 1.
Morphological view of the massive hematoma of the right thigh and scrotum. Note the thigh is extensively enlarged compared to the left side (a). Computerized Tomography (CT) topogram of the lower extremities demonstrates the presence of a huge right thigh. The arrow shows laterally displaced fractured proximal femur shaft (b).

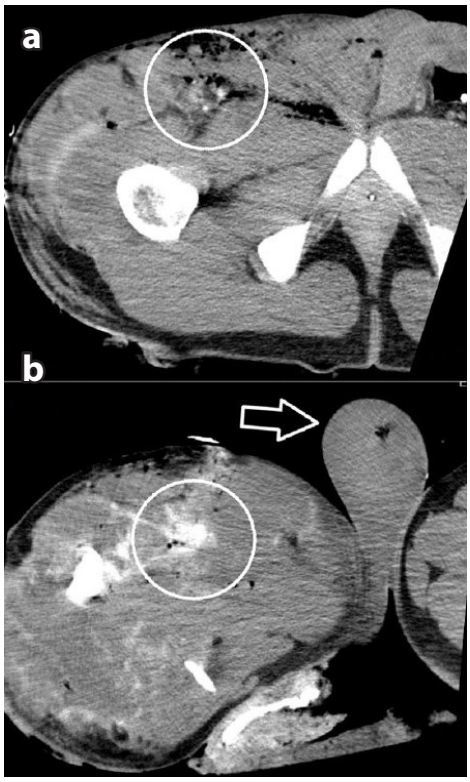

Figure 2.
CT angiography of the right lower extremity demonstrates the presence of a contrast extravasation (encircled) consistent with the vascular disruption (a) and massive hematoma disseminated through the scrotum (arrow) (b).

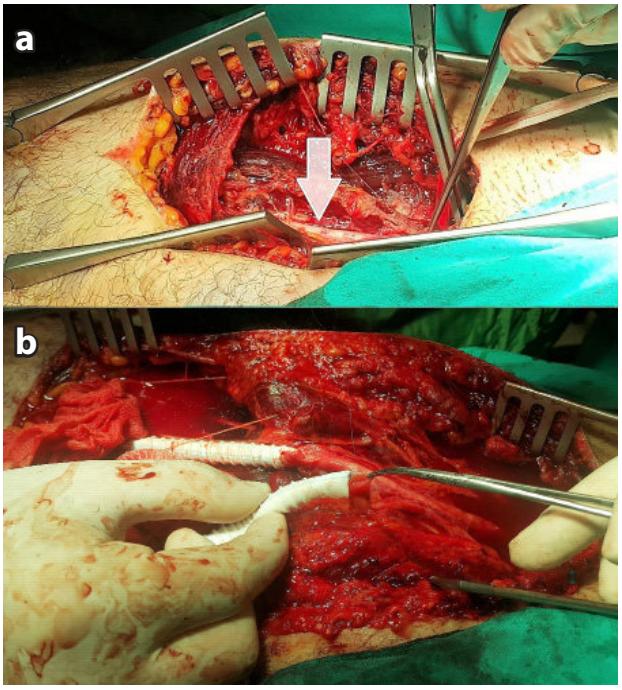

Figure 3.
The intraoperative image is demonstrating the cross-clamped intact femoral artery (arrow) at the level of inguinal ligament (a). Proximal end-to-end anastomosis of the femoral vein is being done with PTFE graft. Note that the femoral artery repair was initially done to restore limb perfusion rapidly (b).

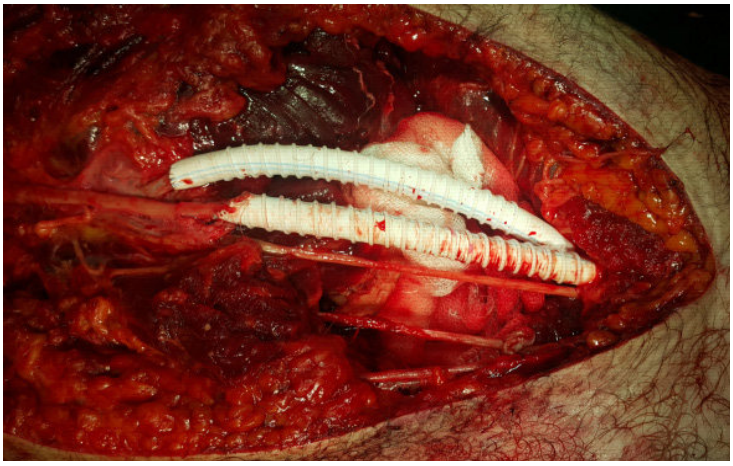

Figure 4.
The intraoperative image is demonstrating the final status of the revascularized femoral artery and femoral vein with ringed PTFE graft.

done at the level of inguinal ligament to explore the intact proximal part of the femoral artery and vein. Explored intact femoral artery was clamped (Fig. 3A). The skin incision was progressed distally to find out the disruption site of the femoral artery. Upon progression into Hunter's canal, the femoral artery and vein were found to be cut totally (Fig. 3B). Distal exploration was made to find the cut distal ends of the artery and vein. The femoral artery and vein were both repaired with 6 mm ringed polytetrafluoroethylene (PTFE) synthetic vascular graft (Fig. 4). Polypropylene 6-0 sutures with 13 mm needles were used for each anastomosis. The femur fracture stabilization and the muscular repair were made by the orthopedics. The patient was then closed with two hemovac drain tubes. The pulses were returned and the distal capillary perfusion was restored.

Discussion

Long bone fractures are considered as a heterogeneous group of traumas when associated with vascular disruptions [6]. Mangled extremities are vulnerable to infections and delayed wound healing due to the disrupted blood supply [7]. If the patient has a multisystem trauma, the prognosis gets even worse and the severe systemic problems may lead to limb amputation [8]. When the limb salvage is attempted, multiple factors affect the reconstruction process including the vascular and skeletal point of vision. These factors simply include the timing and priority of the injury [9]. There are two main factors in the determination of surgical sequence in fractures with vascular disruptions; ischemia time and fracture stability [10]. The reconstructive approach is planned mostly depending on these two main parameters. Prolonged ischemia time with absent collateral blood flow necessitates a rapid revascularization to protect the limb viability. Conversely, a grossly unstable fracture may need a fracture stabilization before the attempt for vascular repair. Temporary vascular shunts may be used to achieve a longer ischemia resistance during the skeletal rigid stabilization. Iatrogenic disruption of the temporary shunts or the permanent grafts may occur during the orthopedic procedures [7].

Although the expeditious surgical intervention is important for the successful prognosis in vascular traumas, imaging techniques should be obtained for accurate diagnosis. Arteriograms are performed either in the emergency department or in the operating room to avoid delays in sending the patient to radiology department [7]. Various methods may be used for vascular repair. Primary repair with end-to-end anastomosis is performed if there is no tissue loss. If there is gross vascular tissue loss that prevents the two ends to come together, graft interposition may be applied. These grafts include the synthetic grafts and reversed vein grafts [3].

In long bone fractures that accompany vascular injuries should initially be evaluated [7]. Despite there is no consensus about the optimum surgical sequence, the urgency and priority should be directed to the restoration of vascular integrity and reperfusion after providing the hemostasis [11]. The prevention of prolonged tissue ischemia should be the primary objective. Thus the treatment goal should be determined on the basis of the tenet that "a viable limb before a functional limb".

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