KEMİK DOKU KAYBI OLAN KRURİS EZİLME YARALANMASI

Cruris Crush Injury with Bone Tissue Loss

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ÖZET

Bu yazıda krurisin kirli ezilme yaralanmasının yönetimini sunduk. Çünkü tibianın açık kırıkları ile sık karşılaşmaktayız. Krurisin bu yaralanmaları uzun dönemde ekstremite kaybı ve morbiditeye neden olabilen ciddi yaralanmalardır. Tibia anatomik yerleşiminden dolayı travmaya kolay maruz kalır. Özellikle crurisin ezilme yaralanmaları, nörovasküler hasar, kompartman sendromu, enfeksiyon, nonunion, malunion gibi komplikasyonlarla yaygın olarak ilişkilidir.

Anahtar kelimeler: *Açık kırık; Ezilme yaralanması; Kemik kaybı*

ABSTRACT

Herein, we present management of unclean crush injury of the cruris. Because, open fractures of tibia are frequently encountered in clinic. These injuries of the cruris are severe injuries which may lead to long term morbidity and extremity loss. The tibia can be easily exposed to trauma due to its anatomic region. Especially, crush injury of the cruris is commonly associated with complications such as norovascular damage, compartment syndrome, infection, nonunion and malunion.

Key words: *Open fracture; Crush injury; Bone loss*

INTRODUCTION

Open fractures of tibia are frequently encountered because very little soft tissue covers the bone. In addition, the tibia is easily exposed to trauma because of its anatomic placement. The type of injury effect the morbidity. Especially, crush injury of the cruris is commonly associated with complications such as norovascular damage, compartment syndrome, infection, nonunion and malunion (1). Injuries may cause loss of the extremity, too (2). In the present study we aimed to present management of unclean crush injury of the cruris.

CASE REPORT

A 53 year old male farmer was wounded by falling on wood with his left cruris while cutting a tree. His first aid was performed in a local hospital and referred to our emergency room about six hours after injury. The systolic and diastolic blood pressures were 70 and 30 mmHg, respectively. The heartbeat rate was 135/minute. The left cruris was completely crushed (Figure 1-A). Common soft tissue and bone defects were present. The wound was contaminated with soil and herbs. His hemoglobin level was 5.6 mg/dl. The routin biochemical laboratory analysis was normal. Red blood cell transfusion was done. Tetannus vaccine and immunoglobulin were administered. The pulse of the arteria tibialis anterior and posterior was not detectable by palpation or doppler USG. The patient was transferred to the operating the atre. Angiography was performed to monitor the popliteal artery together with its distal part (Figure 2-A). Popliteal artery and distal vascular structures were intact. Necrotic and contaminated soft tissue and bone were debrided and irrigated with 5000 cc saline solution. Extremity alignment was provide with one-way extarnal fixator. Wet dressing was applied to the open wound. wound irrigation and debridement were done with 3000 cc saline solution due to wound infection respectively at 2th 5th and 7th days. Granulation tissue began to occur at post-traumatic 15th day. Skin grafts were taken from the thigh, and the open wounds were closed after granulation tissue formation at twenty two day. Inflamatuar markers were returned normal range at post-traumatic 8th week. After closure of the skin, risks of defects or infection were eliminated. Operation was planned for restoration of bone defect of tibial diaphysis. The end plate of the defective bone was renewed by incision of the proximal and distal tibial defects. The fibula was medialized from the proximal side, while the soft tissue and vascular connections were protected, and was then placed into the proximal and distal end plate of the tibia (Figure 1-B). A broad dynamic compression plate, sized 4.5 mm, was approximated to the bone tissue by proximal and distal incision, and fixed to the distal and proximal part of the tibia by screws. This process provide tibial alignment and rotational stability. Tissue damage on the distal and proximal fibula due to drilling and screw application was avoided. Passive movement at the knee and ankle was detected in the second week after the operation. The patient was mobilized with axillar support for six weeks without strain and six weeks with partial strain on the left extremity. He was mobilized with full strength in the postoperative 9th month by using an axillar support (Figure 2-B). The equinus deformity of the foot was treated by physiotherapy.

Figure 1. (A) Preoperative plain radiographs shows the communited cruris fracture on the left side;
(B) postoperative plain radiograph shows that both proximal and distal parts of fibula is medialized, while the soft tissue and vascular connections were protected;
(C, D) nine and fifteen month after the operation plain radiograph shows that fibula is viable.

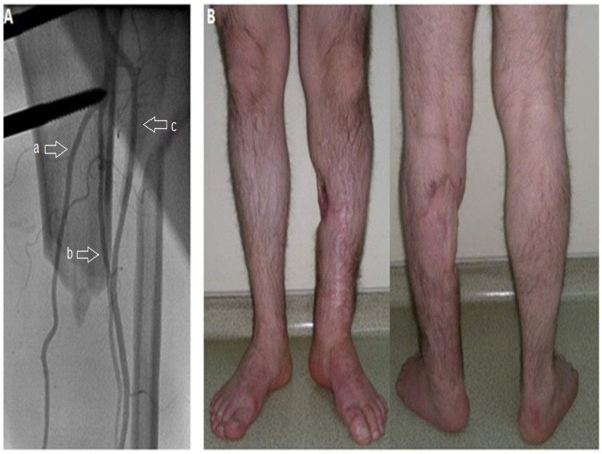

Figure 2. (A) Intraoperative fluoroscopic angiogram of left lower extremity arteries shows the popliteal artery and its distal part. a (white arrow):posterior tibial artery, b (white arrow):fibular artery, c (white arrow): posterior tibial artery;
(B) the patient standing on weight-bearing position at postoperative nine month.

DISCUSSION

Crush injuries of the extremities are commonly seen among agricultural laborers and are contaminated with infected materials such as soil (3). Crush injuries cause serious soft tissue damage and necrosis, and soft tissue flaps are common. Systemic and local infections may occur due to necrosis. Wound closure before treatment of the infection and necrosis may lead to systemic spread of the infection and loss of reconstruction opportunity (4). Various treatment options may be selected but prior management should contain debridement and irrigation of the wound and fixation of the fracture. Antibiotic treatment is necessary to avoid infections, which may negatively affect wound healing (5). Gustilo recommended that especially type 3 open fractures should be left open and closure must be done after the physician makes sure the infection risk is eliminated (6).

Mac Kenzie et al, investigated the factors of extremity loss on high energy trauma of the lower extremities. They determined that the energy of the trauma is a determinant for amputation (2).
Bone tissue loss commonly occurs in open fractures due to trauma or debridement (6). The treatment options for segmentary bone tissue loss of tibia are the Huntington's procedure or the Ilizarov technique or the use of vascular fibula of the opposite extremity (7,8).

The Ilizarov technique has positive effects on the conglutination of the fracture. However, the long treatment process may cause accommodation problems of the equipment and constitutes an infection risk due to the nails. The proximity of the frame to the joint can inhibit joint movements. This situation predisposes to ankylosing and chondromalacia (8).

Taking a vascular fibula graft from the opposite extremity causes morbidity at the healthy leg. Additionally, this process is restrictive in the event of a complication occuring at the traumatized extremity. Excessive scar tissue around the peroneal vessel may hinder anastomosis (9).

Defective area of the tibia may be restored by ipsilateral medialization of the fibula (Huntington's procedure). This tecnique ensures mechanical support and blood supply to the defective area by the nutriational and the periosteal branch of the peroneal artery (10). In this technique, bending or rotational forces may lead to the fracture of the fibula and loosening of the fixation. The patient can not apply force to the extremity safely. Additionally, the fixation must be supported with an external fixator. Thus, in the long term, limitation of the joint movement may cause ankylosing and chondrosis. The length of the graft and the stability of the fixation are important factors for the healing of the fibula graft (9).
In the present case, firstly we ensured uninterrupted blood supplying of the fibula by angiography. The proximal fibular soft tissue and the vessel connection were protected and the fibula was medialized. Flexion forces on the fibula were neutralised by the replacement of the fibula into the intramedullar proximal and distal end of the tibia.

Making a bridge with plate screw on the proximal and the distal part of the tibia ensured tibial alignment and rotational stability. Thus, segmentary stabilization of the cruris was maintained and additional fixation on the distal and proximal fibula were not required. Viability of the fibula was protected (Figure 1-C,D). Early movement of the knee and the ankle joints were ensured.

Crush injuries of the cruris are serious injuries which may cause long term morbidity and extremity loss. Radical debridement should be performed at the beginning of the treatment. Mechanically stable fixation with less morbidity can be maintianed by intramedullar replacement of the ipsilateral fibula into the defective area of the tibia.

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