

Integrated treatment of the severely injured patient with coexistent comorbidities. A case report and literature review

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Summary. Major trauma represents a paradigmatic clinical condition, needing multidisciplinary and structured approach. When a patient is affected by significant comorbidities such as diabetes mellitus and other conditions that compromise the immune competence the risk of infections in the presence of exposed fractures is remarkably high. Although usually managed by multidisciplinary teams, these patients often have unfavorable functional outcomes. We describe here the case of a young diabetic and immunosuppressed man, treated for a destroying injury of the left lower limb, with more than 60 centimeters of multiple fractures exposition. The prompt and fast integration of several different competences led to favorable functional outcome, without any severe local or systemic complication. Therefore, in severely injured patients, especially when affected by significant comorbidities, a quick and highly integrated treatment, provided by a polyspecialistic team, is crucial for reducing unfavorable outcomes and improving the recovery rate. (www.actabiomedica.it)

Key words: major trauma, diabetes, immunosuppression, trauma team

Introduction

Major trauma represents a paradigmatic clinical condition, needing multidisciplinary and structured approach (1,2). In particular, when a patient is affected by significant comorbidities such as diabetes mellitus (3-6) that may compromise the immune competence (7,8), the risk of infection in case of exposed fractures is remarkably high. Although usually managed by multidisciplinary teams, these patients often have unfavorable functional outcomes (9).

We describe here the case of a young diabetic and immunosuppressed man, treated for a destroying injury of the left lower limb, with more than 60 centimeters of multiple fractures exposition.

Case report

B.C., a 36 years old man, was involved in a motor vehicle crash on October 22nd, 2011. He was affected by diabetes mellitus type 2 and severe psoriasis, treated with metformin and with the immunosuppressive agent cyclosporine. While he was driving his motorbike, he hit an open door of a stopped car, which caused a massive injury of the left lower limb, resulting in multiple fractures of femur, patella, fibula and tibia, along with a linear wound of more than 60 cm. The patella was virtually destroyed, with loss of several fragments outside the injured tissues and also suffered from a lateral popliteal nerve palsy (Fig. 1 and 2). The wound was severely contaminated with soil,



Figure 1. The injured limb at presentation, after initial cleaning

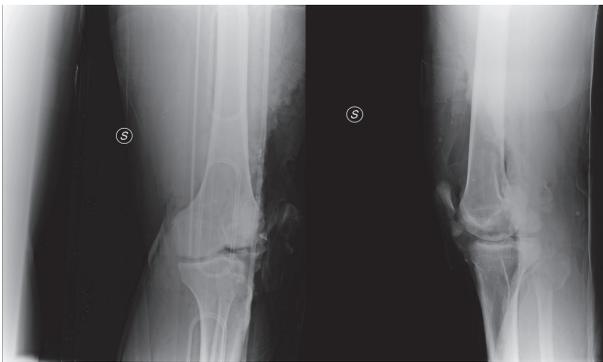


Figure 2. X-ray examination at presentation in ED. With the limitation of the method, the destroying lesions are quite obvious

plant leaves and clothing fragments. A significant venous hemorrhage occurred, the peripheral pulses were present and valid. Upon Emergency Department (ED) arrival, the vital parameters were as follows: Glasgow Coma Score (GCS) = 15; Heart Rate (HR) 120 bpm; Respiratory Rate (RR) 20/min.; Peripheral saturation in oxygen (SpO₂) 100% in ambient air; Blood Pressure (BP) 130/70 mmHg. Concurrently with a careful wound cleaning, antibiotic prophylaxis was immediately started with ampicillin/clavulanic acid 3 gr., gentamycin 80 mg, and metronidazole 500 mg. The left upper limb was also injured, with fractures of radius, ulna and 5th metacarpal bone. No cranial, spinal, thoracic or abdomino-pelvic injuries were found on X-ray, CT scan, and ultrasound examinations. The initial blood tests were substantially normal, with the excep-

tions of blood glucose (238 mg/dL) and haemoglobin (10 g/dL). Three hours and 20 minutes after the traumatic event, the patient underwent surgical operation of the left lower limb, concurrently with a treatment with a plaster of the upper limb fractures. The cleaning of the severely contaminated wound was continued for 45 minutes, using mechanical removing of foreign bodies, and pulsed clearing with saline, iodopovidone and rifampicin.

Surgery consisted in reattachment of lateral femoral condyle with 3 cannulated screws, lateral tibial condyle with 2 cannulated screws, quadriceps tendon with transosseus absorbable sutures. The tourniquet was removed after 1 hour and 40 min; the quality of vascularisation was monitored and drainage was also inserted (Fig. 3). Afterwards, a control X-ray examination was performed (Fig. 4), and the patient was then admitted to the Intensive Care Unit (ICU).



Figure 3. The limb immediately after surgery, showing drainage tubes



Figure 4. First X-ray examination after surgery, showing the reattachment of lateral femoral condyle with 3 cannulated screws, and of the lateral tibial condyle with 2 cannulated screws

Throughtment management in the ED, the patient was transfused with 4 units of concentrated RBCs. While in ICU, the patient was clinically stable in the following days. A thrombo-prophylaxis with dalteparin 7500 IU/day was started from the first ICU day. A slight increase of serum troponin I concentration was observed on day 2 (0.08 ng/mL, reference range <0.06 ng/mL), a frequent occurrence in patients with severe traumatic lesions (10-12). No electrocardiographic abnormalities were observed. On October 27th the patient become febrile. A series of hyperbaric oxygen treatments was hence started after blood cultures tested positive for anaerobic bacteria (*Bacteroides* spp.; *Peptostreptococcus* spp.; *Clostridium* spp.), which was stopped on November 7th. On October 28th the patient underwent surgery for fractures reduction and synthesis of radius and ulna with Limited Contact Dynamic Compression Plate (LC-DCP®) and titanium screws plus one screw placed in the 5th metacarpal diaphysis. An open cast was also applied.

On the same day a series of pus samples from the wound were obtained and an infectivologist was contacted for establishment of optimal antibiotic therapy. The diabetic control was unsatisfactory, so that diabetologic counseling was planned, and insulin treatment was started on November 9th. On December 6th, a new polyspecialistic evaluation was planned. The diabetologist restarted treatment with oral agents, the infectivologist re-evaluated the antibiotic therapy, and the plastic surgeon decided to perform a surgical intervention of necrosectomy with autologous skin implant. On December 22 the patient was discharged at home, afebrile and general conditions.

After one week the patient was evaluated by Plastic and Orthopaedic Surgeons. On January the 9th, hand X-rays examination was performed, showing good evolution of the metacarpal fracture associated with a left forearm fracture's delayed consolidation. Lateral popliteal nerve palsy was lasting/prosecuting while left knee range of motion was estimated (0-90). Weight bearing was still prohibited for the operated lower limb. On January 20th the patient started with initial light weight bearing (10 kg). On February the 3rd forearm's X-rays examination showed complete bone healing, while knee radiographs were still unchanged. In that period the patient was allowed to in-



Figure 5. The limb at re-evaluation on day 120th

crease weight bearing using 2 crutches. On February 27th one crutch was removed. At this moment a secretory fistula near a shinbone's screw was identified. On April 27th the follow-up visit showed good evolution for the fistula and surgery for removing the shinbone's screw was performed.

The patient was fully recovered in 120 days with a knee's range of motion between 0° and 110° degrees. (Fig. 5 and 6). X-ray examination comparing both limbs in upright position is showed in fig. 7.

After one year we noticed the resumption of lateral popliteal nerve function as clinically demonstrated and confirmed by electromyography. With great satisfaction the patient started again to ride his motorbike.

Discussion and conclusions

Widely exposed and contaminated fractures carry an extremely high risk of infection(s). The risk is much higher in case of diabetic and/or immunosuppressed



Figure 6. The limb at re-evaluation on day 120th, showing the range of motion

subjects (3-5,9). A very prompt initiation of wide spectrum antibiotic therapy, along with a similarly prompt surgical debridement of the injury, and surgical synthesis of the fractured bones is effective to reduce the risk of infections, so improving the outcome (13-15).

Our case, characterized by an extreme severity of lesions and the presence of two significant comorbidities such as diabetes mellitus and immunosuppression, is paradigmatic for demonstrating that a timely and highly integrated treatment, given by a polyspecialistic team, is crucial for reducing the unfavorable outcomes, thus dramatically improving the recovery rate.

Acknowledgement

This article is warmly dedicated to the memory of Dr. Massimo Desimoni, Diabetologist, tragically deceased, who was actively involved in the management of the described patient.



Figure 7. X-ray examination, on day 120th, comparing both limbs in upright position. An undeniable good recovery, with a good symmetry between both limbs, is showed in this image

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Received: 27 November 2014

Accepted: 3 February 2015

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