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Case Report

Multi-stage management of a right hip gunshot injury; Case report

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ABSTRACT

A 42-year-old hunter with no previous medical history suffered an accidental gunshot injury while hunting. Upon arrival at our Hospital, the following musculoskeletal lesions were diagnosed during the primary survey: comminuted right trochanteric and femur neck fracture, femoral and sciatic nerve palsy.

The immediate damage control surgery consisted of debridement, jet-lavage, PMMA-chain insertion and extrafocal fixation. Structural neural damage was disclosed.

Primarily the skin wound was treated by delayed closure and later the healing was supported by Negative Pressure Wound Therapy. Six weeks after, the extrafocal fixation was removed and antibiotic spacer was inserted. Primary wound healing occurred without any sign of infection. Neurological recovery of the extremity took almost a year. Low grade infection were excluded by serial labs and culture samples. Finally the patient underwent total hip arthroplasty with excellent result.

Introduction

Despite an increasing rate of civilian low-velocity gunshot injuries worldwide, there remains a lack of evidence-based guiding management or treatment standards [1,2]. More than 30,000 fatal and 70,000 non-fatal injuries result from firearms each year in the USA [3]. Fortunately serious or fatal gunshot injuries are quite infrequent in Hungary, because possession of weapons are strictly ruled and controlled by our federal laws. The survival rate and their outcome are strongly influenced by the injured body part. The more central is the shot, the more probable is the life danger [4].

Gunshot wounds to the upper extremity can result in permanent nerve damage causing substantial morbidity and loss of function [5]. Early mobilisation is essential for recovery, but in some cases there are aggravating circumstances to start immediate post-operative physiotherapy. Specifically, early mobilisation has been associated with a reduction in postoperative complications such as, pneumonia, thromboembolism, wound defects, pressure ulcers, and delirium [6]. We must also emphasize vascular damages, which could lead to amputation to the affected extremity [7]. Moreover extensive muscle and soft tissue damage can prevent primary skin closure [8,9]. In recent years, negative pressure wound therapy (NPWT) has been widely used for management of various and seriously damaged wounds and to support postoperative tissue healing [10] as it was in our case. MESH grafts can also be an excellent choice as an additional option to supplement skin closure, (Fig. 1). Extrafocal fixation supplemented by NPWT was eligible for the initial

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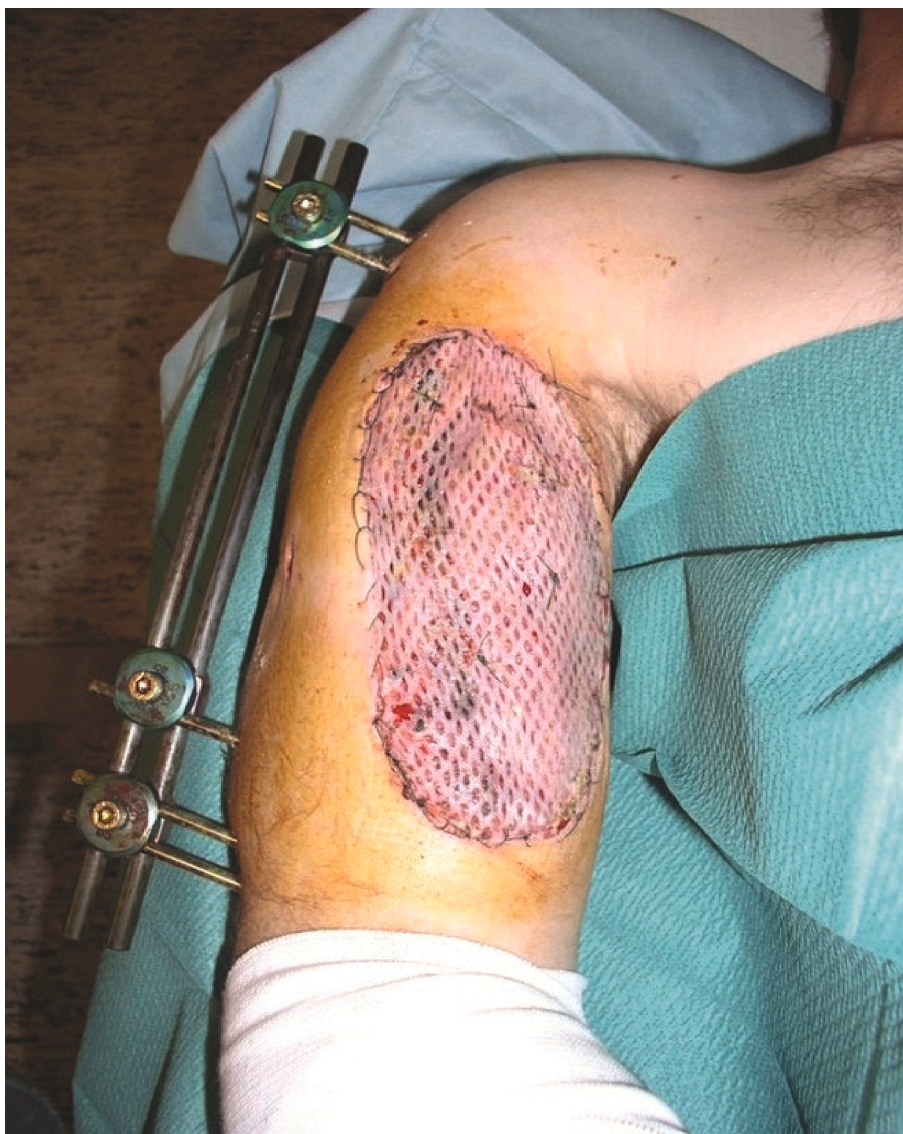


Fig. 1. MESH grafts on right upper limb skin defect (Afghanistan, Courtesy of Pellek S).

procedure. It is important to note if articular involvement present, spacer insertion prior to arthroplasty decrease the risk of infection. Two-stage total hip arthroplasty with an antibiotic-loaded cement spacer, enhance the efficacy of the procedure by eradicating infection and providing functional improvement earlier [11].

We would like to present a case about hip joint gunshot injury, which is reported to constitute 2–17 % of all extremity firearm injuries by the relevant literature [12]. Though our centre is exposed for such injuries due to the service of the national armed forces, we do not have widespread practice in its treatment. The following case report demonstrates that using the international protocols lead to a good result, despite the lack of experience.

Case report

A 42-year-old patient suffered a gunshot injury on his right proximal femur while he was out hunting. He was delivered by ambulance to the emergency care unit of our hospital. Tetanus prophylaxis and single shot antibiotics were administered immediately. Primary diagnostics were physical examination, x-ray and CT angiography, followed by a damage control surgery. During the primary survey sciatic and femoral nerve palsy were found. X-ray images showed comminuted pertrochanteric fracture and several foreign bodies in the affected region of the right femur (Fig. 2). CT angiography revealed no vascular damages. Femoral arteries and veins seemed intact. Intraabdominal involvement was disclosed.

Damage control surgery was performed including substantial debridement, jet-lavage technique and insertion of PMMA-chain to



Fig. 2. AP view of the pelvis shows right comminuted petrochanteric fracture with several foreign bodies.

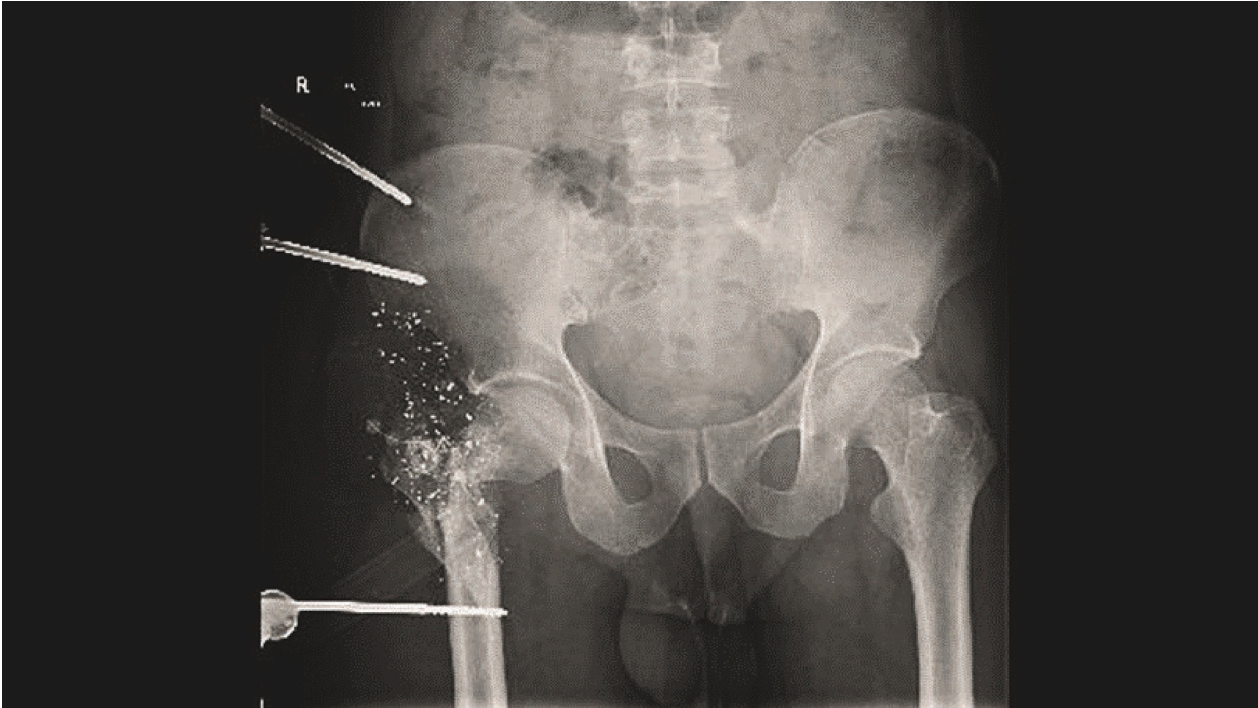


Fig. 3. First open reduction was performed, then extrafocal fixation was placed atypically into the iliac region. These rods loosened by time, and kept the patient temporarily immobile.



Fig. 4. Wound healing was complemented by NPWT after the third look surgery.

decrease the risk of infection. There was no option to arthroplasty as the first line treatment because of the seriously damaged skin. Extrafocal fixation was chosen placed atypically into the iliac region (Fig. 3). Accordingly, the patient was unable to go through early mobilisation. The wound was left with delayed skin closure.

24 and 72 h after the initial treatment, second- and third-look surgery were realized. Wound healing was complemented by NPWT (Fig. 4) and intravenous antibiotics were also administered. Sponge was replaced in every 3–5 five days, reducing its size to minimize the dehiscence of the wound. The patient was immobile for six weeks. During this period the loosening of the extrafocal fixation was detected. As the second line treatment, femoral neck was removed after six weeks, and spacer insertion was chosen for further treatment (Fig. 5). The skin condition was appropriate enough at this time for closure.

The patient was discharged 62 days after hospitalization. Total hip arthroplasty was planned under elective conditions and performed approximately 6 months after the injury (Fig. 6). Low Molecular Weight Heparin (LMWH) therapy was applied.

Discussion

Gunshot injuries of the hip joint can be challenging and have devastating long-term problems as shown in our cases. Open reduction and external fixation are recommended, as the first line treatment [13]. In addition to bone pathologies, severe soft tissue damage or even intraabdominal involvement may be accompanied by neurovascular damage, which also happened in our reported case [14,15].



Fig. 5. Six weeks after the injury, spacer insertion was performed, which allowed the patient to start physiotherapy.



Fig. 6. Postoperative x-ray shows good position of the components. Skin closure by clamps can also be seen as well as remained foreign bodies.



Fig. 7. X-ray was taken three years after the total hip arthroplasty (2022). No sign of infection, or dislocation of the implant can be detected.

It is important to note that after the loosening of the extrafocal fixation, spacer implantation was a good choice in the second stage not only to reduce the infection risk but to start mobilisation as early as possible to avoid other sequelae. Serial blood tests and cultural samples remained negative and no sign of infection was detected. Patients can go through arthroplasty or arthrodesis in the third stage, but it is important to be planned under elective conditions after the thorough preoperative screening [16,17]. Total hip arthroplasties must be performed among prominently sterile circumstances, but in this case due to the several foreign bodies – despite all efforts – it cannot be achieved, so a low-grade infection risk is higher than during routine arthroplasty procedures. At the annual follow up the peroneus palsy - as the result of the injury – disappeared. Radiographic follow up showed no dislocation or indirect sign of infection – the last in 2022, three years after the injury (Fig. 7). We used the Harris Hip Score (HHS) to evaluate the quality of life of the patient. The score in our case at the final follow-up examination was 77 points. Although, it must be mentioned, that the HHS score was strongly influenced by a distracted patella fracture that occurred ipsilaterally on the operated side a year and a half following the operation.

The history of the patient was revised after the emission from our Institute, only one blood samples could be found in the data, and no signs of infection was realized.

As stated above, holistic approach is essential to gain success in a gunshot treatment, with collaboration of multiple specialties. There is a need for future multi-centre studies of larger patient populations which are based on evidence-based classification of gunshot injury in the hip joint.

Limitations

There are certain factors that limit the proper evaluation of our case:

- As everything in the World, in life and in medicine, the schedule and regularity of the follow ups were strongly modified by the Covid pandemic and the travel restrictions.
- Another affecting factor was the ipsilateral knee cup fracture and its rehabilitation.

Due to the above-mentioned facts, we found only one blood sample in the patient history and it fortunately had no signs of infection. The short time (3 years) after the injury, with the irregular follow ups and with the risk of low-grade infection also determines the proper evaluation of the outcome in long term.

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Authors' contributions

All authors passed four criteria for authorship contribution based on recommendations of the International Committee of Medical Journal Editors.

Declaration of competing interest

(We) declare that the case report has not been supported in any way financially and none of the authors have relationships with organizations or with people who may influence the case report.

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