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Case Report

Multifragment fracture of the patellar apex with extensive loss of skin: A case report

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ABSTRACT

Introduction: Patella fractures account for 1 % of all skeletal fractures, and can interrupt the knee's extensor apparatus. They can also be serious if associated with a cutaneous opening. We report the case of a fracture of the tip of the patella with a large loss of cutaneous substance.

Case report: A 22-year-old man was admitted for the management of a left knee trauma following a motorcycle accident. Clinical examination revealed a large loss of skin substance on the anteromedial aspect of the knee, with exposed bone, pain and lack of extension of the left knee. Standard X-ray of the left knee showed an avulsion fracture of the tip of the patella. The patient underwent patellar tendon reconstruction using transosseous stitches, reinforced by a quadriceps tendon reversal plasty, and protected by steel-wire patellotibial cerclage. A medial gastrocnemius flap was used to cover the loss of skin substance. After a functional rehabilitation protocol, the functional results were satisfactory, with a full return to activity after six months.

Conclusion: The stability of osteosynthesis using quadriceps tendon reversal plasty and patellotibial cerclage allows mobilization and immediate weight-bearing. This may lead to better clinical results.

Introduction

The patella is the largest sesamoid bone in the body, articulating with the femoral trochlea and forming part of the knee's extensor apparatus. Patella fractures account for 1 % of all skeletal fractures regularly encountered by surgeons, these fractures can interrupt the knee's extensor apparatus, compromising the knee's functional prognosis and consequently the injured person's socio-professional and sporting future [1–4]. They are also serious if associated with a skin opening. This case study illustrates the originality of this condition, and provides details of its practical management.

Case report

A 22-year-old patient, with no pathological history, an occasional sportsman, he was admitted to the traumatology emergency department for left knee trauma following a motorcycle accident.

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Fig. 1. Clinical image shows extensive loss of substance on the anteromedial aspect of the knee, exposing the joint.

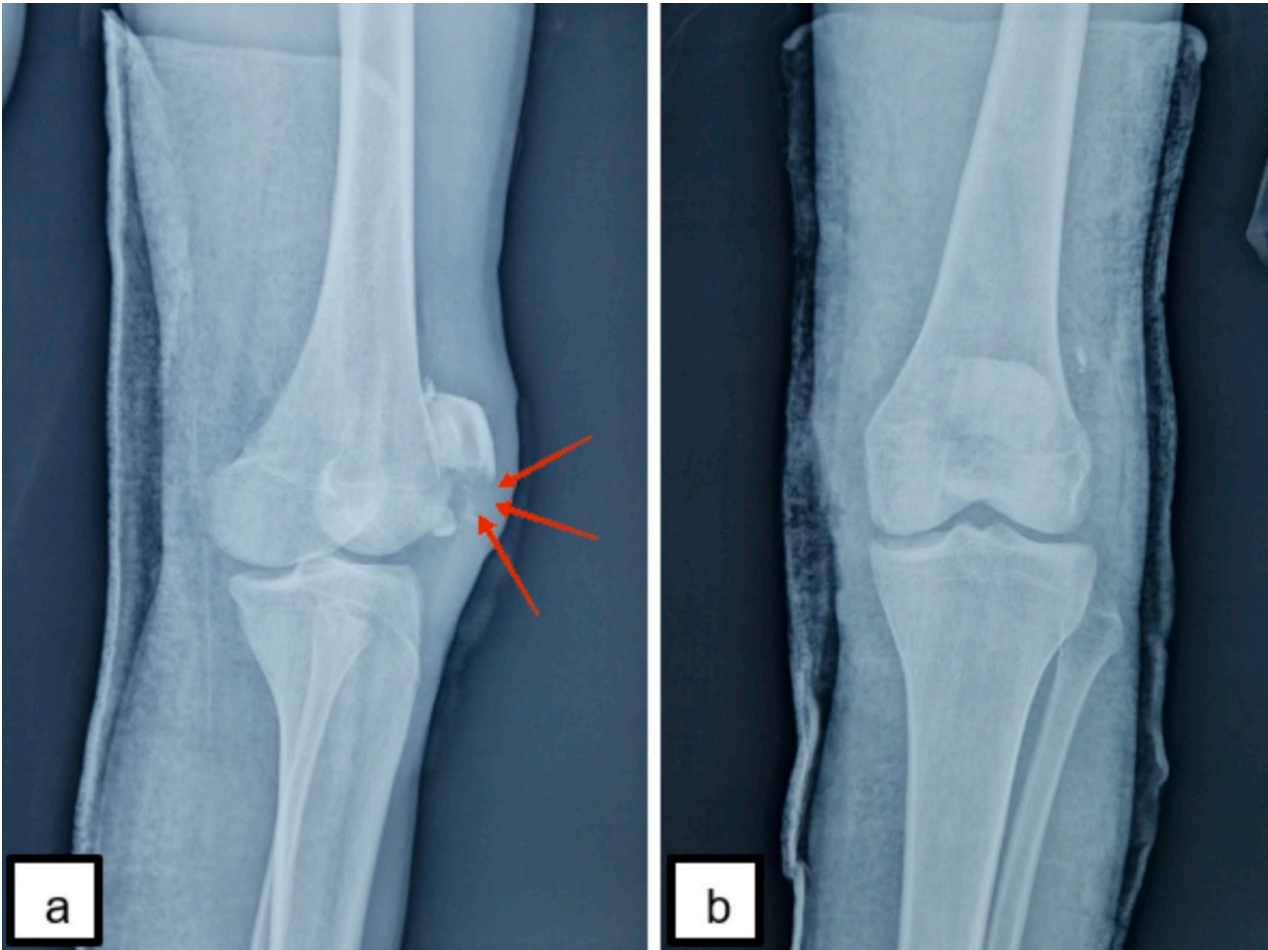


Fig. 2. X-ray of the left knee (frontal view(b), profile view(a)) shows an avulsion fracture of the tip of the patella with communication at the distal fragment (red arrows). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Clinical findings

Clinical examination revealed a large loss of substance on the anteromedial aspect of the knee, exposing the joint and producing a squinty fluid (Fig. 1), painful mobility with lack of active extension and distal pulses of the left lower limb were present.

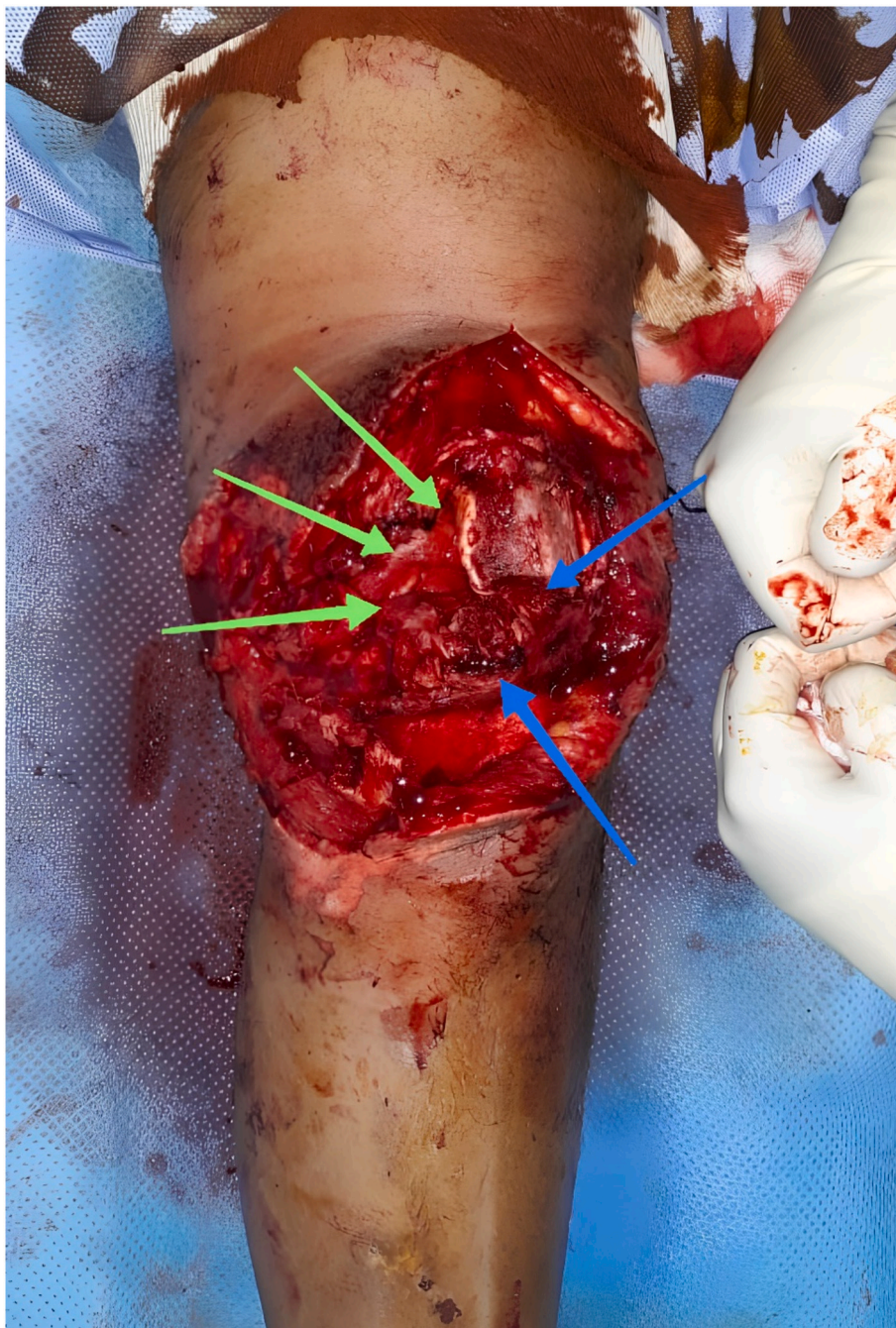


Fig. 3. Intraoperative image after trimming shows partial loss of substance of the medial patellar fin and joint capsule (green arrows) with rupture of the extensor apparatus (blue arrows). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

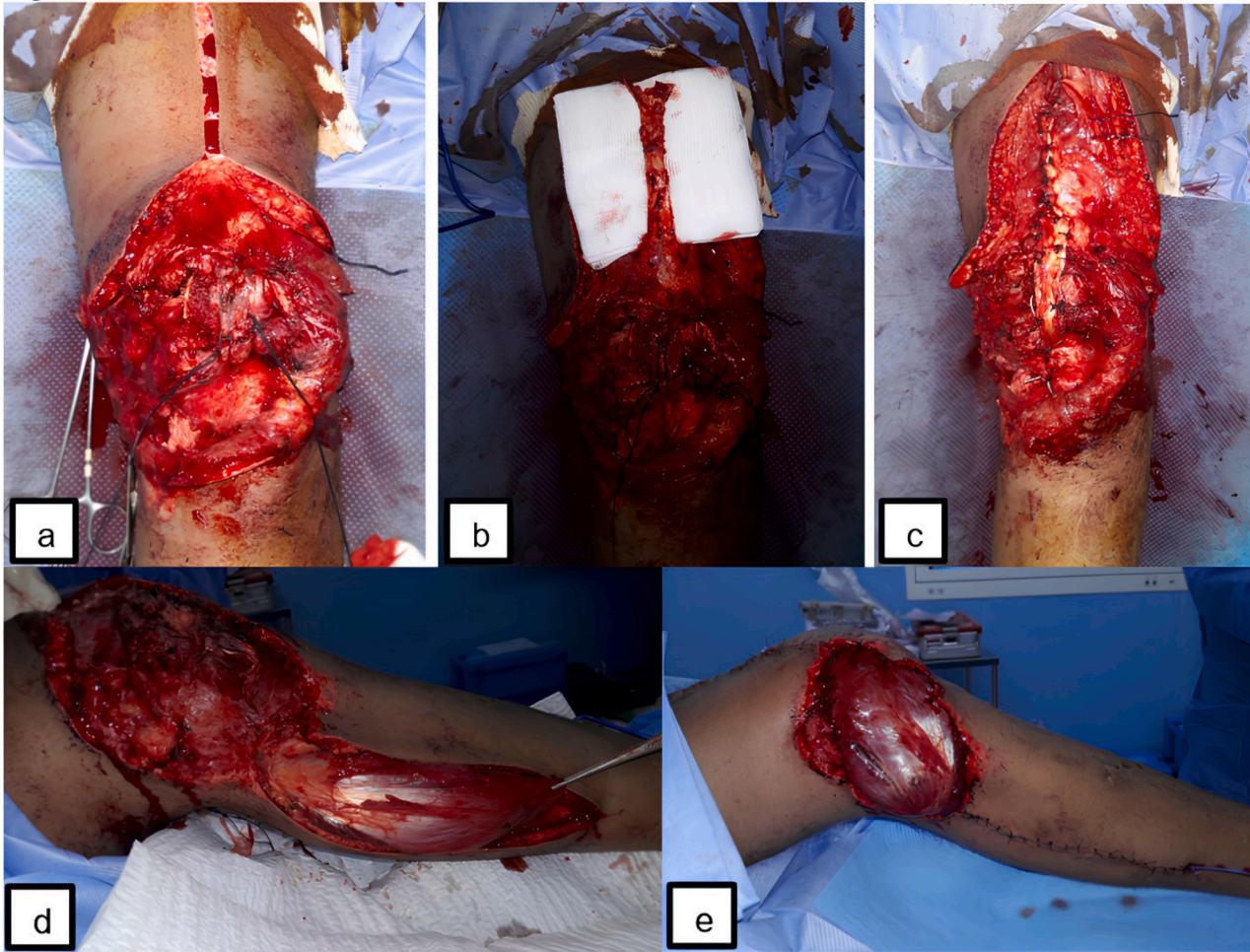


Fig. 4. Reinsertion of patellar tendon using transosseous stitches (a), reinforced by a quadriceps tendon reversal plasty (removal of a quadriceps tendon rod (b) and suturing to the remaining patellar tendon (c) cover the loss of substance with a medial gastrocnemius flap (d,e).



Fig. 5. X-ray of left knee (front (b) and profile (a)) shows postoperative control of patellotibial cerclage with steel wire.

Diagnostic assessment

Preoperative X-ray of the left knee shows an avulsion fracture of the tip of the patella; the main fragment is displaced upwards and there is a comminution at the distal fragment (Fig. 2).

Treatment

The patient was admitted to the operating theatre, under general anaesthetic, we performed a trimming and excision of doubtful tissues and abundant saline lavage. The injury assessment revealed partial loss of substance of the medial patellar fin and joint capsule, with avulsion fracture of the tip of the patella (Fig. 3).

The first stage of the operation involves reconstruction of the extensor apparatus; extension of the wound into the medial parapatellar region, exposure of the fracture site, reinsertion of the patellar tendon using transosseous stitches, reinforced by a quadriceps tendon reversal plasty (Fig. 4). The extensor apparatus was protected by patellotibial cerclage with steel wire (Fig. 5), followed by suturing of the medial patellar fin. Stability was satisfactory up to 90° of flexion.

The second stage of the operation involves covering the patellar tendon and joint capsule with a medial gastrocnemius flap.

The patient benefited from a therapeutic rehabilitation protocol to preserve lower limb function from day one post-op. One week later, the patient benefited from an autologous skin graft, however, the implant was removed one year post-op due to the presence of pain on material.



Fig. 6. Functional results after 4 months (flexion at 120°, extension at 0°).

Follow-up and outcomes

Post-operative follow-up was unremarkable. The protocol of passive and active rehabilitation was implemented, with full weight-bearing protected by a knee brace. Functional results were satisfactory, with a full return to activity after six months (Fig. 6).

Discussion

Patella fractures account for 1 % of all skeletal fractures, and can affect knee function, compromising the knee's socio-professional and sporting future. The patella's subcutaneous disposition exposes it to skin lesions, which are present in 25 % of cases, either in the form of open fractures or dermabrasions, making the fracture more serious [5].

All fractures of the patella with interruption of the extensor apparatus should be treated surgically, with the aim of achieving anatomical reduction and a solid construct for early mobilization.

Several surgical techniques have been proposed, the most classic of its are screw fixation, cerclage, bracing and, in some cases, partial or total patelectomy. The particularity of our case is the fracture of the tip of the patella and the loss of skin substance. As regards the therapeutic options in our case, it was difficult to perform a conventional reduction, as the avulsed bone fragment was too small to be fixed firmly. We reconstructed the patellar tendon with the rest of the patella body using transosseous stitches, reinforced with a quadricipital tendon reversal plasty, and protected the assembly with a steel wire patellotibial cerclage. This cerclage procedure protects the anastomosis junction from disruption and avoids the use of additional fixation devices, such as a cylindrical cast and to start early mobilization.

The patient begins passive movement exercises on the first postoperative day and encouraged to perform active knee flexion exercises in the supine position. Active extension exercises are allowed after the third postoperative week, and full weight-bearing without limitation is encouraged at six weeks.

In the case of patella tip fractures, the literature has shown that suture anchor construction offers greater strength, shorter operating time and reduced incision size than transosseous techniques [6]. Another study presented a technique for treating comminuted patella tip fractures using a basket plate [7].

Published techniques using transosseous suture fixation keep patients in strict extension immobilization for 4 to 6 weeks, with variable restrictions on weight-bearing. Our technique has the same disadvantages in terms of surgical management as other forms of fixation. Technically, the use of a quadricipital tendon turn-up plasty and a patellotibial steel-wire cerclage has provided mounting stability, enabling immediate mobilization and weight-bearing, and thus faster rehabilitation protocols.

Conclusion

The stability of osteosynthesis using quadricipital tendon reversal plasty and patellotibial cerclage allows mobilization and immediate weight-bearing. It may give better clinical results. The particularity of our observation is the association of a fracture of the tip of the patella and the large loss of substance on the anteromedial aspect of the knee.

Informed consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Institutional ethical committee approval

The ethical committee approval was not required give the article type (casereport).

However, the written consent to publish the clinical data of the patient was given and is available to check by the handling editor if needed.

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CRedit authorship contribution statement

Mohammed Barrached: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Aboubacar Lawan Abdou:** Writing – review & editing, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Achraf Tebbaa el Hassali:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Adnane Lachkar:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Najib Abdeljaouad:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project

administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Hicham Yacoubi**: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare no competing interest.

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