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Trauma Case Reports

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Case Report

Reconstruction technique of multiligamentous knee injury in a patient with traumatic transtibial amputation

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ARTICLE INFO

Keywords:

Reconstruction technique
Multiligamentous knee injury
Traumatic
Amputation

ABSTRACT

Multiligamentary knee injuries associated with transtibial amputation is a pathologie with a low incidence, so their diagnosis and treatment represent a great challenge for the medical team, mainly due to the low rate of scientific publications on the matter. This article intends to present the treatment of a really infrequent pathology, presenting the clinical case of a polytraumatized patient who suffered a left transtibial amputation associated with a multiligament knee injury with dislocation of the proximal tibiofibular joint.

After analyzing the multiple therapeutic options, a specific surgical planning is carried out for the specific case of a multiligament knee injury associated with an ipsilateral transtibial amputation, proceeding to the execution of the reconstruction of the injury with good results. For this, several specific surgical gestures are carried out, adapted to the patient's condition, which will facilitate the surgery and are explained in the surgical technique. In conclusion, we must know that in order to obtain satisfactory results in these patients, it is important to carry out an early diagnosis and treatment of the injury, analyzing the proximal tibiofibular stability and providing adequate stability through the execution of a precise surgical technique.

Introduction

Multiligamentous knee injuries are defined as those structures that affect at least two of the four main ligamentous structures of the knee, causing pain and articular instability [1].

On many occasions, these injuries occur after high-energy trauma that also causes a knee dislocation [1].

The incidence of these injuries is quite frequent; however, the incidence is unknown when we speak of multiligamentous lesions in patients with associated transtibial amputation [1,2]. This is mainly due to the fact that the majority of patients who suffer traumatic amputations are polytraumatized patients which cause a delay in diagnosis. Finally, we must know that it is essential to stabilize the fibular dislocation, if it exists, since otherwise, it can cause an unstable fibula that would make the fitting process difficult [3].

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<https://doi.org/10.1016/j.tcr.2023.100941>

Accepted 22 September 2023

Available online 24 September 2023

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Fig. 1. Initial X-ray injury which requires lower leg amputation.



Figs. 2–4. Preoperative MRI imaging: posterior cruciate ligament injury and posterolateral complex injury.



Fig. 5. Preoperative MRI imaging: posterolateral complex injury.



Fig. 6. Preoperative planning.

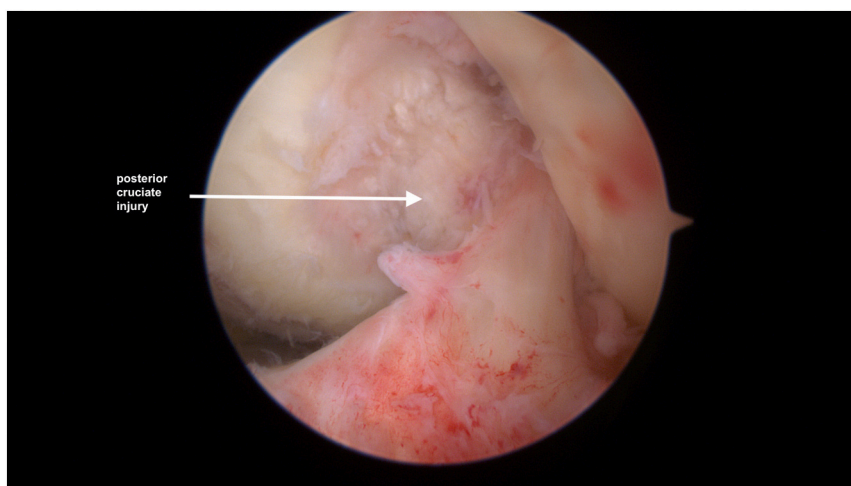


Fig. 7. Arthroscopic view of posterior cruciate injury.

Case presentation

The case of a 56-year-old male patient is presented, who suffered a motorcycle accident with a traumatic amputation of his left foot (Fig. 1). Once the patient had been stabilized, the affected limb was explored in the operating room and it was decided to perform a regulated transtibial amputation pending filiation of the knee injury Magnetic Resonance Imaging (MRI): posterior cruciate ligament (PCL) injury and posterolateral complex injury (Figs. 2–5).

After 1 month of evolution, definitive surgery was performed.

An exploratory knee arthroscopy was performed, which revealed a complete PCL injury (Figs. 6–7).

Under leg ischemia, a PCL ligamentoplasty is performed with an Achilles tendon allograft that is fixed, keeping the knee at 90° of flexion and performing an anterior drawer. Plasty tension is checked and definitive femoral fixation is performed with a 10 × 30 interference screw. A 35 × 12 interference screw is placed in the tibia with optimal fixation. Fixation is complemented with a tibial staple, perfectly reducing posterior subluxation (Figs. 8–10).

Subsequently, an open reduction of the dislocation of the proximal tibiofibular joint is performed, definitively fixing it with two 3.5 mm diaphyseal screws from the fibula to the tibia, in order to maintain the reduction and facilitate the reconstruction of the posterolateral corner (Figs. 11–12). Finally, the reconstruction of the posterolateral angle is performed according to the LaPrade technique with a hamstring allograft 7 mm thick and 25 mm long, tunnelled in the form of a popliteofibular ligament LPF, External Collateral Ligament (ECL) and popliteal tendon (PT) (Figs. 13–18). After placement of the plasty, very good stability is observed and complete passive mobility is maintained.

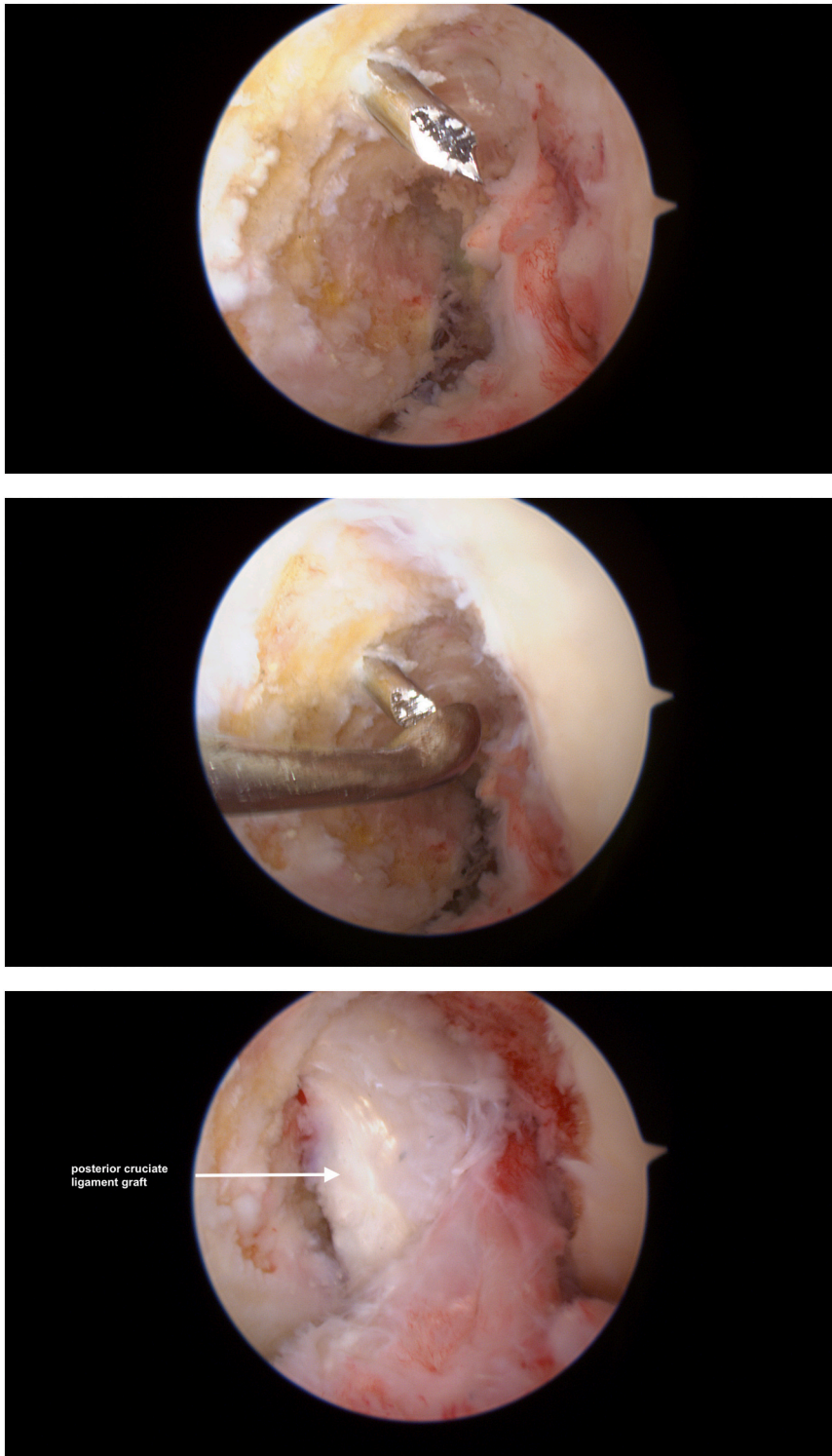
Discussion

Multiligamentous knee injuries in amputee patients are underdiagnosed injuries, since the diagnosis is extremely complex due to the patient's conditions. For this reason, it is essential to carry out a correct examination of the affected limb [3,4].

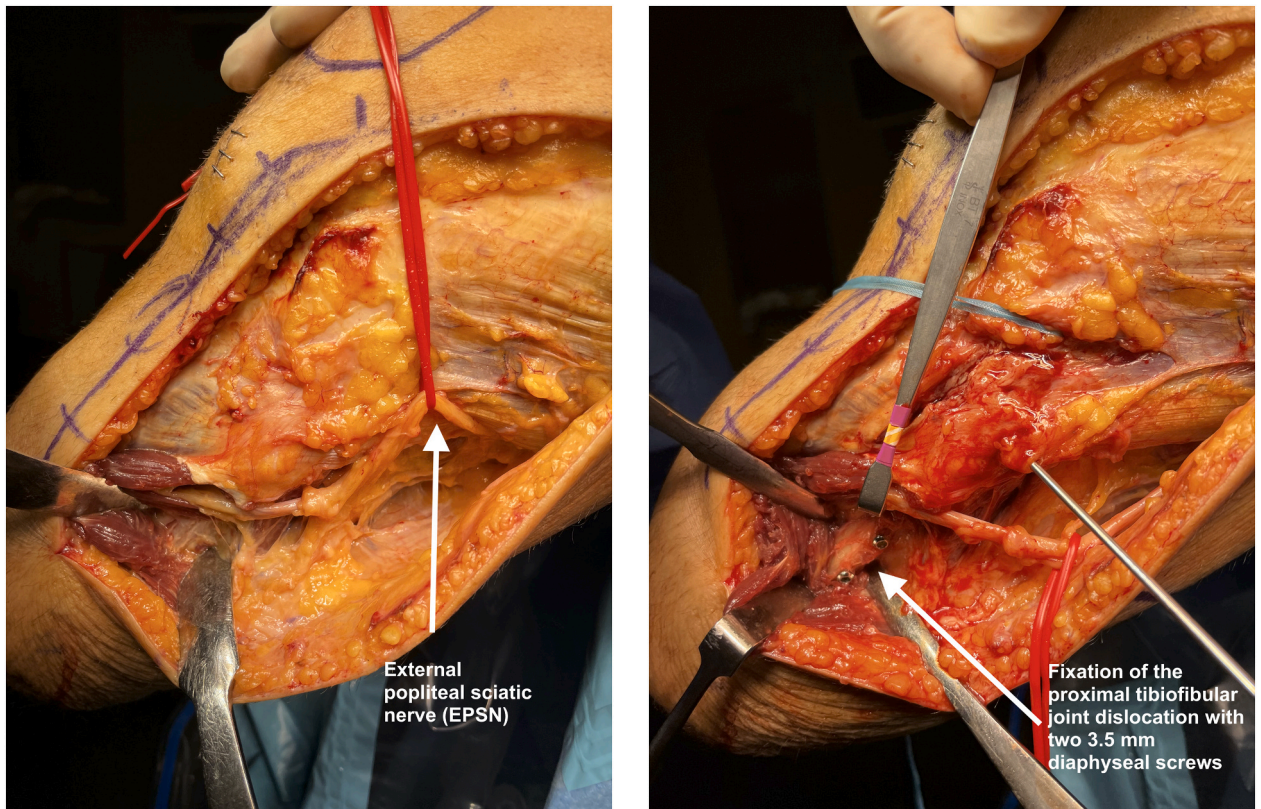
The growing evidence suggests that stabilization surgery has better results if it is performed early, in the context of amputee patients, the stabilization of the patient and the late diagnosis of the lesion make it necessary to perform a late reconstruction [4].

When selecting the graft and the fixation method in amputee patients, we must consider that due to the biomechanical alteration and the greater stress that the ligamentous must resist, associated with a poor-quality bone due to a prolonged discharge period, it is advisable the use of suspensive cortical fixation systems [4,5] together with allografts that provide benefits such as the possibility of choosing multiple graft size [4,6,7]. In our case, good results have been reported with the use of an Achilles and semitendinosus tendon allograft, fixing with interference screws.

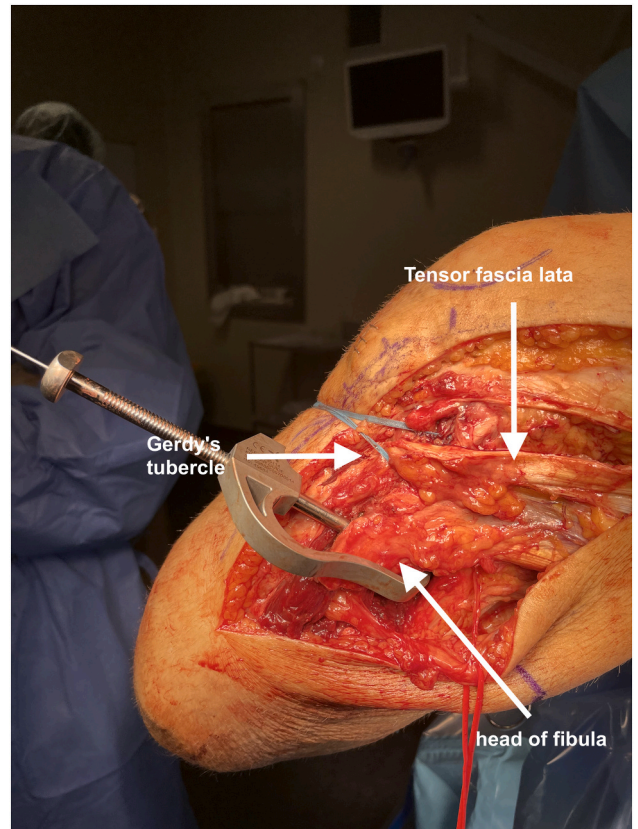
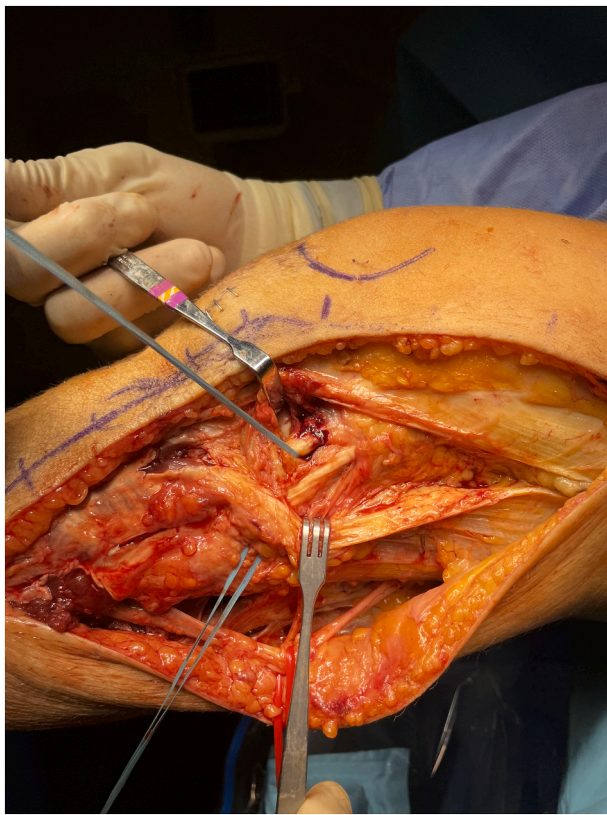
In addition to this, the possibility of performing the surgery in one or two stages should be evaluated depending on the complexity of the injury and the possible comorbidities of the patient; although the majority of studies conclude that reconstruction in one stage provides satisfactory results and a low rate of complications [6].



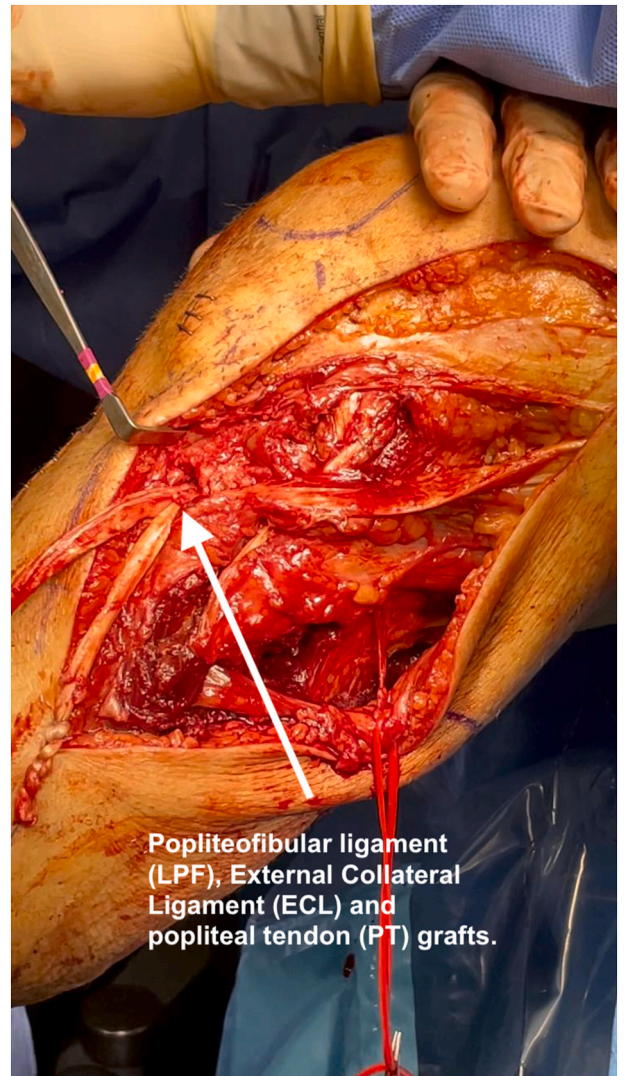
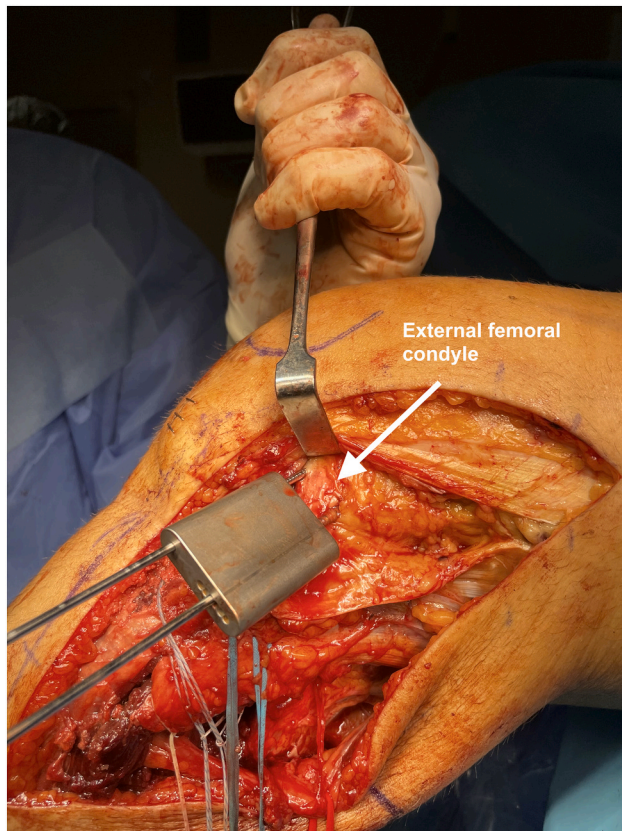
Figs. 8–10. Arthroscopic repair of posterior cruciate injury.



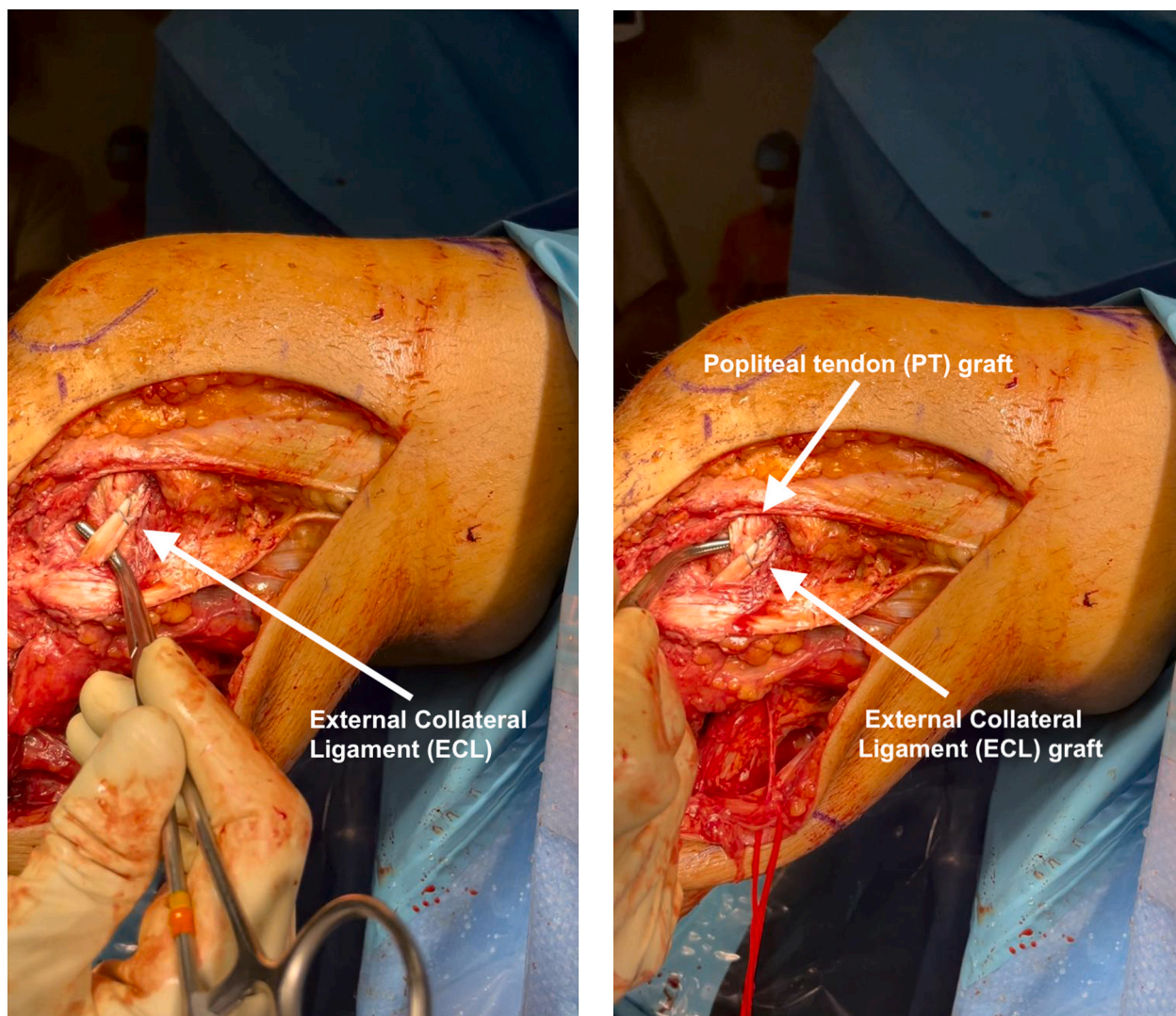
Figs. 11–12. Open reduction and fixation technique of proximal tibiofibular dislocation.



Figs. 13–18. Posterolateral angle reconstruction using LaPrade technique.



Figs. 13–18. (continued).



Figs. 13–18. (continued).

In a retrospective study with 129 knees with multiple ligament injury, Jabara et al. reported a 9 % incidence of proximal tibiofibular injury. These patients underwent ligament reconstruction together with screw fixation, showing good functional results [4,8]. However, there are multiple fixation techniques for the proximal tibiofibular lesion [8,9]. In addition, it is important to know that in chronic cases, the reduction of the dislocation of the fibular head can be complex, and that generally, it must be done in an open way [10].

In conclusion, ligament instability should be suspected and thoroughly examined in patients with transtibial amputation to avoid delays in diagnosis. Finding a possible associated tibiofibular instability is key to performing a successful PLC reconstruction and future studies may be needed to define the most appropriate fixation technique for this type of injury, the type of graft and the role played by the tibiofibular joint in combination with the posterolateral corner to provide stability to the knee [3].

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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