

Open lateral femoral condyle fracture concomitant with a vertical patella fracture in an adolescent: A case report

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ABSTRACT

We present the rare case of an open femoral condyle fracture (Gustilla IIIA) combined with a vertical patella fracture due to sharp injury after a traffic collision in a 17-year-old female. During subsequent operation, a locking compression plate was used for definitive fixation of the distal femur and the patella was reduced and fixated with two screws. Four months after surgery, the patient had practically full range of motion again and no secondary complications occurred. On control X-ray, there was consolidation of the fracture.

Introduction

Distal femur fractures are rare and complex. In total, they represent 3% of all femoral fractures [1]. A bimodal distribution is seen with a peak incidence in young men and elderly women [2]. In young adults, femur fractures are mainly caused by direct impact on the flexed knee in trauma with high-energy transfer. Patients report pain on clinical presentation and are unable to bear weight on the affected limb.

Distal femur fractures are diagnosed using plain radiographs. Computed Tomography (CT) is helpful in characterizing the fracture pattern and interpreting involvement of the joint. Concomitant injuries seen with distal femur fractures are ligamentous or meniscal injuries. Although vascular injury is rare, one should be aware of this complication. Fractures of the distal femur can be classified according to the AO system (type 33) [3]. They are divided in type A (extra-articular), type B (partial articular) and type C (complete articular fracture). Condylar fractures belong to group B and are further subdivided in three groups. B1 involves lateral condyle, B2 medial condyle and B3 coronal fractures.

Patellar injuries next to unicondylar femur fractures are seldomly seen. This case report describes the combination of an open lateral condyle fracture and a vertical patella fracture, due to a sharp injury (cut through) after a traffic collision in a 17-year-old female.

Case presentation

A 17-year-old female was presented in the emergency room (ED) after a traffic collision (scooter versus car). Prehospital medical service reported an arterial bleeding of the right upper leg. On admission, the paramedics had immobilized the neck, applied a pelvic binder and put a tourniquet on the right upper leg. The vital signs were normal. On further assessment according to Advanced Trauma

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Life Support principles, no abnormalities in airway, breathing, disability or exposure were found. On circulation, the patient had a blood pressure of 137/96 mmHg with a heart rate of 99/min. An ultrasound of the abdomen showed no free fluid. X-thorax and X-pelvis revealed no fractures. The pelvic binder was removed and the pelvis appeared stable. Femoral pulsations were powerful. Secondary survey was performed and propofol (on surveillance of the anaesthesiologist) was administered so that the wound at the level of the right distal femur could be examined. The tourniquet was removed and an open wound anterolateral of the distal femur without active bleeding was observed. Both the patient and the paramedic reported a sharp edge of metal on the car as cause of the wound. A longitudinal cut through of the patella was observed, Gustilo IIIA (Fig. 1).

Additional examination showed a haemoglobin level of 7.7. On an X-ray of the right femur, a lateral condylar fracture and longitudinal patella fracture were seen. A CT-scan of the knee revealed an intra-articular, transcondylar fracture on the lateral side (Fig. 2A/B) with also a longitudinal fracture of the patella (Fig. 3). After cleaning the wound, a splint was applied and the patient was taken to theatre for a one stage approach with debridement of the wound and open reduction and internal fixation of the right femur and patella. The distal femur fracture was reduced and fixated with two 4.5 mm cannulated screws. A locking compression plate 5.0 mm (Synthes) was used for definitive fixation of the distal femur. Next, the patella was reduced and fixated with two 3.5 mm partial threaded cancellous screws from lateral to medial and from medial to lateral. After extensive debridement and open reduction of the distal femur and patella, we were able to close the fascia lata and the skin without any problems.

Post-operative care contained treatment with intravenous antibiotics for 5 days according to local protocol for treatment of open fractures. After surgery, the patient got a splint for the right knee in order to relieve the soft tissue. We removed the splint after two days on the ward and continuous passive motion (CPM) was started. In the first four weeks of rehabilitation a gradual increase of motion from 45 degrees up to 60 degrees flexion was allowed using a dynamic knee brace. Another two weeks of non-weight bearing without any restrictions was performed. An X-ray showed good positioning of the osteosynthesis and further remodelling of the fracture. Six weeks after surgery, full weight bearing was allowed. Four months after surgery, patient is doing fine and is able to walk again. Her range of motion was 120–0–0 degrees (flexion-extension). Control X-ray showed consolidation of the fracture (Fig. 4).

Discussion

In this case report, we describe the rare combination of a distal femur and open vertical patella fracture caused by sharp injury. To the best of our knowledge, no other cases of a cut through of the patella and distal femur are described. Only two other similar cases of a



Fig. 1. A large open wound of the distal femur was observed without active bleeding (Gustilo IIIA).



Fig. 2. A/B: CT-scans of the distal femur: Coronal and axial images of the intra-articular, transcondylar fracture on the lateral side.

combination of a patella fracture and lateral femur condyle have been described in the literature before [4,5].

The majority of open patella fractures are attributed to high-energy trauma such as traffic collisions [6]. In this case an intersection of the patella and lateral femur condyle was caused by a sharp edge of metal. Comminuted patella fracture and associated fractures of the other joints can also be found. Open patella fractures have higher incidences of complications as compared with closed fractures, which mostly involves infection and non-union [7]. Immediate fixation as performed in this case is recommended in type I, II and IIIA [7]. This strategy does not increase infection rates or joint functionality change. Immediate (premature) stabilization also prevents

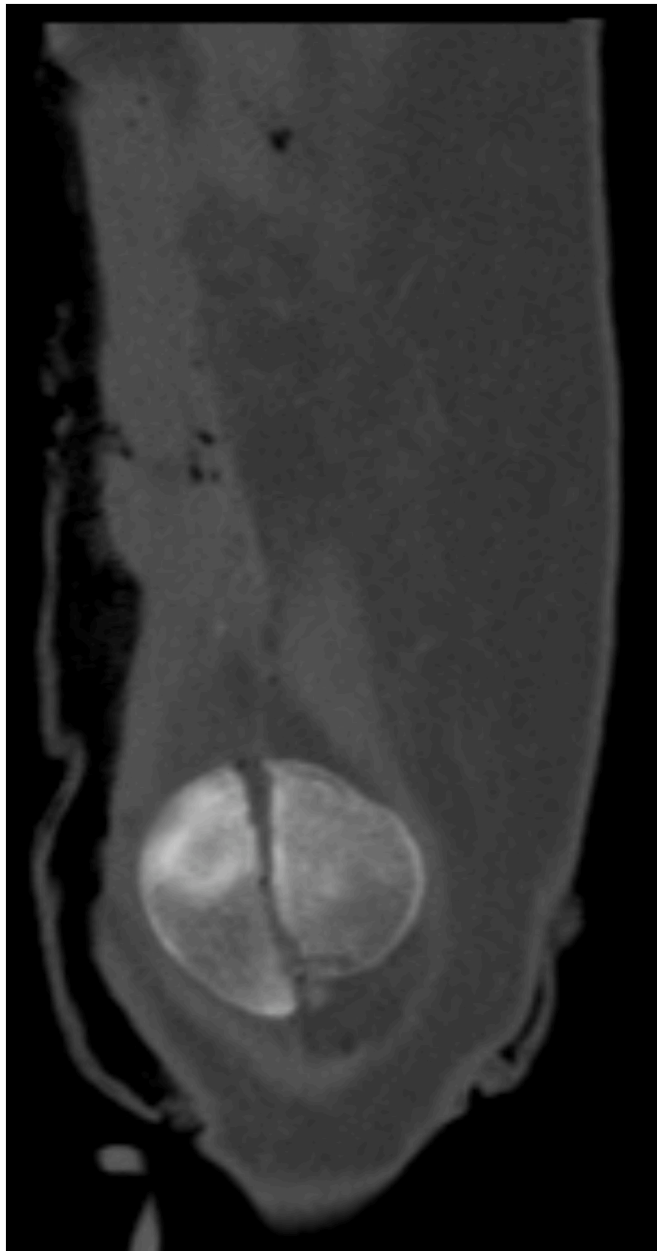


Fig. 3. CT-scan of the patella: Coronal image of the longitudinal fracture of the right patella.

infection due to increased tissue perfusion and neovascularization.

Postoperative care of these type of injuries includes (intravenous) antibiotics and immobilization. Duration and type of antibiotic depends on local hospital protocols, but normally involves three to five days of a broad-spectrum antibiotic. In these cases, consultation of a microbiologist could be of added value. Postoperative immobilization protects the bone and reduces pain. In order to prevent knee stiffness, CPM can be applied to facilitate the recovery process. Especially in young patients, early mobilization could be beneficial to reduce rehabilitation time. In general, a scheme of 6 to 8 weeks of non-weight bearing with gradual increase in range of motion is applied using a dynamic knee brace. A physiotherapist can aid in this process. After this period, weight bearing is gradually build up where pain is the limit.

The patient in our case showed a good clinical result with almost full range of motion of her knee. The small functional limitation can be attributed to the high energy transfer with injury of the cartilage as well. It is possible that the patient regains complete function after finishing her rehabilitation. We realize that the patient's age and the fact that the patellar fracture was not comminuted probably influenced the outcome positively.



Fig. 4. A/B: X-rays of the right knee: Coronal and sagittal images show consolidation of the fractures with good positioning of the osteosynthesis material.

Abbreviations

CT	Computed Tomography
ED	Emergency room
CPM	Continuous Passive Motion

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

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