Displaced patella fracture after cruciate ligament reconstruction with patellar ligament graft.

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Abstract
We report on four patients presenting a displaced patella fracture after cruciate ligament reconstruction using a patellar tendon autograft.

Résumé
Nous rapportons le cas de quatre patients qui ont présenté une fracture de la rotule déplacée après reconstruction du ligament croisé utilisant une autogreffe du tendon rotulien
Introduction
The central-third patellar tendon is the autogenous graft mostly used for arthroscopic reconstruction of cruciate ligaments [7,9]. Patella fracture following the use of this graft is a rare complication. Although morbidity of the donor site has been greatly discussed [5,10] there are few publications referring to this complication after the patellar tendon is harvested.

Case-Report
Material and Method: From 1986 to 1998, 1058 patients with cruciate ligament instability were treated in our institution with a central-third patellar tendon reconstruction. In this twelve-year period, we recorded 4 patients with displaced patella fracture of the operated knee. All patients required surgical treatment. These fractures occurred at an average of 63 days after the reconstruction (range 50-160 days). Three patients were male and one female, being the average age 31 years (range 25 -36). Patients were assessed with the Lysholm knee scoring scale and anterior tibial translation side-to-side difference was evaluated with KT-1000 arthrometer. In order to harvest the graft, a midline incision over the patellar tendon was used. A microsaw with a blade thinner than 10 mm was used. The bone blocks were 2.3 cm long, 1 cm wide and 1 cm deep approximately. Case 1: A 36 year old male patient sustained a rupture of the Posterior Cruciate Ligament (PCL) while playing football in 1993. Five months after the operation, the patient was kicked on his operated knee, suffering a transversal patella fracture. It was fixed using tension band wiring (Figure 1). Case 2: A 25-year-old woman tore the ACL in a fall when skiing in 1994. Seventy days after the reconstruction the patient tried to prevent a fall when descending stairs and the hyperflexion of her donor knee caused a patella fracture. An open surgery and a fixation using two 4 mm lag screws were performed. Case 3: A 28-year-old man sustained an acute ACL rupture at football in 1997. Seventy five days after the reconstruction he suffered a transversal patella fracture due to a forceful contraction of the quadriceps with the knee in flexion. An arthroscopic reduction and percutaneous fixation were performed using two cannulated screws (Figure 2). Case 4 A 36-year-old man tore the ACL in a fall at football in 1998. Fifty days after primary reconstruction a rapid flexion of the knee fractured the patella. An open reduction applying rigid fixation by tension-band with two 3.5 cannulated screws was carried out. Results: The average follow-up was 42 months (range 24 to 64). The Lysholm evaluation showed an average of 90 points (range 85 and 100). All patients presented moderated patellofemoral crepitation with no symptoms (Table 1). The knee mobility was complete in three patients. One patient had flexion limitation of up to 15 degrees. All of them showed a stable knee with anteroposterior displacement of 3 mm or lower according to the KT-1000 arthrometer. Radiographic union of the fracture was evident at 4 months average after surgery. Internal fixation was removed in two patients nine months after the fracture.

Discussion
Displaced patella fracture is a rare complication after reconstruction of the cruciate ligament using an autogenous patellar tendon with few publications showing an incidence between 0.35 % and 2.3 % [1,2,11]. In our series the incidence was 0.37 % beeing the transversal fracture line the most frequent type of fracture, with disruption
of the extensor mechanism and loss of the active extension of the knee. Although the cause of the fracture seems multifactorial, the bone stock deficit caused by the harvesting of the graft may be related to this pathology as the fracture lines were adjacent to that defect in all the cases. Another cause might be the fact that patients in the postoperative period presented an unbalance between the flexor and extensor muscles of the knee. In 3 of the 4 patients an indirect mechanism consisting in the sudden contraction of the quadriceps with the knee in flexion and hip in extension caused the fracture. In order to prevent this complication and based on the information found in the literature we considered that the use of a blade thinner than 10 mm and harvest the graft in a bullet shape avoiding transversal cuts, may be important. It should be considered that the resistance of the anterior facet of the patella after the transversal cut bone decreases between 30 and 40 percent [12]. For this reason it has been reported no operative fractures when an oscillating hollow saw was used to remove the cylindrical bone block [11]. Placement of the remaining osseous graft in the patellar defect may be useful, however, there is no evidence in the literature that this autograft decreases the incidence of the patella fracture [3]. The patella should be considered at potential risk in the first 8-12 weeks of rehabilitation. All protocols should take this into account, thus emphasizing the correct rehabilitation of the gait and the proprioception [4]. As well as in other published series, this complication extended and delayed rehabilitation [2]. Postoperatively patients used crutches until the consolidation of the fracture and the rehabilitation was very cautious. In 1997 we evaluated the clinical results of a series of 82 patients with anterior cruciate ligament reconstruction. The average Lysholm score was 94 while in these 4 patients decreased to 89 [6]. Although the patella fracture did not affect the stability of the knee in these four cases, the final outcome in them appears less satisfactory than in those patients without this complication.
Legends

Table 1:

<table>
<thead>
<tr>
<th>Case</th>
<th>Age</th>
<th>Lesion</th>
<th>Period (*)</th>
<th>Type Fracture</th>
<th>Mechanism of the fracture</th>
<th>Follow-up (months)</th>
<th>Lysholm score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>36</td>
<td>PCL</td>
<td>160 days</td>
<td>Transversal</td>
<td>Direct</td>
<td>64</td>
<td>87</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
<td>ACL</td>
<td>70 days</td>
<td>Transversal</td>
<td>Indirect</td>
<td>56</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
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<td>75 days</td>
<td>Transversal</td>
<td>Indirect</td>
<td>28</td>
<td>87</td>
</tr>
<tr>
<td>4</td>
<td>36</td>
<td>ACL</td>
<td>50 days</td>
<td>Comminuted</td>
<td>Indirect</td>
<td>24</td>
<td>85</td>
</tr>
</tbody>
</table>

(*) = N° of days from ligament-reconstruction to patella fracture.
Figure 1: Lateral radiography showing transversal fracture of the patella following posterior cruciate ligament reconstruction.
Figure 2: Antero-posterior radiography showing fracture of the patella following anterior cruciate ligament reconstruction.
References


