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Original Article

# Allograft of the knee extensor in cases of patellar tendon rupture in total arthroplasty patients☆

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ABSTRACT

*Objective:* Retrospective study to evaluate the functional results of patients with total knee arthroplasty and rupture of the patellar tendon, submitted to transplantation of the extensor knee apparatus with fresh frozen allograft.

*Method:* Nine patients, operated between 2003 and 2015, with a minimum of one year of follow-up. All patients were reviewed by performing a functional evaluation using the Knee Society score. Preoperative values were compared with those of the final evaluation.

*Results:* Mean survival was 2.7 ± 1.9 years (14–1). The knee score improved from 38 ± 4.5 to 70 ± 8.5, and functional score from 30 ± 6.5 to 90 ± 3.5. Mean extension deficit was 5 (1–15). Mean range of motion was 80 (60–100).

*Conclusion:* The use of allograft is a solution for extreme cases of patellar rupture after total knee arthroplasty, providing reasonable functional results and representing an alternative to knee arthrodesis.



## Transplante de aloenxerto de aparelho extensor do joelho em casos de rotura do tendão patelar em pacientes com artroplastia total

*Palavras-chave:*
Ruptura
Ligamento patelar
Artroplastia do joelho
Transplante
Aloenxerto

RESUMO

*Objetivo:* Estudo retrospectivo para avaliação dos resultados funcionais de pacientes com artroplastia total do joelho e rotura do tendão patelar submetidos a transplante total de aparelho extensor do joelho congelado.

*Método:* Nove pacientes, operados entre 2003 e 2015, com um mínimo de um ano de seguimento. Procedeu-se a uma avaliação funcional com o escore da *Knee Society*, compararam-se os valores no pré-operatório e na última avaliação.

*Resultados:* Sobrevida média de 2,7 ± 1,9 anos (14–1). O escore joelho melhorou de 38 ± 4,5 para 70 ± 8,5 e o escore funcional de 30 ± 6,5 para 90 ± 3,5. Déficit de extensão médio de 5 (1–15). Arco de movimento médio de 80° (60–100).

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*Conclusão:* O uso de aloenxerto é solução, de recurso, para casos extremos de rotura do tendão patelar após artroplastia total do joelho, parece apresentar resultados funcionais razoáveis e apresenta-se como uma opção à artrodese do joelho.



## Introduction

Patellar tendon rupture in patients who have undergone total knee arthroplasty is a rare[1,2] and highly disabling condition with diverse etiologies.[3] Several treatments are available, from simple suture to allograft.[4] The use of complete extensor apparatus allograft (tibial tuberosity, patellar tendon, patella, and quadricipital tendon) is an uncommon and technically challenging solution that presents acceptable results.[5]

This study is aimed at evaluating the authors' experience with this type of treatment.

## Materials and methods

A retrospective study with a mean duration of six years (1–14 years) was performed in nine patients who had undergone total knee arthroplasty and presented rupture of the patellar tendon, who then received a frozen complete knee extensor apparatus allograft. All patients were operated and followed by the author.

There were nine patients, two males and the remaining, females. The mean age at surgery was 66.4 ± 10.2 years. The mean time between implantation of the primary prosthesis and rupture was 7.0 ± 2.9 years. In six patients, the rupture was caused by trauma; in the others, it was secondary to previous surgery for treatment of knee stiffness (two cases) or infection (one case), and an arthroplasty revision was performed at the same time.

The allograft comprised the entire knee extensor apparatus, frozen at −80 °C, in accordance with current quality standards.[1]

In all cases, the surgery was performed using an anterior medial approach, over the previous incision. After identifying the patella and extensor apparatus, it was longitudinally divided, with total patellectomy and identification of the anterior tibial tuberosity. In it, a diamond-shaped bed was opened, so as to impact the donor graft into the recipient area. Fibrotic tissues and those of poor quality and viability of the quadricipital tendon were also excised. While the patient's recipient bed was being prepared, another team thawed the allograft and prepared its tibial tuberosity for placement on the patient's recipient bed. The final implantation of the graft began by inserting the tibial tuberosity of the graft on to the patient's tibial tuberosity bed; the graft was secured with screws or cerclage wiring, according to the patient's local condition. The final suture to the patient's quadricipital muscle was made in extension, under tension with nonabsorbable sutures (Fig. 1).

Postoperatively, the knees were immobilized with an articulated orthosis locked in extension for the first three weeks; weight-bearing was authorized with the support of Lofstrand crutches. Three weeks after surgery, the orthosis joint was unlocked and patients were encouraged to perform knee flexion and extension exercises. Six weeks after surgery, the orthosis was removed; patients were required to continue using Lofstrand crutches for another two weeks. At eight weeks, patients were encouraged to walk about without crutches and continue to perform joint mobility exercises.

Thromboembolic prophylaxis was conducted; oral antibiotic therapy (amoxicillin and clavulanic acid) was continued for a further two weeks after surgery.

Clinical and radiographic assessment[2] (Fig. 2) were performed at six weeks, six months, one year, and yearly thereafter. In each evaluation, the Knee Society score and the functional knee score,[6] validated for the Portuguese language,[7] were used; active joint range of motion was measured with a goniometer.

The data included in the present study refer to the last evaluation as seen in the medical records.

## Results

Two patients who underwent the procedure died, at one and four years after the surgery, from causes unrelated to the procedure. In the three patients in whom arthroplasty revision was associated, complications were observed (infection in one case and suture dehiscence in the other two), requiring reintervention with knee arthrodesis until the end of the first year. Thus, the study focused mainly on six cases, with a mean follow-up of 2.7 ± 1.9 years (14–1).

The mean Knee Society scores were 70 ± 8.5 (60–87) and 68 ± 7.5 (50–80) on functional evaluation; preoperatively, those values were 20 ± 3.5 (0–40) and 25 ± 7.5 (0–45), respectively.

Regarding active mobility, the mean lack of extension was 6 ± 0.5 (0–8). The mean active flexion was 90° ± 5.5° (80–100; Fig. 3). The mean range of motion was 82 ± 6.5 (90–100).

Overall survival was 44%, the main complications being observed during the first year after surgery (Fig. 4).

[1] Guidelines from the Bone Tissue Bank of the Hospital and University Center of Coimbra, approved by the Portuguese Institute of Blood and Transplantation.

[2] According to the protocol of the Orthopedic Department that anticipates knee radiographs on an anteroposterior view, lateral view at 30° of flexion, and a skyview of the patella with 30° of flexion.

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