The Knee 21 (2014) 1175–1179

Contents lists available at ScienceDirect

The Knee

MPFL reconstruction using a quadriceps tendon graft☆ Part 2: Operative technique and short term clinical results

Christian Fink [a], Matjaz Veselko [c], Mirco Herbort [b], Christian Hoser [a,*]

[a] Sportsclinic Austria, Innsbruck Austria
[b] Department of Trauma-, Hand- and Reconstructive Surgery, Westfaelian-Wilhelms University of Muenster, Muenster, Germany
[c] Department of Traumatology, University Medical Center, Ljubljana, Slovenia

ARTICLE INFO

Article history:
Received 4 February 2014
Received in revised form 28 April 2014
Accepted 13 May 2014

Keywords:
MPFL reconstruction
Quadriceps tendon
Minimal invasive MPFL reconstruction

ABSTRACT

Background: We describe the preliminary clinical results of a new operative technique for MPFL reconstruction using a strip of quadriceps tendon (QT).
Methods: Patients: 17 patients (7 male, 10 female; mean age 21.5 years ± 3.9) have been operated on with this technique. All patients were evaluated clinically, radiologically and with subjective questionnaires (Tegner-, Lysholm-, Kujala Score) pre-operatively and post-operatively at 6 and 12 months (m).
Surgical technique: A 10 to 12 mm wide, 3 mm thick and 8 to 10 cm long strip from the central aspect of quadriceps tendon is harvested subcutaneously. The tendon strip is then dissected distally on the patella, left attached, diverged 90° medially underneath the medial prepatellar tissue and fixed with 2 sutures. The graft is fixed in 20° of knee flexion with a bioabsorbable interference screw.
Results: Lysholm score at 6 m was 81.9 ± 11.7 and at 12 m 88.1 ± 10.9, Kujala score at 12 m was 89.2 ± 7.1 and Tegner Score was 4.9 ± 2.0 (6 m) and 5.0 ± 1.9 (12 m). Two patients had a positive apprehension test at 12 months. There was no re-dislocation during the follow-up period.
Conclusion: MPFL reconstruction with a strip of QT harvested in a minimal invasive technique was found to be associated with good short term clinical results. We think that this technique presents a valuable alternative to common hamstring techniques for primary MPFL reconstruction in children and adults, as well as for MPFL revision surgery.
Level of evidence: IV, prospective case series.

1. Introduction

The Medial Patellofemoral Ligament (MPFL) represents the primary soft-tissue restraint to lateral patellar dislocation close to knee extension [1–5]. Rupture of the MPFL has been reported in 95 to 100% of patients with acute patellar dislocation [1,3,6–8]. Therefore, recently reconstruction of the MPFL for the treatment of patellar instability has captured more attention.

Several surgical techniques with promising clinical results have been described; most of them involve using hamstring tendons as the graft [9–19]. The majority of these techniques utilize bone tunnels and/or anchors for graft fixation on the patella [10,13,14,17–20]. Complications, however, such as implant breakage, patellar fractures through bone tunnels and loss of motion have also been described [5,21,22].

Anatomically, the MPFL is flat band-like structured. There are few reports on MPFL reconstruction using a strip of quadriceps tendon [23–26]. The gross morphological appearance of such a quadriceps tendon strip more closely resembles the natural MPFL than a hamstring construct. A human cadaveric study investigated the biomechanical characteristics of a 3 mm thick and 10 mm wide quadriceps tendon strip and found that they are similar to the natural MPFL, with respect to maximum load to failure, yield load and stiffness [27]. Despite these potential biomechanical advantages of QT MPFL reconstruction, the cosmetic appearance of longitudinal scars over the thigh as well as the technical difficulties harvesting a uniform 2–3 mm strip of the QT have most likely prevented a widespread use of these techniques.

The purpose of this study is to describe the short term results of a new minimally invasive MPFL reconstruction technique using the QT [28]. We hypothesized that MPFL reconstruction with a QT in a minimal invasive technique is feasible and leads to good clinical short term results.

☆ Investigation performed at Sportsclinic Austria, Innsbruck, Austria.
* Corresponding author at: Sportsclinic Austria, Olympiastr. 39, 6020 Innsbruck, Austria. Tel.: +43 512 397030; fax: +43 512 39703020.
E-mail address: christian.hoser@sportsclinicaustria.com (C. Hoser).

http://dx.doi.org/10.1016/j.knee.2014.05.006

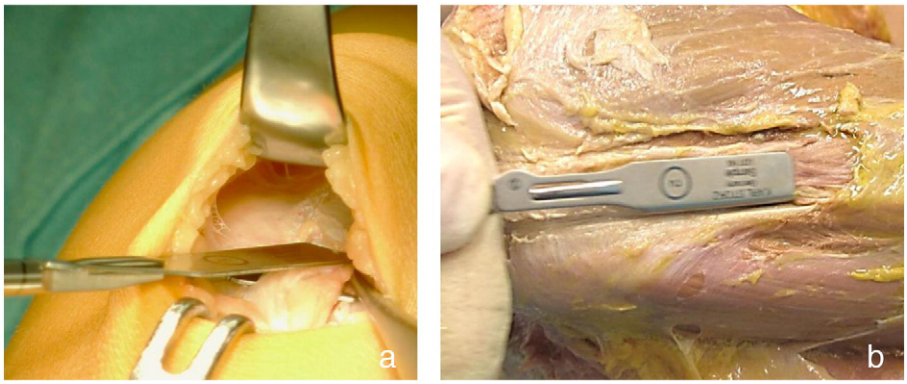

Fig. 1. A tendon separator (2 or 3 mm) (KARL STORZ, Tuttlingen, Germany) is introduced and advanced proximally to approx. 8 cm. (a. operative procedure; b. cadaveric preparation).

2. Methods

All patients were evaluated clinically (ROM, apprehension test) and with subjective questionnaires (Tegner-, Lysholm Score) [30] pre-operatively and post-operatively at 6 and 12 months. At the 12 month follow-up (FU) Kujala Score [31] was added. Wilcoxon's Matched-Pairs Test with 95% confidence intervals was used to compare pre-operative to 6 and 12 month results.

All patients were asked if they would undergo this operation again and if they were satisfied with their cosmetic outcome.

Radiological evaluation included MRI and AP and lateral radiographs pre-operative and AP and lateral radiographs at 12 months.

2.1. Surgical technique

Patients were positioned to allow free knee motion between 0° and 120°. The knee was draped to allow fluoroscopy during the procedure. In 90° of knee flexion a 2.5–3 cm transverse skin incision was placed over the superomedial pole of the patella. The prepatellar bursa was incised longitudinally and the quadriceps tendon then carefully exposed. A long Langenbeck retractor was introduced and the quadriceps tendon subcutaneously exposed proximal to the patella. A double knife of 10 or 12 mm (KARL STORZ, Tuttlingen, Germany) width was then introduced starting over the middle of the superior patella border and pushed up to a minimum of 8 cm (marked on the instrument). The thickness of the graft was then determined by a 3 mm tendon separator (KARL STORZ, Tuttlingen, Germany). The separator was pushed proximal to the same mark (minimum 8 cm) (Fig. 1ab). Finally the tendon strip was cut subcutaneously by a special tendon cutter (KARL STORZ, Tuttlingen, Germany) (Fig. 2ab). The graft was left attached distally and the free proximal end anchored with a resorbable suture whip stitch. Distally the longitudinal cuts were continued with a surgical knife towards the patella and over the patellar surface in the chosen width (10 or 12 mm); lateral for 2 cm and medial for 1 cm, on the anterior surface of the patella. The quadriceps tendon strip was then subperiostally elevated from the surface of the patella. The proximal 1.5 cm of the medial patellar border was exposed. From the medial patellar border the prepatellar tissue was elevated laterally creating a tunnel reaching the medial edge of the graft. This was performed with a periosteal elevator. A surgical clamp was introduced into the tunnel from medial to lateral and the graft passed through the tunnel. The graft was then secured to the retinaculum tissue on the medial patellar edge by 2.0 resorbable sutures (Fig. 3ab). A 1.5 cm skin incision was then made over the adductor tubercle. Starting at the patella a curved clamp was used to create a tunnel in the space between the vastus medialis and the joint capsule. A suture loop was then pulled through the tunnel. This loop was used to pull the graft towards the femoral insertion. Under fluoroscopic guidance a 2.4 mm guide pin was drilled into the insertion of the MPFL [19,25]. It was directed antero-laterally to exit the femur on the lateral cortex well proximal to the lateral epicondyle. If found accurate by fluoroscopy, the guide pin was overreamed with a 6–8 mm cannulated reamer to a depth of 30 mm.

The graft was then inserted into the tunnel. The knee was cycled five times with moderate tension on the graft. Fixation was performed with a 6–8 × 28 mm bioabsorbable interference screw at 20° of knee flexion with the lateral patellar border flush with the lateral border of the trochlear groove.

2.2. Postoperative treatment

A knee brace with ROM 0–90° was used for 6 weeks during post-operative rehabilitation. The patients were mobilized with 20 kg partial weight bearing for 3 weeks. Full weight bearing was started thereafter. Passive ROM exercises to a maximum of 90° were initiated immediately postoperative. Stationary cycling was started 6 weeks postop. Full return to pivoting sports was allowed between 4 and 5 months after the operation.

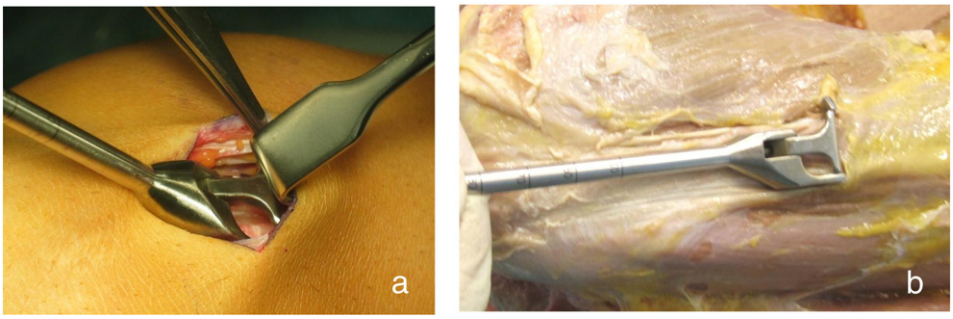

Fig. 2. The tendon strip is cut at the desired length (8–10 cm) using a tendon cutter (KARL STORZ, Tuttlingen, Germany) (a. operative procedure; b. cadaveric preparation).