Between 1999 and 2001 thirty knees underwent a semitendinosus tendon plasty to recreate the medial patellofemoral ligament for recurrent patellar dislocation. The mean follow-up was 38 months. The mean improvement of the patellofemoral congruence angle after surgery was $14 \pm 7$ degrees. All patients ended up with a full range of motion, except one patient, whose flexion was limited to $120^\circ$ due to superficial wound infections. Dislocation did not recur. According to the Larsen and Lauridsen outcome score the clinical results were excellent in 27 patients, good in 2 and fair in one. In conclusion this procedure is indicated for the chronic dislocation and cases of severe femoral dysplasia with marked laxity. The procedure assures the stabilisation of the patella, although it doesn’t restore the patellofemoral congruence angle to normal values.

**INTRODUCTION**

Recurrent patellar dislocation and subluxation is a common problem affecting the extensor mechanism of the knee. Patients who have experienced patellar dislocation are at a high risk of recurrence and frequently experience disability due to pain and giving way (1, 6, 11, 13). Several aetiologic factors have been described such as patellar and femoral dysplasia, lateral displacement of the anterior tibial tubercle, and many surgical techniques have been reported in the literature.

In recent years, some authors have described the influence of the medial patellofemoral ligament (MPFL) as the primary restraint among the medial patellar stabilisers (4, 7, 13, 19, 21, 25, 26, 31, 33, 35, 36).

Surgical findings show that the medial retinaculum is torn as the patella dislocates (11, 21) and inadequate healing can lead to subsequent instability and recurrent dislocation (2).

Based on the results of other authors about the anatomy of the MPFL and its surgical repair (23, 29), we conducted a prospective study to assess the effect of a plasty using the semitendinosus tendon to recreate the MPFL in cases of patellar dislocation and instability.

**PATIENTS AND METHOD**

Between 1999 and 2001, MPFL reconstruction using autologous semitendinosus tendon was performed for recurrent patellar dislocation on 30 knees (28 patients). There were 20 females and 8 males, with an average age of 23 years (range : 17 to 28). Three had bilateral involvement : two patients with cerebral palsy and one with Marfan’s syndrome. Three patients had previous proximal realignment procedures.
The average duration of symptoms before operation was 2.9 years (range: 1 to 10). All patients underwent a physiotherapy program for a minimum of 6 months and surgical treatment was indicated if pain and instability were still present after this period of time.

All patients had radiographic and CT-scan evaluation. The patellar height was measured as described by Insall and Salvati (30, 35), patellar shape following Wiberg (24) and trochlear dysplasia were noted. Patella alta was present in 44% of the cases and a crossing sign, according to Dejour, was present in 80% (18). Eleven knees (37%) had a pathological trochlear bump (18). Twenty knees (60%) had a patellofemoral congruence angle greater than 16°.

Arthroscopic inspection was performed in all cases; the condition of the articular cartilage was recorded. Using the Outerbridge classification, 18 knees (60%) were qualified as a grade II chondromalacia and 2 knees (7%) as a grade III chondromalacia. Osteochondral or chondral loose bodies were present and removed in 3 knees (10%). Lateral retinacular release was done in two cases due to evident patellar tilt. In two patients, medial transfer of the tibial tubercle was associated to the MPFL reconstruction because of a Q-angle greater than 25 degrees.

The surgical procedure started by obtaining the semitendinosus tendon through a 3-cm incision over the pes anserinus, 1 cm medial to the anterior tibial tubercle, with a sharp tenotome. Two baseball sutures (Ethibond #2) were placed at each end of the 10-cm long graft. A second incision was made at the medial margin of the femoral condyle.
patella starting at the proximal angle and finishing 2 cm distally. A 1-cm long tunnel was drilled in the patella from its medial margin to the lateral margin, using a 4.5 mm drill. Two parallel tunnels were then drilled from the first tunnel through the lateral margin of the patella with 2.5 mm drill bits. The sutures at one end of the graft were then placed through each of the 2.5 mm tunnels and pulled until the graft was engaged in the 4.5 mm tunnel. Another 2 cm incision was done over the adductor tubercle. Subsequently, subcutaneous dissection was done between the anterior joint capsule and the medial retinaculum to communicate with the second incision. The other end of the graft was passed from the medial margin of the patella to the adductor magnus tubercle (fig 1). The knee was placed at 90° of flexion and the graft was fixed just distally to the tubercle using a soft tissue staple. Afterwards the subcutaneous tissues and skin were closed and a compressive dressing was applied without drainage.

After surgery the patients were placed in a knee immobiliser with the knee in extension for one week, allowing immediate weight bearing. After one week, progressive flexion exercises were started. The knee immobiliser was kept for walking during 6 weeks. Full activity was allowed at 12 weeks.

The clinical results were evaluated according to the Larsen and Lauridsen scoring scale (27) as excellent (19-20 points), good (17-18 points), fair (15-16 points) and poor (less than 14 points). Postoperative x-ray evaluation was made in all cases, CT-scan was done in 15 patients, and clinical examination was done after a mean follow-up of 38 months (range: 12 to 48)
306 E. FERNANDEZ, D. SALA, M. CASTEJON

compare the values of preoperative and postoperative congruence angles the data was analysed using the Student’s t-test for paired variables. The level of significance was set to $p < 0.05$.

**RESULTS**

All patients regained full range of motion (ROM) two months after the surgical procedure, except one patient with superficial wound infection by *Pseudomonas aeruginosa* treated with local wound care and intravenous antibiotics. He achieved $120^\circ$ of flexion, and had a poor final result. One patient required removal of the staple because of discomfort. There were no postoperative recurrent dislocations or symptoms of instability.

According to the Larsen and Lauridsen score, 27 knees (90%) had an excellent result; two knees had good result (7%) and one fair result (fig 2).

The mean postoperative congruence angle improved from $25^\circ \pm 15^\circ$ to $12^\circ \pm 8^\circ$ (fig 3). In two cases the patellofemoral congruence angle improved from $60^\circ$ to $30^\circ$ and permanent subluxation of the patella was resolved, with an activity level increased from a preoperative fair to a postoperative good.

**DISCUSSION**

The medial structures of the retinaculum contribute to the stabilisation of the patella in this order: The MPFL is responsible for 53% of the medial stability, the patellomeniscal ligament for 22%, the patellotibial ligament for 11% and the medial retinaculum for 5% (14, 19). In the absence of major structural deformities therefore, the recreation of a medial tension band would logically stabilise the patella and prevent further dislocation. In the present study it is demonstrated that no recurrent dislocation occurred after the reconstruction of the MPFL.

The MPFL is a thin fascial band 10 to 30 mm wide (mean : 19) and 45 to 64 mm long (mean : 53) linking the superior border of the patella to the adductor tubercle (37). Although initially the femoral insertion of this ligament was described in the same adductor tubercle (14, 21, 26), later it was proven that the insertion is superior and posterior to the medial epicondyle and just distal to the adductor tubercle (30, 31). The technique described in the present study recreates the exact anatomic linkage of the normal ligament.

Between 15% and 25% of patellar dislocations recur after patellar realignment (3). Excessive passive laxity is the essential element in instability of the patellofemoral joint, and the role of extensor alignment and muscle forces is not clear (15). Proximal realignment, in casu medial plicature and lateral advance of the vastus medialis obliqus will not stabilise the patella in case of a condylar dysplasia or high riding patella, and in case of a femoral desinsertion or diffuse fraying of the MPFL (10, 15, 32, 36). To safeguard normal passive motion it is better to repair or reconstruct the torn ligamentous structures only in an unstable joint. Some authors (15) prefer awaiting primary healing of the MPFL. As this ligament is extrasynovial, unless a full-thickness capsular injury occurs, the MPFL tear may heal spontaneously. In chronic lesions, the MPFL is absent or very weakened and a semitendinosus plasty to limit the external displacement of the patella is to be preferred. A few techniques have been published using the semitendinosus tendon and medial patellar retinaculum plication in children (17, 28). In the classic tenodesis (Galeazzi’s technique) the semitendinosus is transferred to the inferior pole of the patella. This procedure provides a medial tether and effectively alters the net vector of the patellar tendon towards the medial side. However, this procedure does not

---

*Fig. 2. — Clinical results according to the Larsen and Lauridsen scoring system.*
restore the normal tracking of the patella (5).

The main advantage of our technique is the iso-
metrical placement of the graft, avoiding knee flex-
ion limitation or patella maltracking. In one study
with human specimens it is shown that tracking of
the patella was not completely restored after recon-
struction of the MPFL alone (34). Tracking was
markedly improved, especially in the early flexion
where dislocation is thought most likely to occur,
but the patella tended to be overconstrained in
extension and underconstrained in flexion, probably
because of non-isometric placement of the plasty.

Some authors have reported that distal realign-
ment is unnecessary when proximal realignment is
performed, while others suggest that failure to
medialise the tibial tubercle adequately when the
Q-angle is high has been correlated with unsatis-
factory results (9, 12, 14, 16, 22, 36). We carry out a
distal realignment in cases with a Q-angle over 25°,
although this procedure only reduces the lateral
force but does not decrease patellofemoral pres-
sure (20). We perform a lateral release only if later-
al tilt is present, to avoid iatrogenic medial patellar
instability (8).

It is of interest that, although the outcome after
medial patellofemoral ligament plasty was satisfac-
tory and no recurrent dislocations were observed,
the congruence angle was not completely restored
in many cases. Excessive tension applied to the
plasty to restore the congruence would also cause
an unacceptable flexion limitation as observed
intra-operatively in the early cases of our series.

The technique of MPFL plasty is a simple and
effective procedure for chronic patellar dislocation
and is also indicated in cases of severe femoral dys-
plasia and marked laxity. It makes it possible to
achieve a durable patellar stabilisation although it
does not improve the patellofemoral congruence
angle to normal values. Long-term studies are
required to find out if this stabilisation is sufficient
to prevent early osteoarthritis.

REFERENCES

1. Abraham E, Washington E, Huang TL. Insall proximal
30: 61-65.
2. Ahmad CS, Stein BE, Matuz D, Henry JH. Immediate
surgical repair of the medial patellar stabilizers for acute
patellar dislocation: a review of eight cases. Am J Sports
3. Arendt EA, Fithian DC, Cohen E. Current concepts of
519.
history of recurrent dislocation of the patella. Long-term