

SYNTHETIC LIGAMENT RECONSTRUCTION OF RECENT ISOLATED OR COMBINED POSTERIOR CRUCIATE LIGAMENT LESIONS

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The question about treatment of recent isolated or combined posterior laxities still remains unsolved.

Dejour [1], Chiu [2], Shelbourne [3], Shino [4] have shown that an isolated anterior cruciate ligament injury could be treated functionally with good results, and Akisue [5] showed the capacity of spontaneous healing of the ruptured PCL in a MRI study. However in athletes, with an important laxity, there is a high risk of failure of functional treatment. But, on the contrary to ACL lesions, late surgical treatment of chronic posterior laxities has not shown an anatomical and reproducible result. The prognostics of combined laxities (posterior triads, pentads or luxations) are even worse, and it seems actually as if an early reparation of all injured structures (but probably for the ACL) would give the best result.

These considerations have led us to an early surgical treatment (within 21 days) for :

- isolated posterior laxities in young patients with a drawer > 10mm (measured by Telos or dynamic xrays under general anaesthesia (where bony eminentia detachments constituent a separate entity not discussed here).
- combined posterior laxities in young patients (triads, pentads and dislocations with a detachment of the collateral structures.

In early reparation of PCL ruptures, three different techniques are available :

- direct suture
- the use of a graft (auto- or allografts for reinforcement or substitution)
- the use of a synthetic ligament

Direct sutures have not shown good result (Mariani [6]). Allografts are difficult to find in France. Autografts, like bone to bone patellar tendon grafts, quadriceps tendon grafts, hamstrings grafts) are interesting alternatives as they do not imply the introduction of any foreign materials : their use is probably logical in case of isolated laxities. For combined laxities, the reparation of other lesions (especially the ACL and the collateral ligaments) often calls for the use of autografts as reinforcement or substitution, and in case of an associated PCL rupture it could be important to save as much as possible of the available ligament graft capital. That is why we focused on recent posterior laxities, for the use of synthetic ligaments. In ACL reconstruction and in chronic posterior laxities, synthetic ligaments have not shown good results (Cazenave [7], Molé [8], Klein [9], Barry [10], Fukubayashi [11] and Moyen [12]. But the extrasynovial position of the PCL, its vascularisation (Chambat [13, 14], Petersen [15]) led us to accept the ideas of Durselen [16] and Bosh [17] that a synthetic ligament could be of value as a tutor guide for the healing of a recently ruptured PCL.

Our experience is short, based on 14 patients in 6 years with a mean follow-up time of 34 months (range 10-80). The laxity was isolated in 3 patients, and combined in 11 patients

lateral in 6, medial in 5). The preoperative laxity varied between 15 and 57 mm, indicating the degree of the actual lesion.

We used the LARS ligament, a woven polyester ligament composed of longitudinal fibres and transversal chains. In its intraarticular portion, the texture consists of only longitudinal fibres, and in both ends by a woven structure intended for anchorage in bony tunnels. As all synthetic ligaments, LARS has a satisfying resistance to rupture (2500N for a diameter of 6mm, 3500N for a diameter of 8mm), and a minor elongation before rupture (7-11%), which is lower than that for the natural PCL (18-19). The ligament has been subject of an evaluation of biocompatibility, performed by independent laboratories (INRA, Biomatech), which showed an absence of inflammatory, infectious or immunological reactions and a colonisation of fibrous tissue and fibroblasts on its surface.

As we used the ligament for reinforcement, the smaller diameter was chosen (6mm). The ruptured PCL fibres were spared. One or two strand techniques could be used, and the procedure performed arthroscopically or by open surgery, depending on the associated lesions. Those were all repaired during the same surgical procedure.

COMPLICATIONS

We observed :

- Five cases with stiff knee joints, all in the combined lesions, particularly the postero-medial types. Those needed a mobilisation or an arthroscopic arthrolisis. They did not seem to be caused by the synthetic ligament, but by the gravity of the initial lesion. We consider stiffness as part of the treatment in these patients.
- One septic arthritis with the wound infection after a ipsilateral intramedullary nailing performed 8 days before as its origin. Intraarticular lavage, without removing the ligament, led to complete healing.
- Two algodystrophies
- One secondary rupture of the synthetic ligament, verified by arthroscopy, after a new trauma in a young patient with a satisfying functional result after the primary intervention. The posterior drawer was 10mm in the Telos after the rupture.
- No chronic synovitis nor osteolysis close to the bone tunnels were observed.

RESULTS

Due to the IKDC score, the results were as follows :

| | A | B | C | D |
|-----------------------|----------|----------|----------|----------|
| Fonction | 36 % | 57 % | 7 % | 0 % |
| Mobilité | 29 % | 64 % | 0 % | 7 % |
| Laxité Post | 23 % | 54 % | 23 % | 0 % |
| Laxité globale | 23 % | 46 % | 28 % | 8 % |
| Score global | 0 % | 55 % | 30 % | 15 % |

Even if 36% of the patients were very satisfied and 57% satisfied, nobody had a global score grade A. The global score was decreased by the stiffness and the residual laxity. However, the importance of these data could be discussed according to :

- the gravity of the initial lesions
- the gain in posterior laxity measured by Telos: The laxity decreased with 8mm, corresponding to 63% compared to the preoperative values.

The principal prognostic factor was the association of lesions: Combined postero-medial lesions was characterised by an important postoperative stiffness (leading to mobilisation or arthrolysis). Postero-lateral combined lesions showed the worst functional and global scores.

Without drawing any conclusions, due to the limited series, the technique using two strands seemed to give a better result as regards mobility and global scores. Concerning function and laxity the techniques seemed equal. The mean mobility was 5/0/135 in the two strand group, compared to 5/0/125 in the single strand group. All patients in the two strand group had class B global scores, compared to 3B, 3C and 2D in the single strand group.

DISCUSSION

Regarding this rare and non homogenous pathology, where the treatment is widely discussed, it is difficult to draw any strict conclusions. We have therefore been very prudent in our conclusions.

There are few articles to find in the literature on this subject. In 1995, Chambat (13) drew the conclusion that synthetic ligaments were allowed in recent ruptures at the SOFCOT symposium on the PCL. He based his statement on non the published experience of M. Bercovy.

We found two publications on the use of a synthetic ligament in recent posterior laxities. Dejour 2001 [20] published a series of 17 dislocations with a follow-up time of 3 years. This series differs from ours, as it considers only knee dislocations and as the PCL was sutured, leaving the synthetic ligament as reinforcement. Those results could be compared to ours as regards the absence of complications related to the implant. He found a mean residual laxity of 9mm, and 16 of 17 patients were satisfied or very satisfied. Chiu 1994 (2) as well as Roolker (21), found a high frequency of Goretex ligament ruptures in a series of 46 patients with isolated PCL lesions, using Leeds Keio, Dacron or Goretex grafts), but satisfying results with the other ligaments. In this series, the result as regards the posterior laxity is superior compared to functional treatment or PCL suture.

In this specific indication, there was no morbidity related to the synthetic ligament.

CONCLUSION

The use of a synthetic ligament as a tutor guide for a healing ruptured PCL, in recent major laxities, is an alternative which allows saving of ligament autograft material. The use is mainly indicated in combined injuries, where it is integrated in the reparation of all the ligament lesions. A technique using two strands is probably better than one strand, to the price of a more difficult technique. The technique could be of interest in major isolated laxities (posterior drawer > 10mm in Telos) in young active patients. The prognosis is merely correlated to the associated lesions and the gravity of the trauma than to the use of a synthetic ligament.

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