

Extra-articular stabilization of the knee

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During 1979-81, 34 patients were operated according to Losee for chronic disabling anterior cruciate insufficiency. Twenty-nine patients were available for follow-up after 2 (1-4) years. At follow-up, 20 patients had a negative Slocum test. Twenty-one patients had a Lysholm knee score >77 points, and were classified as good or excellent, with a significant relation to anterolateral stability.

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From 1979 to 1983, we used the extraarticular "sling and reef" operation described by Losee et al. (1978), and to our knowledge no further reports of the results of this method have been published. We therefore feel a presentation of the results of a retrospective study of patients operated during 1979-1981 to be justified.

Patients and methods

Thirty-four patients were operated on. Twenty-nine, six females and 23 males with a median age of 29 (16-63) years, were available for follow-up, and are included in the study.

The median time from primary injury to reconstruction was 3 years (5 months to 13 years). Primary treatment after injury had been none in 24 patients, plaster cast in one patient and attempted operative repair with suture without augmentation in four patients. Eight patients had one or both menisci removed before the Losee operation, and one had the lateral meniscus removed during the stabilizing procedure.

All patients had a positive Slocum test, and recognized the subluxation/reduction movement as their main complaint. Fourteen patients had an additional moderate (two patients) or slight (12 patients) valgus instability in slight flexion, and one patient had a moderate posterolateral instability. All patients had an arthroscopy preoperatively, and an old ACL tear was verified in all cases.

The operation was performed according to Losee et al. (1978), using a strip of the iliotibial tract as shown in Figure 1. Thirteen patients had the strip tunneled through the lateral femoral condyle, while 16 patients had the strip taken beneath the proximal part of the lateral collateral ligament (Losee et al. 1978, Mølster 1982).

In addition, one patient had a ventralization of the tibial tuberosity, and one patient a posterolateral stabilization according to Trillat (1978) done in combination with the Losee procedure. No medial stabilizing procedures were performed.

Postoperatively, a plaster cast was applied with the knee in 40 degrees of flexion and in outward ro-

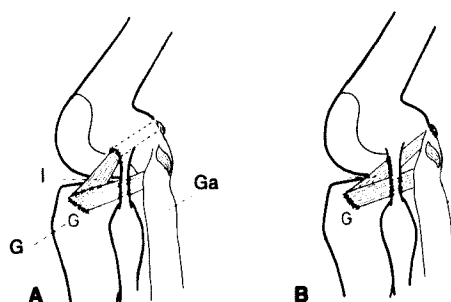


Figure 1. Schematic drawing of the completed "sling and reef" procedure, outlining the course of the strip from the iliotibial band.

A: Through a bony tunnel.

B: Under the collateral ligament.

G = Gerdy's tubercle, I = iliotibial band, Ga = gastrocnemius muscle.

tation, with the plaster including the foot. After 6 weeks, the cast was removed, and after 2 weeks with partial weight bearing, rehabilitation with hamstrings and quadriceps exercises was started, usually supervised by a physiotherapist.

At follow-up after 15–49 (median 23) months, all patients were examined by at least two of the authors. Functional results were assessed by the Lysholm knee score (Lysholm & Gillquist 1982), with values above 77 points taken as good or excellent (Odensten et al. 1983). The patients also graded their subjective results pre- and postoperatively by choosing between four levels labelled as excellent (very slight or no difference when compared to the normal knee); good (slight but not incapacitating difference in function when compared to the other knee); fair (significant but acceptable impairment of function), or poor (intolerable impairment of function). The physical examination included assessment of ALRI by the Slocum test (Slocum et al. 1976), graded as positive (unstable) or negative.

Statistical evaluation was by the Mann-Whitney test.

Results

Two patients developed deep infection and one patient a superficial wound infection.

Subjectively, the majority were improved at follow-up (Table 1). The median knee score at follow-up was 90 (14–100) points; 21 patients had good/excellent results (>77 p).

Nine patients had a positive Slocum test at follow-up; the remaining 20 were stable concerning ALRI. The group with objectively stable knees had a higher knee score (median 95 p) than the unstable group (median 69 p), mainly due to symptoms of instability ($p < 0.05$).

The 14 patients with a preoperative valgus instability had a median knee score at follow-up of 96 points, and no significant difference as

compared with patients without valgus instability.

No difference in results was found between knees operated with the fascia strip through a bony tunnel as compared to knees with the strip beneath the proximal part of the lateral collateral ligament.

Discussion

Different methods of lateral stabilization using a single thickness of the iliotibial band have been reported (MacIntosh & Darby 1976, Ellison 1979, Kennedy et al. 1978), as well as the lateral one third of the patellar tendon in the same localization (Benum 1982). Short-term results may indicate that the lateral localization of the stabilizing structure is adequate. The report of Odensten et al. (1983), however, indicates a tendency for late recurrence of instability by the Ellison method. The initial strength of the stabilizing structure obviously has significance, and the distal iliotibial band is one of the strongest of the materials commonly used for reconstructions (Kennedy et al. 1980, Butler et al. 1979). The Losee method implies the use of a double thickness strip of this band. The same principle was used in Coker's modification of the MacIntosh procedure in 132 patients (Arnold et al. 1979), the follow-up time of 1.2 years, however, being too short to evaluate late results. Our results are in accordance with most published series of extraarticular ACL-reconstructions, but the follow-up time is still too short to interpret our results as permanent.

The presence of a slight valgus instability did not significantly influence the results. This is in accordance with the results of Losee et al. (1978), and supports the concept that in a combined anteromedial/anterolateral instability, the anterolateral component is the main cause of symptoms.

Table 1. Subjective assessment of knee function.

	Preoperative	Postoperative
Excellent	0	6
Good	0	15
Fair	10	3
Poor	19	5

References

- Arnold, J. A., Coker, T. P., Heaton, L. M., Park, J. P. & Harris, W. D. (1979) Natural history of anterior cruciate tears. *Am. J. Sports Med.* 7, 305–313.

- Benum, P. (1982) Anterolateral rotatory instability of the knee joint. *Acta Orthop. Scand.* **53**, 613–617.
- Butler, D. L., Noyes, F. R., Grood, E. S., Miller, E. H. & Malek, M. (1979) Mechanical properties of transplants for the anterior cruciate ligament. *Orthop. Res. Soc. Proc.* p. 180.
- Ellison, A. D. (1979) Distal iliotibial-band transfer for anterolateral rotatory instability of the knee. *J. Bone Joint Surg.* **61-A**, 310–337.
- Kennedy, J. C., Stewart, R. & Walker, D. M. (1978) Anterolateral rotatory instability of the knee joint. *J. Bone Joint Surg.* **60-A**, 1031–1039.
- Kennedy, J. C., Roth, J. H., Mendenhall, H. V. & Sanford, J. B. (1980) Intraarticular replacement in the anterior cruciate ligament-deficient knee. *Am. J. Sports Med.* **8**, 1–8.
- Losee, R. E., Johnsen, T. R. & Southwick, W. O. (1978) Anterior subluxation of the lateral tibial plateau. *J. Bone Joint Surg.* **60-A**, 1015–1030.
- Lysholm, J. & Gillquist, J. (1982) Evaluation of knee ligament surgery results with special emphasis on the use of a scoring scale. *Am. J. Sports Med.* **10**, 150–154.
- MacIntosh, D. L. & Darby, T. A. (1976) Lateral substitution reconstruction. *J. Bone Joint Surg.* **58-B**, 142 (abstract).
- Mølster, A. (1982) Anatomical studies of lateral ligament stabilization of the knee. *Acta Orthop. Scand.* **53**, 502 (abstract).
- Odensten, M., Lysholm, J. & Gillquist, J. (1983) Long-term follow-up study of a distal iliotibial band transfer for anterolateral knee instability. *Clin. Orthop.* **176**, 129–135.
- Slocum, D. B., James, S. L., Larsson, R. L. & Singer, K. M. (1976) Clinical test for anterolateral rotatory instability of the knee. *Clin. Orthop.* **118**, 63–69.
- Trillat, A. (1978) Posterolateral instability. In: *Late reconstructions of injured ligaments of the knee* (Eds. Schulitz, K.-P., Krah, H. & Stein, W. H.), pp. 99–105. Springer Verlag, Berlin-Heidelberg-New York.