

Replacement of the anterior cruciate ligament

Comparison between the endoscopic and mini-open technique in 56 and 100 patients, respectively

Argyrios MITSOU, Panayotis VALIANATOS and Michael GAVRAS

56 patients with anterior cruciate ligament (ACL) rupture underwent an endoscopic procedure to replace the torn ligament with a bone-patellar tendon-bone autograft. Their mean age was 24 (18–35) years and 45 were men. Follow-up was mean 3 (1–5.5) years. The outcome of the endoscopic technique was compared to that of 100 patients, matched for age and

activity level, who were operated on during the same period using the mini-open method.

Patients operated on with endoscopic technique had considerably less postoperative pain and regained knee motion faster. Function and stability were similar in the two groups.

Sports Injuries Department, KAT Hospital, Athens, Greece. Correspondence: Dr. A Mitsou, Venizelou & Filimonos 13, Dionysos 145 65, Greece. Fax +30-1-684 5089.

Bone-patellar autografts are commonly used for anterior cruciate ligament (ACL) reconstruction (Eriksson 1976, Schultzer et al. 1989) and recently an endoscopic technique has been described (Paulos et al. 1991, Harner et al. 1994). We have used either open (mini-arthrotomy) or closed (endoscopic) technique and compared the outcome.

Patients and methods

Between 1989 and 1993, 56 patients (45 men) were operated on in our department by the senior author (AM) for chronic ACL insufficiency using an endoscopic method and a bone-patellar tendon-bone autograft. Their average age was 24 (18–35) years. In 50 patients the ligament had ruptured during athletics.

During the same period, 100 age and activity level matched patients were selected as controls and were operated by same surgeon using the same type of graft but with the mini-open technique.

Immediately postoperatively, a simple bandage was applied with the knee in full extension. Drains were removed on the second postoperative day and passive movements of the knee up to the pain limit were initiated the same day. Free weight bearing as tolerated with crutches and the knee in a functional brace was started after 5 days and the patient was discharged from our hospital with instructions to use the brace for 3 months and to ambulate with crutches for 1 month.

The average follow-up time was 37 (10–55)

months. Evaluation included: 1) Lysholm score (Tegner and Lysholm 1985) at final follow-up, 2) stability (anterior drawer, Lachmann's test, Pivot shift test), 3) mobility 1 and 3 months after the operation, and 4) pain during the first 24 hours after the operation. Postoperative pain was assessed by recording the consumption of analgesics.

Results

At follow-up, function was equal in both groups with excellent or good function in more than 90% of the patients (Table 1). Also, stability did not differ (Table 2). The range of knee motion was greater in the patients treated endoscopically 1 month postoperatively, but at 3 months normal motion had been achieved in both groups (Table 3). Patients treated with the endoscopic method had less postoperative pain and requested strong analgesics only in the evening (Table 4).

Table 1. Function (rating), number of cases (fraction)

| Lysholm score | Miniarthrotomy n=100 | Endoscopy n=56 |
|-----------------|-------------------------|-------------------|
| Excellent (>94) | 32 | 19 (0.3) |
| Good (84–94) | 58 | 34 (0.6) |
| Fair (65–83) | 7 | 2 (0.04) |
| Poor (<65) | 3 | 1 (0.02) |

Table 2. Stability test (rating), number of cases (fraction)

| Test | Miniarthrotomy n=100 | Endoscopy n=56 |
|-----------------|-------------------------|-------------------|
| Anterior drawer | | |
| - | 50 | 38 (0.7) |
| + | 34 | 13 (0.2) |
| ++ | 11 | 2 (0.04) |
| +++ | 5 | 3 (0.05) |
| Lachman | | |
| - | 59 | 39 (0.7) |
| + | 33 | 12 (0.2) |
| ++ | 6 | 2 (0.04) |
| +++ | 2 | 3 (0.05) |
| Pivot shift | | |
| - | 66 | 38 (0.7) |
| + | 28 | 13 (0.2) |
| ++ | 5 | 2 (0.04) |
| +++ | 1 | 3 (0.05) |

Table 3. Mean degrees of knee motion

| Time after operation | Miniarthrotomy n=100 | Endoscopy n=56 |
|----------------------|-------------------------|-------------------|
| 4th week | 15°-85° | 0°-100° |
| 3rd months | 0°-120° | 0°-125° |

Table 4. Postoperative analgesics and time of administration, fraction refers to patients

| | Miniarthrotomy n=100 | Endoscopy n=56 |
|-----------------------------------------------|-------------------------|-------------------------------------------------|
| 12 noon | | |
| Dextropropoxyphen ^a | 1.0 | Paracetamol inj. ^d 1.0 |
| 6 pm | | |
| Dextropropoxyphen | 0.5 | Paracetamol+codein 0.5 |
| Paracetamol ^b +codein ^c | 0.5 | nothing 0.5 |
| 10 pm | | |
| Dextropropoxyphen | 1.0 | Dextropropoxyphen 0.8 Paracetamol+codein 0.5 |

^a 75 mg im, ^b 0.5g, ^c 10 mg supp, ^d 0.6 g im.

Discussion

Today, endoscopic methods are widely used for intraarticular replacement of the ACL. Besides smaller skin incisions and easier access to the menisci, the method offers better visibility and more accurate placement of the bony tunnels (Noyes et al. 1987, Gillquist and Odensten 1988, Wainer et al. 1988, Kariya and Kuroska 1989, Howe et al. 1991, Paulos et al. 1991).

Our findings are compatible with previous studies, suggesting that the outcome of the 2 methods are comparable except perhaps for a small advantage of the endoscopic technique in the final rehabilitation of the thigh muscles (Noyes et al. 1987, Gillquist and Odensten 1988, Howe et al. 1991).

References

- Eriksson E. Reconstruction of the anterior cruciate ligament. *Orthop Clin N Am* 1976; 7: 167-79.
- Gillquist J, Odensten M. Arthroscopic reconstruction of the anterior cruciate ligament. *Arthroscopy* 1988; 4: 5-9.
- Harner C D, Marks P H, Fu F H, Irrgang J J, Silby M B, Mengato R. ACL reconstruction: Endoscopic versus two-incision technique. *Arthroscopy* 1994; 10 (5): 502-512.
- Howe J G, Johnson R J, Kaplan M J, Fleming B, Jarvinen M. ACL reconstruction using quadriceps patellar tendon graft. *Am J Sports Med* 1991; 19: 447-57.
- Noyes F R, Mangine R E, Barber S D. Early knee motion after open and arthroscopic ACL reconstruction: *Am J Sports Med* 1987; 15: 149-60.
- Paulos L E, Cherf J, Rosenberg T D, Beck C L. ACL reconstruction with autografts. *Clin Sport Med* 1991; 10 (3): 469-85.
- Schutzer S F, Christen S, Jakob R P. Further observations of the isometricity of the anterior cruciate ligament. *Clin Orthop* 1989; 242: 247-55.
- Tegner Y, Lysholm J. Rating systems in the evaluation of knee ligament injuries. *Clin Orthop* 1985; 198: 43-9.
- Wainer R A, Clarks T J, Poehling G S. Arthroscopic reconstruction of the anterior cruciate ligament using allograft tendon. *Arthroscopy* 1988; 4: 199-205.