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Suture of fresh ruptures of the anterior cruciate ligament

A 5-year follow-up

Thirty-five of 41 consecutive patients were followed for 5 years after early primary suture of the acutely torn anterior cruciate ligament and repair of all other injured structures; three early failures were excluded from the series, and three patients were lost to follow-up.
Twenty-three of the patients also had an early follow-up 2 years postoperatively. From the early to the late follow-up, the function of the operated knees decreased significantly.

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In 1938, Ivar Palmer presented a technique for primary suture of the acutely torn anterior cruciate ligament (ACL). This formed the basis for a widely accepted therapeutic philosophy for knee ligament injuries (O'Donoghue 1955, Liljedahl & Nordstrand 1969). Feagin et al. (1972) reported promising early results of primary suture, but in a long-term follow-up of the same patients they found deteriorating results (Feagin & Curl 1976). They also reported a high incidence of isolated tears of the anterior cruciate ligament, in contrast to the opinions of Palmer (1938, 1957), O'Donoghue (1950) and to our own results (Lysholm et al. 1981). Recently, Balkfors (1982) concluded on the basis of a retrospective long-term follow-up that primary repair of the anterior cruciate ligament was unrewarding. We have now analysed the course and long-term results after early primary suture of the acutely torn anterior cruciate ligament with respect to stability and knee function.

Material and methods

Forty-one consecutive patients, eight women and 33 men, were followed for at least 4 years after surgery. The mean age was 28 (13–58) years. All patients had a total ACL tear. In addition, 32 had a torn medial collateral ligament and 26 patients a rupture of the posterior oblique ligament. Twenty-four patients also had a torn meniscus, 19 a rupture of the medial meniscus and five a torn lateral meniscus. No patient had an isolated ACL rupture. Only patients without a history of previous injury to the same joint were included.

Most patients sustained their injuries in activities related to sports, 25 in contact and nine in non-contact sports. Seven of the patients had work- or traffic-related injuries.

Thirty-two patients were treated within 1 week after injury and the remaining nine within the next 2 weeks.

All patients underwent clinical examination under anaesthesia. Arthroscopy as described by Gillquist et al. (1976, 1977) was also carried out in 27 patients.

All tears of the anterior cruciate ligament were located in the mid-portion or the upper third.

The type of operation performed was described by Palmer in 1938. Seven non-resorbable U-sutures were used, pulled out through two drill channels in the lateral femoral condyle. A drill guide was used to place the channels as close as possible to the anatomical insertion of the ligament. All associated ligament injuries were carefully repaired. Torn menisci were sutured when possible.

Twenty-three randomly selected patients also had an early follow-up review 24 months after operation.

All reexaminations were done by two orthopaedic surgeons not involved in the primary operations. The follow-ups included physical examination and evaluation with a knee function score (Lysholm & Gillquist 1982). The maximum score was 100 points; patients with a score more than 82 points were rated as good or excellent. The score emphasizes symptoms of instability and pain during walking, running and jumping. The reproducibility of the score evaluation was good with a coefficient of variation of ±3.3%.

Results

Late follow-up (> 4 years)

Out of the 41 patients, three were reoperated with anterior cruciate ligament reconstruction 11, 14 and 18 months postoperatively. They were registered as failures of the primary procedure and they were not included in the follow-up. Three patients were lost to follow-up. The follow-up thus included 35 patients. At 63 (49–88) months postoperatively, the mean score was 81±17 points. Twenty patients were rated over 82 points (good or excellent). Sixteen patients were unstable with a positive pivot-shift and/or Slocum sign and had a mean score of 74±20, while 19 stable patients had a higher score (87±13, $p<0.02$).

The mean score in 16 patients with two normal menisci (89±9 points) was higher than in 11 patients with the medial meniscus removed (74±21 $p<0.01$). Three patients with the lateral meniscus removed had a mean score of 86±23 (n.s.). Finally, there were two patients who had removal of both menisci with a mean score of 61±11 ($p<0.001$). There were no significant differences in occurrence of meniscal ruptures during the follow-up period in patients with stable or unstable knees.

Early follow-up (2 years)

Twenty-three of the patients also had an early follow-up 24±12 months postoperatively. At the early follow-up, their mean score was 95±11 points, which deteriorated to 82±18 at the late follow-up ($p<0.001$). Twenty-two patients were rated over 82 points at the early follow-up. At the late follow-up, 14 of these were rated over 82 points. Four patients were unstable at the early follow-up (mean score of 80±21), while 19 patients were stable with a higher score (98±2 $p<0.001$). At the late follow-up, 10 patients remained stable but their score had dropped from 97±2 to 85±14 ($p<0.02$). Six of the stable patients at 24 months had become unstable; four of these had a lower score and two were unchanged. Three patients were lost to the late follow-up. The unstable patients had a further decrease in score, from 80±21 to 66±28 ($p<0.05$).

Discussion

There have been different opinions regarding the importance of the ACL for knee stability and function and whether a good result can be accomplished by early repair (Palmer 1938, 1957, O'Donoghue 1955, Liljedahl & Nordstrand 1969, Kennedy et al. 1974, Feagin & Curl 1976, Hughston et al. 1976).

Previous reports of poor results after repair (Feagin & Curl 1976, Balkfors 1982) were hampered by the fact that a large number of ACL tears were treated as isolated tears, suggesting insufficient diagnosis of associated injuries (Nicholas 1976). Therefore, the theses of Palmer (1938), O'Donoghue (1955) and Liljedahl & Nordstrand (1969) of excellent results after primary suture of the ACL and all associated lesions have not been contradicted. Early operation with primary suture is still practised in many sports trauma centres. In spite of a careful diagnosis and repair of all injured structures about half of the patients with a torn ACL in this study were unstable after 4 years.

The fact that the results were better at the early follow-up than later indicates the need for sufficiently long follow-up periods. Two years seems to be too short a time to give a true picture.

Medial or bilateral meniscectomy led to worsened results in both the present study and previous ones (Oretorp et al. 1979, Lysholm et al. 1982, Odensten et al. 1983). This tallies with the findings of Hughston & Barrett (1983) stressing the importance of the medial menisco-ligament complex for a good knee function.

Butler et al. (1980) outlined primary and secondary restraints to anterior stability, the ACL being the primary one. With time, the secondary restraints stretch out if the primary restraint is insufficient, as proposed by Chatard (1979). This is corroborated by our results after primary repair of the ACL. Clinical instability as well as symptoms of instability and pain increased between the two follow-ups. The primary restraint in these patients was probably insufficient while the secondary restraints stretched out with time.

Nevertheless, the stability obtained in the patients in this study seemed to be better than that achieved in other series with conservatively treated ACL lesions (McDaniel & Dameron 1980, Noyes et al. 1983). Two-thirds of the patients had no symptoms in activities of daily living. Even some patients with unstable knees seemed to do well in daily activities. However, in athletic activities the unstable patients had increased symptoms, indicating the importance of creating a stable knee in athletic patients.

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