Modified Hauser operation for patellar instability

Immediate mobilization of 35 knees, a 5–8 year follow-up study

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We performed a follow-up examination of 35 knees with chronic patellar instability treated by a modified Hauser operation: medialization and distalization of the tibial tubercle without dorsal transfer, and fixation of the tubercle rigidly with 2 cortical screws. Cast immobilization was not used and the patients were allowed to mobilize the knee immediately. The follow-up period was 6 (5–8) years. 27 of 35 knees were excellent or good at follow-up, while 8 patients were more or less dissatisfied with the result. 5 knees had arthrosis at follow-up. No severe complications occurred, nor did the rate of minor complications differ from earlier reports.

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The Hauser (1938) operation is a commonly used realigning procedure for recurrent subluxation or dislocation of the patella. Postoperative cast immobilization is usually advised (Freeman 1987), but Dougherty et al. (1975) introduced a modification with early mobilization.

The standard Hauser procedure, as well as the Dougherty modification, transfers the tibial tubercle posteriorly (as well as medially), which increases the patellofemoral pressure in knee flexion, thus possibly increasing the risk of patellar arthrosis (Barbari et al. 1990). Since 1986, we have used a new modification of the Hauser method, including tibial tubercle transfer medially, but not posteriorly, and no postoperative cast immobilization. We present here the results of this procedure.

Patients and methods

37 patients (1 bilateral) were surgically treated between 1986 and 1991 for disabling patellar instability. 3 patients were lost to follow-up, thus this study comprises 34 patients (35 knees). The average age of the patients at operation was 23 (16–45) years, 27 were women (Table 1). Most patients suffered from frequently recurring dislocations (21 knees), while the rest had milder symptoms in the form of chronic subluxation, but only a few dislocations. The average age at the onset of symptoms was 18 (11–44) years. There were no cases of congenital dislocation or early childhood presentation. The average duration of symptoms prior to the operation was 6 (2–18) years, and the number of dislocations ranged from 3 to > 50. Realignment was performed no earlier than at the age of 16, since tibial tubercle osteotomies are contraindicated before growth has ceased. All patients were first treated with patellar braces and intense quadriceps exercises. Although only 1 patient with bilateral operations was included in this study, the symptoms had been bilateral in 12 cases.

Before operation, each patient was assessed clinically and radiographically. Standard lateral and anteroposterior images as well as the Laurin et al. (1979) projections in 30° knee flexion, were used. Patella alta was diagnosed in 17 cases when the Insall and Salvati (1971) index was < 0.8. The sulcus angle (SA) was measured from Laurin projections, accord-

Table 1. Summarized preoperative data on the patients. Figures are mean (SD)

	n	Onset of symptoms (years)	Duration of symptoms (years)	Q-angle (°)	Sulcus angle (°)
All	35	18 (4.6)	5.7 (2.9)	9.4 (3.9)	149 (4.4)
RD	21	18 (4.7)	2.0* (1.9)	9.2 (3.9)	154 (5.7)
CS	14	18 (8.1)	7.7 (4.0)	9.7 (5.0)	147 (4.4)

RD recurrent dislocations, CS chronic subluxation.
* Statistical difference between RD and CS groups, p = < 0.001 (t-test)

ing to Kujala et al. (1989). The measurement was clearly abnormal (> 150°) in 7 cases. Positive lateral patellar displacement (LPD) at 30° knee flexion was found in 12 patients, while the lateral patellar tilting (LPT) was over 15° in 17 cases (Kujala et al. 1989). The Q-angle, measured with a goniometer, was a median of 11° in women and 6° in men ($p = < 0.001$, using the Student's t-test).

Diagnostic arthroscopy had been performed on 16 knees preoperatively. Arthroscopy revealed patellar chondromalacia in 7 cases and intra-articular loose bodies in 2 knees. Lateral release had previously been performed in 3 patients, but it had proved ineffective as recurrence of dislocations or subluxation had occurred. A more complex proximal soft tissue operation (medial plication combined with lateral release) had been performed on 1 patient, but dislocations persisted.

Spinal or epidural anesthesia was used with a tourniquet controlled bloodless field (average tourniquet time was 47 minutes). A curved longitudinal 7-cm incision was made over the tubercle, and the patellar tendon was liberated both laterally and medially. The tibial tubercle with patellar tendon insertion was osteotomized (Figure 1). The block measured approximately 4 cm in length and its proximal margin was about 2 cm in width and 1 cm in depth. We then cut another, thinner block of cortical bone just medially to the tubercle (Figure 1) to create an even frontal plane for medialization. The tubercle was then transferred medially for 0.5–2 cm and secured in a oblique position (for even tension on the tendon) with a drill bit or a Kirschner wire. The knee was thereafter tested through its range of motion to assess the patellar tracking, and if any lateral tightness was suspected, a subcutaneous lateral release was performed to the level of the superior patellar margin (22 cases). In case of a patella alta, the tubercle was also transferred distally, but not more than the knee could still easily be flexed to about 100°. The distal transfer measured 2–5 mm in 11 cases, 6–8 mm in 4 cases and about 10 mm in 2 cases. The reinsertion of the tubercle was secured with 2 cortical screws, which penetrated the posterior cortex and washers. The second bony block was inserted to cover the previous tubercle site and was fixed with absorbable sutures. A sterile dressing was applied over the wound, but no splinting or casting was used.

The patients started passive unresisted range of motion exercises immediately after recovery from the anesthesia. Quadriceps exercises were begun after 2 weeks. Patients were released from the hospital 3–5 days after the surgery. A sick leave of an average of 8 (5–17) weeks was prescribed. Patients had permission

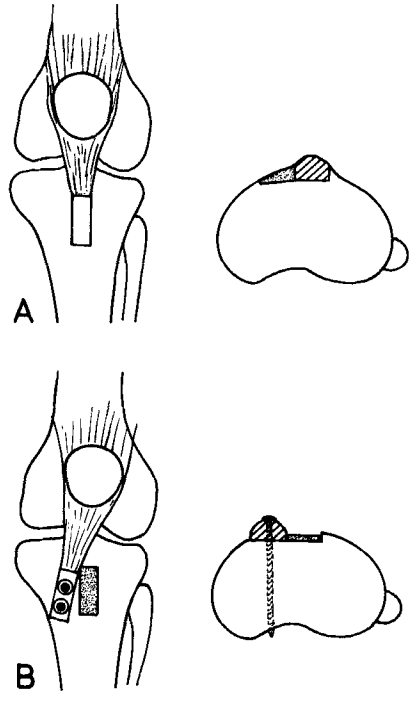

Figure 1. Anterior and cross-sectional views of the proximal tibia showing the osteotomy.
A. The tibial tubercle is first osteotomized, followed by cutting of thin medial cortical bone chips in the same frontal plane.
B. Bone blocks are transferred to replace each other; the tubercle is fixed with 2 cortical screws.

to bear some weight on the extended leg after a few days; full weight bearing and normal gait were allowed after 3–4 weeks. They were allowed to return gradually to sports activities 2–3 months after the operation. Radiographs were taken after 6 months, and if healing of the osteotomy seemed normal, the cortical screws were removed after an average of 10 months under epidural or local anesthesia.

The patients were called for a late follow-up after a minimum of 4.8 years, and 29 of them attended (30 operated knees). A further 5 patients were interviewed by telephone. The outcome of the operation was assessed, any complaints or symptoms recorded, and subjective satisfaction was graded using the criteria of Crosby and Insall (1976). Radiographs were repeated at the follow-up.

Results

2 patients had a mild wound infection, which healed uneventfully. Other early complications included 3 cases with early redislocation, 1 of which was successfully treated with vigorous muscle exercise. 2 pa-

Table 2. Length of patella : length of tendon-ratio (LP:LT), lateral patellar tilting (LPT) and lateral patellar dislocation (LPD) preoperatively and at follow-up, mean (SD)

	n	LP:LT		LPT (°)		LPD (mm)	
		Preop.	F-U	Preop.	F-U	Preop.	F-U
All	35	0.82 (0.10)	0.85 (0.21)	19.1 (8.8)	16.8 (9.1)	6.6 (6.6)	6.3 (5.1)
RD	21	0.75 (0.11)	0.80 (0.12)	17.4 (8.1)	15.8 (9.9)	4.7 (5.5)	4.9 (6.1)
CS	14	0.89 (0.19)	0.87 (0.13)	22.2 (9.2)	20.9 (12.1)	9.9 (7.1)	8.4 (6.0)

RD recurrent dislocations, CS chronic subluxation.
None of the changes between RD and CS groups and preoperative and follow-up values are statistically significant (Student's t-test).

Table 3. Long-term results at follow-up, according to the criteria of Crosby and Insall (1976)

	n	Excellent	Good	Fair to poor
All	35	10	17	8
RD	21	6	10	5
CS	14	4	7	3

RD recurrent dislocations, CS chronic subluxation.

Differences between RD and CS groups are not significant (Fisher's exact test).

Excellent: No pain, normal activity, including all sports, full range of motion. Knee subjectively normal.

Good: Occasional discomfort, feelings of stiffness or instability, no participation in contact sports, slight loss of flexion. Knee improved or normal.

Fair to poor: Pain most of the time, symptoms altered but because of recurrent subluxation or significant loss of flexion, further surgical treatment required in some instances.

tients required a re-operation, which stabilized the patella in 1 of them, but the other was still experiencing dislocations, this time medially. She was later reoperated in another hospital, but still has occasional medial dislocations. 1 man suffered from persistent pain in the tubercle 2 months after the operation: non-union was suspected and a cylinder cast was applied for 1 month. The patient recovered normally thereafter. 1 patient fell when dancing 2 months after the operation, and suffered a tibial fracture through the distal fixation screw site. Her leg was placed in a long cast for 3 months and she recovered uneventfully.

After an average follow-up of 6 years, the patella was stable in all but 1 of the 35 controlled cases. 1 woman after 3 operations was still suffering from medial dislocations. 9 patients complained of anterior knee pain at exertion. 2 patients had occasional knee effusions after exercise. 5 of the patients with knee symptoms had radiographic evidence of patellar arthrosis, usually mild. Symptom-free arthrosis was not detected in any of the 30 radiographically controlled knees. Of the 16 patients who had been athletically active before their knee problems, 10 had returned to their previous level, while 5 had continued athletic activities less intensely.

LPD and LPT changed insignificantly after the operation (Table 2). Pathological SA, LPT or LPD preoperatively did not predict a poor outcome. The only patient with a preoperatively pathological Q-angle had complete relief of her symptoms.

27 of the 34 evaluated patients (35 knees) considered their final outcome as excellent or good, while none felt the knee to be worse than before the operation (Table 3). 4 of the 8 dissatisfied patients had arthrosis. 6 of the 8 had a lateral release performed, while only 2 had their tubercle transferred distally (3 and 7 mm, respectively). Of the 2 most dissatisfied patients, the first (a woman, 28 years at first operation) still has medial dislocations. The second dissatisfied patient, a woman already 45 years old at operation, is now, after a follow-up of 5 years, somewhat disabled because of occasional knee symptoms on normal walking. Both of these patients had mild patellar arthrosis at follow-up .

Discussion

Serious complications, such as deep venous thrombosis, pulmonary embolism (Brown et al. 1984) and compartment syndrome (Wall 1979) have been reported in association with cast immobilization after tibial tubercle transfer operation. No such complications were encountered in our patients.

Patellar chondromalacia and patellar arthrosis are well-known late complications of the unstable patella, after both closed and open treatments. Some studies have follow-up periods up to 19–54 yeras, and they conclude that some degree of patellar arthrosis develops almost inevitably (Hampton and Hill 1975, Barbari et al. 1990, Arnbjörnsson et al. 1992). Crosby and Insall (1976) preferred soft tissue procedures to tibial tubercle transfer, as they considered medial tubercle transfer to be responsible for the arthrosis. The question whether arthrosis is an inevitable complication of the patellar instability, or is due to overly aggressive operative treatment, remains unsolved. Surgery that increases patellofemoral pressure may speed up the development of arthrosis, therefore posterior transfer of the tibial tubercle should be avoided. We believe that an operative method combining tubercle elevation with medialization (e.g., Elmslie-Trillat proce-

dure modified by Brown et al. 1984), can prove advantageous, as it will further reduce patellofemoral pressure.

In our study, all 3 of the patients aged over 30 at operation were dissatisfied with the outcome. 2 had occasional knee pain or poor tolerance of exertion, while the third had anterior knee pain and radiographic arthrosis.

No standard treatment of recurrent patellar dislocation or subluxation can be recommended, but each case must be carefully assessed prior to the operation. If abnormal patellar tracking must be corrected, the operative treatment we describe offers advantages, as it gives good control of dislocations and allows free range of distal and medial transfer of the tubercle without posteriorization. We have also shown that the potentially harmful cast immobilization can be omitted safely.

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