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A Modified Hauser Procedure for Recurrent Dislocation of the Patella

A Long-term Follow-up Study with Special Reference to Osteoarthritis

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Summary. A modified Hauser operation was used for the treatment of recurrent dislocation of the patella. Thirty-seven patients (40 knees) were traced for the purpose of long-term follow-up with regard to subjective and objective results and the degree of osteoarthritis in the patellofemoral joint. The mean follow-up time was 18 years. Only 12% of the patients had objectively satisfactory results, but 48% were satisfied with their operation. There was no correlation between the opinion of the patients and the objective findings. Dislocation recurred in 20% of the knees. More than two-thirds of the patients had some degree of osteoarthritis, and a poor result was always combined with osteoarthritis. The incidence of osteoarthritis increased with the time of follow-up and the age of the patient, but it was also found in younger patients. It seems that distal realignment of the patella enhances the development of osteoarthritis.

Zusammenfassung. Eine modifizierte Hauser-Operation wird in der Behandlung von rezidivierenden Luxationen der Patella benutzt. Für eine Langzeit-Kontrolle der subjektiven und objektiven Operationsresultate und des Entwicklungsgrades von Arthrosen des Femoropatellargelenkes war es möglich, 37 Patienten (40 Kniegelenke) wiederzufinden. Die durchschnittliche Zeit der Kontrolle war 18 Jahre. Nur 12% der Patienten hatten ein objektiv zufriedenstellendes Resultat, aber 48% der Patienten waren mit ihrer Operation zufrieden. Es gab keine Korrelation zwischen der Auffassung der Patienten betreffend des Operationsresultates und den objektiven Befunden der Untersuchung. In 20% der Kniegelenke kamen wieder Luxationen der Patella vor. Mehr als zwei Drittel der Patienten hatten viel oder wenig Arthroseentwicklung in dem Femoropatellargelenk, und ein schlechtes Resultat war immer mit einer Arthrose kombiniert. Der Befund der Arthrose vermehrte sich mit dem Zeitraum zur Kontrolle und dem Alter der Patienten, aber es lagen Arthrosen auch bei den jüngeren Patienten vor. Man hat den Eindruck, daß die Distalversetzung der Tuberositas tibiae die Entwicklung der Arthrose beschleunigt.

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Several procedures have been advocated to realign the patellofemoral joint in the treatment of recurrent patellar dislocations. The different procedures can be divided into two main groups, one using proximal soft tissue reconstruction and the other various methods of transferring the patellar tendon insertion. In 1938, Hauser described his method of "tibial tubercle transfer." Several modifications of this method have been used during the years. Most reports indicate satisfactory results with a low recurrence rate, but some authors report late osteoarthritis as a frequent complication (Crosby and Insall 1976). There are indications that the results became more unsatisfactory with time, but only a few of the series reported have a follow-up time that is long enough to estimate the real frequency of osteoarthritis. The aim of this study was to assess the effectiveness of the described procedure and the incidence of late osteoarthritis in a long-term follow-up series.

Material and Methods

Between 1961 and 1971 43 patients (48 knees) with recurrent subluxation or dislocation of the patella were treated operatively with a modified Hauser method. Thirty-seven patients (40 knees) were traced for follow-up, 34 women (37 knees) and

3 men. Six patients were lost to follow-up. Thirty-two knees were examined radiographically, 25 of which were also examined clinically. Thirteen patients were only available for an interview. The mean follow-up time was 18 years, ranging from 11 to 21 years. Age at operation ranged from 9 to 52 years, with an average age of 24.

Surgical Technique

The patellar tendon and retinacula are exposed through a long medial parapatellar incision. The medial and lateral capsule are incised along the patella and the patellar tendon. On the medial side a parallel incision is made about 12 mm medial to the first incision. A capsular strip is thus created and extended up into the oblique part of the vastus medialis. The insertion of the patellar tendon on the tibial tuberosity is removed with a bone bloc measuring about 2×2 cm (Fig. 1, left). The tibial tuberosity is then reinserted in a preformed slot in the tibial condyle, which is located about 1 cm medial and 1 cm distal to the original insertion. The exact distance by which the tibial tuberosity has to be transposed is determined in each patient, depending on the actual Q-angle. The medial capsular strip is then tunnelled through the quadriceps tendon and sutured into the incision in the lateral capsule. Finally, the medial capsule is tightened up by suturing the defect from the strip (Fig. 1, right). The deep surface of the patella was examined during the operation, but there was no shaving or drilling of the cartilage. A plaster cast was applied and worn for 4–6 weeks. The patient then began was permitted to be active and quadriceps exercises were begun.

Rating of Results

At follow-up, the patients were questioned regarding pain, patellar stability, ability to run, performing sport activities and satisfaction with the procedure.

The clinical examination included range of motion, degree of lateral rotation of the tibia, apprehension when the patella was displaced laterally with the knee flexed at 30°, lateral subluxation of patella during flexion, retropatellar tenderness and crepitus and patellar stability. The symptoms and clinical findings were evaluated using the demerit point system given in Table 1. The result was considered excellent only in patients with no demerit points. A score between 1 and 5 was considered as good, between 6 and 11 fair and over 11 poor. Patients who had undergone a patellectomy were also considered as having poor results.

Table 1. Demerit point system used for evaluation of symptoms and clinical findings. The latter were rated with respect to their functional importance

Symptoms	Demerit point
Pain	0–3
Patellar stability	0–3
Ability to run	0–3
Performing sport activity	0–3
Satisfaction with the procedure	0–3
Clinical findings	**Demerit point**
Range of motion	
>130°	0
130°–110°	2
<110°	3
Lateral rotation of tibia	
No	0
Yes	1
Apprehension sign	
No	0
Yes	2
Lateral subluxation at flexion	
No	0
Yes	2
Retropatellar tenderness and crepitus	
None	0
Mild	1
Serve	2
Patellar stability	
Stable	0
Increased lateral mobility	2
Subluxation/dislocation	3

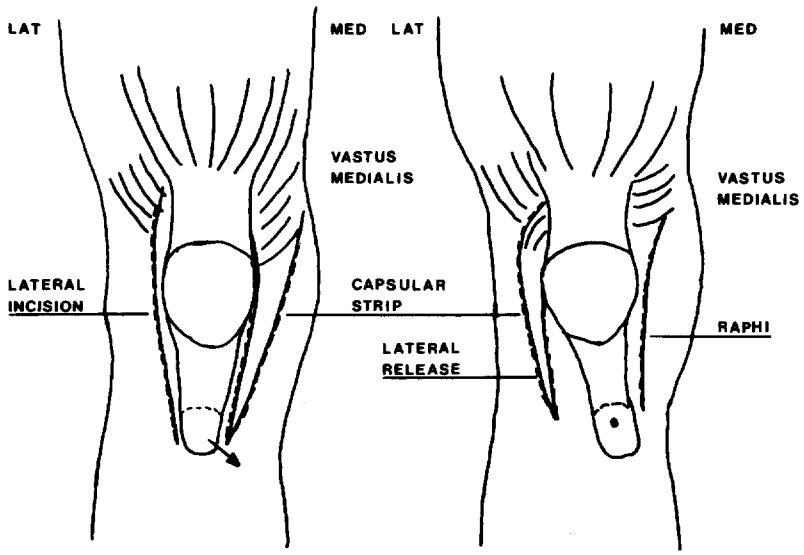

Fig. 1. Modified Hauser operation; surgical technique

Radiographic Examination

Post-operative examination included an anteroposterior view with the knee extended, as well as one lateral and one axial view of the patella with the knee in 30° of flexion. The extent of osteoarthritic changes in the patellofemoral joint and femorotibial joint was evaluated using a four-grade scale. The position of the patella (alta or baja) was measured using the method of Blumensaat. Subluxation of the patella to either side was estimated by the angle of congruence described by Merchant et al. (1974).

Results

Preoperative Findings

Twenty-three knees had a history of recurrent habitual dislocation or subluxation and 17 had recurrent traumatic dislocation. The number of dislocations ranged from 2 to 30 over a period of 3 months to 30 years.

In eight patients the actual knee was operated upon before the modified Hauser procedure, including three meniscectomies, one extraction of loose bodies, one transcondylar fracture of the femur (the dislocations started afterwards), and three patients underwent a medial capsular raphi after the first dislocation. Preoperative radiographic examination showed osteoarthritic changes of the patellofemoral joint in five knees.

Early Complications

Post-operatively, six complications occurred; two deep vein thromboses, one with pulmonary embolism; two superficial wound infections; one peroneal palsy (function restored within 1 year); and in one case there was a prolonged period of decreased range of motion.

Subluxation continued in five knees immediately after the operation, but none underwent early reoperation.

Reoperation

Seven knees had at least one more operation because of persisting subluxation and dislocation. Two underwent the same procedure again, and two underwent transposition of the patellar tendon. Three patients were subjected to a patellectomy, which for one of them was the second reoperation and for another the third. One patient underwent explorative surgery on the knee and is now awaiting patellectomy.

Late Functional Results

In 37 patients (40 knees) the patient's opinion about the operation result was evaluated by the demerit point system mentioned above (Table 2). Twenty-five knees were followed-up by a clinical examination; the results are given in Table 3.

When the subjective and objective results were combined in the 25 knees examined clinically, only 6 could be regarded as satisfactory: excellent and good (Table 4). Nineteen patients had unsatisfactory results and, in addition to these, three had undergone patellectomy. Of 12 patients with subjective excellent or good results, 10 were rated as fair or poor when examined clinically. However, half of the patients with objective fair and poor results were satisfied subjectively. The inability to run was the predominant subjective complaint (17 patients). In 11 knees the operation failed to achieve patellar stability and 3 knees had persistent patellar dislocations. Of them, 3 later underwent patellectomy and 2 are waiting for this operation.

Fourteen of 22 patients with unsatisfactory results either had been operated upon previously, had had osteoarthritic changes pre-operatively, or had had early post-operative complications.

A radiographic examination was carried out in 32 knees. Pre-operatively, 5 knees showed moderate (++) patellofemoral osteoarthritis. At follow-up, all

Table 2. Subjective results in 40 knees operated on with the modified Hauser procedure

Excellent	9
Good	10
Fair	8
Poor	13 (3 patellectomies)
	40

Table 3. Objective results in 25 patients clinically examined

Excellent	2
Good	1
Fair	8
Poor	14
	25

Table 4. Combined rating of subjective and objective results in 25 patients clinically examined

Excellent	1
Good	5
Fair	7
Poor	12
	25

Table 5. Osteoarthritic changes in 32 patients operated upon with the modified Hauser procedure

Degree of osteoarthritis	Osteoarthritis in the patellofemoral joint	Osteoarthritis in the femorotibial joint
0	10	23
+	11	5
++	6	2
+++	5	2
	32	32

Table 6. Results in relation to the degree of osteoarthritic changes in the femorotibial and the patellofemoral joint

Osteoarthritis in the femorotibial joint				Osteoarthritis in the patellofemoral joint		
+++	++	+		+	++	+++
			Excellent			
			Good	3		
		3	Fair	2	1	1
2	2	1	Poor	4	2	4

Table 7. Age at follow-up in relation to the degree of osteoarthritis and results

Osteoarthritis in the patellofemoral joint		Age	Results	
			Unsatisfactory	Satisfactory
None-mild	Moderate-severe			
4		<30	3	1
11	3	30-50	9	5
2	5	>50	7	
25			25	

Table 8. Follow-up time and age in relation to patellofemoral osteoarthritis

No.	Mean age at follow-up (years)	Follow-up time (years)	Degree of osteoarthritis			
			0	+	++	+++
10	32	11-16	5	4		1
22	49	17-21	5	7	6	4
32				32		

but 10 knees showed patellofemoral osteoarthritis in varying degrees (Table 5).

Nine patients had varying degrees of femorotibial osteoarthritis (Table 5). Patella alta was seen post-operatively in 9 knees and patella baja in 3. The patellar position was not related to the incidence of osteoarthritis. Femoropatellar congruence was in the normal limits in 22 knees, whereas 5 had a medial and 5 a lateral subluxation.

Although half of the patients with excellent and good results showed a mild patellofemoral osteoarthritis, more pronounced osteoarthritis was always related to fair or poor results. Osteoarthritis in the femorotibial joint was always related to fair or poor results (Table 6). No relationship between history, type of dislocation or age at operation and osteoarthritis was found. With increasing follow-up time, and hence increasing mean age at examination, there was an increased incidence of degenerative changes. Seven of ten knees over 50 years of age at follow-up were examined clinically and radiographically. All but one had some degree of osteoarthritis in the patellofemoral joint, and they were all considered to be failures. However, more than half of the knees with a short follow-up time and low mean age at follow-up showed radiographic degenerative changes (Tables 7, 8).

Discussion

Recurrent dislocation or subluxation of the patella is a common disorder. As the predominant symptoms are pain and a feeling of giving way, the conditions are often misinterpreted as a meniscus tear, loose body or chondromalacia of the patella. Moreover, all these pathological conditions often exist concomitantly with a defective extensor mechanism. Crosby and Insall (1976) found some kind of intra-articular abnormality in 87% when the knee was explored at the time of the realignment procedure.

In our series, 4 of 40 patients had been operated upon previously for meniscus tear and loose body, but no additional intra-articular abnormalities were corrected at the time of the realignment operation. We have no information from the records about the degree or frequency of chondromalacia of the patella. Grana and O'Donoghue (1977) and Chrisman et al. (1979) found chondromalacia of the patella in about half of the cases operated upon. In fact, degenerative changes of the patella can be considered to be a part of the disease, and the cartilage of all unstable patellae will in time undergo degeneration. This degeneration is the morphological response to dysfunction of the extensor mechanism of the knee. Some authors have suggested that surgical repositioning of the patella may stop the degenerative process (Harrison 1960; Macnab 1962). However, in a series of 44 patients followed up for an average of 16 years, Hampson and Hill (1975) found a correlation between follow-up time and degenerative changes. Crosby and Insall (1976) stated that the prevention of osteoarthritis should not be a reason for realignment of the unstable patella; in fact,

the operation may enhance the incidence of osteoarthritis.

In our series with long-term follow-up (average 18 years) some degree of osteoarthritis was found in 69%. This is in agreement with Hampson and Hill (1975), who found 70% osteoarthritis in their long-term follow-up.

Although there is not always a correlation between radiographic degenerative changes and symptoms, advanced degenerative changes were always combined with poor results in our series. The osteoarthritic changes were not found to correlate with the length of the pre-operative history or the number of dislocations, but with the age of the patient and the follow-up time.

Crosby and Insall (1976) found a lower incidence of osteoarthritis when proximal soft tissue reconstruction was used, but their follow-up time was rather short (8 years). Like Hampson and Hill (1975), we found a correlation between osteoarthritis and increasing age and time since operation. Although we had a rather small number of patients, we found a strikingly high incidence of osteoarthritis in young patients, which suggests that this kind of operation enhances the development of osteoarthritis in the patellofemoral joint.

The overall results in our series were not encouraging, with objectively satisfactory results in 12% of the patients only. However, subjectively, 48% of the patients were satisfied with their operation. The main complaint was the inability to run (42%) and 30% had some degree of pain. Another series with long-term follow-up (Hampson and Hill 1975) also reported a high degree of subjective complaints; 75% of the patients had pain, 88% had retropatellar crepitus.

In 80% of the cases examined, we succeeded in preventing further dislocations. This is in agreement with other reports of distal realignment operations, but somewhat better than reports after some of the proximal soft tissue operations (Madigan et al. 1975). Our conclusion is that this method of surgical treatment of recurrent dislocations is a good preventive measure against further dislocations, but it enhances osteoarthritis.

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