

The use of isolated patellar prostheses in Sweden 1977–1986

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Summary. During 1977 to 1986, 106 patients had isolated patellar prostheses, with both patellar and femoral components, inserted in 20 different hospitals in Sweden. At follow up, 7 years (range 3 to 14 years) after operation, 9 patients had died so that 97 patients with operations on 113 knees were included in this study. Thirty-three (38 knees) had been operated on before or after a prosthesis had been inserted. At follow-up, 75% were satisfied with the operation; 83% had improved, 59% could walk without an aid and 44% had no, or only occasional, pain in the knee. These results encourage the use of an isolated patellar prosthesis in cases of advanced and disabling localised patellar arthrosis. There is no place for this operation in the treatment of chondromalacia.

Résumé. Durant la période allant de 1977 à 1986, 106 patients ont bénéficiés d'une prothèse isolée de la rotule. Les prothèses bipolaire – un composant fémoral en un composant rotulien – ont été mises en place dans vingt hôpitaux suédois. Une étude rétrospective, avec un recul moyen de 7 ans (3–14) a permis d'analyser 113 genoux chez 97 patients, 9 étant décédés. 33 patients (38 genoux) avaient subi une intervention au niveau du genou porteur de la prothèse rotulienne avant ou après celle-ci. Lors du contrôle, 75% de patients étaient satisfaits de l'opération, 83% ayant été améliorés. 59% marchaient sans canne et 44% n'avaient pas ou peu de douleurs. Ces résultats sont en faveur de l'utilisation de prothèse de rotule dans les cas d'arthrose rotulienne isolée lorsque celle-ci est invalidante. Cette prothèse n'a pas de place dans le traitement de la chondromalacie.

Introduction

In most patients with a painful knee caused by patellar chondromalacia or patellofemoral arthrosis, simple conservative treatment is effective, but there are a few who do not respond, or respond inadequately, to conservative treatment. Different operations have been used including debridement of osteophytes and chondrectomy with drilling of the subchondral bone [12], simple debridement [4, 12, 25, 31] and elevation of the tibial tuberosity [8, 9, 21, 23, 26]. Uniformly good results have not been reported and the complications are significant [26, 27]. The radical solution to the problem is excision of the patella [10, 11, 16, 18, 30]. However, this operation has disadvantages leading to decreased quadriceps power, weakness, persistent pain, and instability of the knee in some patients [1, 14, 15, 21, 28].

Prosthetic replacement of the articular surface of the patella is an alternative which has not been widely studied. McKeever first reported the use of a patellar prosthesis in 1955 [22] followed by DePalma et al. 1960 [7]. Early results were encouraging [2, 7, 22, 32], as were some recent reports [3, 24]. Others have not shown good results [13, 19].

This paper describes a follow-up study of the clinical results after operations using an isolated patellar prostheses.

Materials and methods

Since 1975 all knee arthroplasties performed in Sweden have been prospectively registered in a central data bank [5, 17]. From this pool, 106 patients were identified as having had an isolated patellar prosthesis inserted at 20 different hospitals during 1977 to 1986. After 1986, very few such implants were used in Sweden, partly due to the experience of individual surgeons and partly because of discouraging reports [13, 19].

Information about these patients was obtained by reviewing their records and by a questionnaire which included data

Table 1. Number and types of operations performed previous to the index operation in 97 patients (113 knees) operated on with isolated patella prostheses

Type of operation	Number of operation knees
Arthroscopy/meniscectomy	30/17
Osteotomy of the tibia	2/2
Lateral release 18/17	
Transfer of the tibial tuberosity	2/2
Other alignment operations	6/6
Elevation of the tibial tuberosity	11/11
Other operations	6/6
Total number of operations	75/34

for the compilation of the Lysholm score and information regarding the function of the patellar joint. Radiographic evaluation was not done.

After a follow-up at an average of 7 years (range 3 to 13 years) after operation, 9 patients had died and were excluded from the study, leaving 97 patients with 113 operations. There were 33 males and 64 females; 16 patients had bilateral operations, 81 unilateral. The age at operation was 56 years (range 18 to 80 years). The average age at follow-up was 63 years (range 22 to 86 years).

All the prostheses were bipolar with patellar and femoral components. There were 73 Blazina-Bechtel prostheses, 18 Lubinus, 12 Richards type II and 10 miscellaneous other types.

The indication for operation was primary patellofemoral arthrosis in 83 knees, secondary (post-traumatic) arthrosis in 10 and chondromalacia in 20. Twenty-three patients had recurrent dislocation of the patella and 25 knees were operated on because of patellofemoral arthrosis in 20 and chondromalacia in 5.

Thirty-four of the operated knees had undergone a previous operation (Table 1). The total number of operations before the index arthroplasty was 75. Sixty-one operations in 25 knees were performed after the index prosthetic operation (Table 2). There were thus a total of 136 operations performed, other than the index arthroplasty, which were done on 38 knees (33 patients), leaving 75 knees that were operated on with a patellar prosthesis only.

Table 2 shows that 6 patients had an operation for a change of patellar prostheses, 3 had a total knee replacement, one patient had an arthrodesis after patellectomy, and in 5 patellectomies were performed. All these operations were carried out for pain. There was one deep infection.

Table 2. Operations performed on 97 patients (113 knees) after the index isolated patellar arthroplasty

Operation	Number of reoperations						Total
	I	II	III	IV	V	VI	
Change of patellar prosthesis	3	1	1			1	6
Femoro tibial prosthesis		1	1		1		3
Arthrodesis		1					1
Patellectomy	2	1	2				5
Arthroscopy/-tomy	5	4		2			11
Lateral release/medial reefing	5	1	1		1		8
Manipulation of the knee	4	3	1	2			10
Med transfer of the tibial tub.			3	1			4
Osteotomy of the tibia	3	1					4
Synovectomy for infection				1	1	1	3
Extr. osteosyntesm.		2		1			3
Other operations	2	1					3
Total number of operations/knees operated							61/25

The indication for operation in the 38 knees that were operated on more than once was patellofemoral arthrosis in 18, secondary arthrosis in 4, and chondromalacia in 16. The mean age at the index operation in these 33 patients (38 knees) was 46 years (range 18 to 72 years).

Subjective disability in the knee was evaluated by the modified [29] knee scoring scale of Lysholm [20]. The maximum score is 100; a score >83 is rated as good or excellent, 65 to 83 as fair, and <65 as poor [30].

Results

The average Lysholm score before operation was 45 (range 20–64) and at follow up was 62 (6–100). The difference is significant ($P<0.01$; Spearman correlation coefficients). Fourteen per cent of the knees had Lysholm score >83, 33% between 65 and 83, and 53% <65.

Subjectively, 75% (85/113) of the knees were satisfactory or very satisfactory at follow-up; 44% (50/113) had no or only occasional pain from the knee, 83% (94/113) had improved after operation, and 12% (13/113) were worse after operation than before.

The Lysholm score was higher with increasing age ($P<0.01$; Spearman correlation coefficients). In the patients who were 18 to 44 years of age at operation, the Lysholm score at follow-up was 53 (6–100); it was 62 (13–100) in the age group 45 to 60 years and 66 (19–100) in patients aged over 60 years.

Comparison between the preoperative Lysholm score and the scores at follow up in different diagnostic groups shows that the follow-up score was significantly higher in the 83 knees with patellar arthrosis (at $P<0.001$; Wilcoxon matched-pairs signed ranks test). There was no difference between the pre- and postoperative score for the 10 knees with secondary arthrosis ($P=0.063$; Wilcoxon matched-pairs signed ranks test), nor for the 20 knees with chondromalacia ($P=0.5721$; Wilcoxon matched-pairs signed ranks test).

Out of the 20 knees with the diagnosis of chondromalacia, there were 16 which were operated on more than once; these patients were also younger than the

others, averaging 39 years (18 to 59 years) at the index operation. Their score at follow-up was 49 (6–100).

There were 27 knees which had either a lateral release or an advancement of the tibial tuberosity before the index operation. They were no better at follow up than before operation ($P=0.226$; Wilcoxon matched-pairs signed ranks test). The Lysholm score for these patients before operation was 45 (range 20–56) and at follow-up 56 (range 6–87); 10 were operated on for primary arthrosis, 3 for secondary arthrosis, and 14 for chondromalacia.

The 75 patients operated on once had Lysholm scores of 46 (30–64) before, and 66 (13–100) after operation. This difference is significant (at $P<0.001$; Wilcoxon matched-pairs signed ranks test). For those operated on once or more and/or after the index operation, the score before was 45 (25–59) and 54 (6–87) after. This difference is not significant ($P=0.065$, Wilcoxon matched-pairs signed ranks test). At follow-up, only one patient out of the 38 operated on more than once had a satisfactory result.

The knees with previous recurrent patellar dislocation had pre- and postoperative Lysholm scores which did not differ from the rest of the knees (Mann-Whitney U-test; $P>0.05$).

Discussion

We believe that this is the largest series of isolated patellar prostheses which has been recorded, and is the study with the longest follow-up. We found that the clinical state of the operated knees improved after the operation. Most patients were satisfied, and only 19% had pain at rest at follow up, compared to 89% before operation. Almost half had no or only occasional pain on walking. Although the objective Lysholm score was higher after than before operation, it was not very high in many cases, and the overall as-

essment is that these knees were not as good as a total knee prosthesis.

Pain has been used as a main parameter in most reports. No pain, or only occasional pain, has been equated with good or excellent results (Table 3). Our results are the much same as those of Insall et al. [13] and Levitt [19], but they did not compare the pre- and postoperative state of the operated knees. Table 3 shows that there were less than 30 patients in each of the previous series.

Levitt [19] reported 20 patients with a follow-up of 7 years using an unipolar prosthesis for the patella only with 52% of satisfactory results. Insall et al. [13] and Worrell [33] reported bad results in patients who had had a prosthesis inserted with only a patellar component. Arciero et al. [3] and Pedersen [24] used a bipolar prosthesis and had better results. All our patients had been operated with prostheses with patellar and femoral components. The main reason for operation on patients in these reports was arthrosis.

Arciero et al. [3] found that women had better results than men and older patients with isolated patellar arthrosis had a high rate of success, which was also our finding.

Patients with tibiofemoral arthrosis, as well as patellar arthrosis, should not be treated with isolated patellar arthroplasty [3, 13, 19]. Total knee replacement would seem to be the best operation for these patients, as for those with rheumatoid arthritis [6].

An isolated patellar prosthesis for chondromalacia in young patients does not give good results [13, 33]. The Lysholm score at follow-up was lower for patients with chondromalacia than for patients with arthrosis, and they were not significantly better than before operation. Sixteen out of 20 patients with chondromalacia had been operated before and/or after the index operation.

Following the early reports on isolated patellar prostheses, very few of these operations are now performed in Sweden [5]. Our study indicates that there

Table 3. A summary of the literature on isolated patellar prosthesis

Author (year of publ)	Number of patients/op knees	Age at operation	Follow-up (years)	Results	Patellar/femoral component
Arciero et al (1988)	22/25	62 (33–86)	5	72% good or excellent	+/+
Insall et al (1980)	28/29	47 (17–73)	3–6	55% good or excellent	+/-
Levitt (1973)	20/21	46 (20–68)	7 (2–12)	52% satisfactory	+/-
Pedersen (1986)	-/11	66 (31–81)	1–5	64% satisfactory	+/+
Worrell (1986)	14/15	18–38	1–8	20% good or excellent	+/-
This study	97/113	56 (18–80)	7 (2–13)	44% good or excellent	+/+

is no place for patellar prostheses in the treatment of chondromalacia, nor in progressively deteriorating knees which have often been operated on previously. The less good results of total knee arthroplasty in younger individuals [5, 17] lead us to consider the use of patellar prostheses for isolated patellar joint arthrosis. Nevertheless, a patellar prosthesis is hardly ever indicated in young and athletic individuals, and should be considered only as a conservative alternative to patellectomy [6, 13, 19]. For older patients with arthrosis of the patellar joint, a total knee prosthesis yields better results. Between the ages of 45 and 60 years, an isolated patellar prosthesis may be appropriate. The operation yields reasonable results, and improvement relative to the preoperative state can be expected. The operation is relatively minor with little postoperative morbidity. If the patellar prosthesis fails, the knee can be revised to a primary total knee arthroplasty.

References

- Ackroyd CE, Polyzoides AJ (1978) Patellectomy for osteoarthritis. *J Bone Joint Surg [Br]* 60:353
- Aglietti P, Insall JN, Walker PS, Trent P (1975) A new patella prosthesis. Design and application. *Clin Orthop* 107:175–187
- Arciero RA, Toomey HE (1988) Patellofemoral arthroplasty. A three to nine year follow-up study. *Clin Orthop* 236:60–71
- Beltran JE (1987) Resection arthroplasty of the patella. *J Bone Joint Surg [Br]* 69B:604–607
- Bauer G, Knutson K, Lindstrand A (1980) Swedish knee arthroplasties. *Läkartidningen* 77:2088–2091
- Brobäck L-G, Paradystal T (1980) Endoprotes I patellofemoral-leden enligt Blazina. *Läkartidningen* 77:2113–2115
- DePalma AF, Sawyer B, Hoffman JD (1960) Reconsideration of lesions affecting the patello-femoral joint. *Clin Orthop* 18:63
- Ferguson AL, Brown TD, Fu FH, Rutkowski R (1979) Relief of patellofemoral contact of the stress by anterior displacement of the tibial tubercle. *J Bone Joint Surg [Am]* 61A:159
- Ferguson AL (1982) Elevation of the insertion of the patellar ligament for patellofemoral pain. *J Bone Joint Surg [Am]* 64:766
- Geckler EV, Queranta A (1962) Patellectomy for degenerative arthritis of the knee-late results. *J Bone Joint Surg [Am]* 44:1109
- Haliburton RA, Sullivan CR (1958) The patella in degenerative joint disease. A clinicopathologic study. *Arch Surg* 77:677–683
- Insall JN (1967) Intra-articular surgery for degenerative arthritis of the knee. A report of the work of the late K.H. Pridie. *J Bone Joint Surg [Br]* 49:211–228
- Insall JN, Triaz AJ, Aglietti P (1980) Resurfacing of the patella. *J Bone Joint Surg [Am]* 62:933–936
- Kaufer H (1971) Mechanical junction of the patella. *J Bone Joint Surg [Am]* 53:1551
- Kaufer H (1979) Patella biomechanics. *Clin Orthop* 144:51
- Kelly MA, Insall JN (1986) Patellectomy. *Orthop Clin North Am* 17:289
- Knutson K, Lewold S, Robertsson O, Lidgren L (1994) The Swedish knee arthroplasty register. A nation-wide study of 30,003 knees 1976–1992. *Acta Orthop Scand* 65:375–386
- Lewis MM, Fitzgerald PF, Jacobs B, Insall J (1976) Patellectomy. *J Bone Joint Surg [Am]* 58-A:736
- Levitt RL (1973) A long-term evaluation of patellar prosthesis. *Clin Orthop* 97:153–157
- 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
- Maquet P (1976) Advancement of the tibial tuberosity. *Clin Orthop* 115:225
- McKeever DC (1955) Patellar prosthesis. *J Bone Joint Surg [Am]* 37:1074–1084
- Nakamura N, Ellis M, Seedhom BB (1985) Advancement of the tibial tuberosity. *J Bone Joint Surg [Br]* 67:255
- Pedersen D (1986) Patellofemoral endoprotes. Blazina type II hos 11 patienter. *Ugeskr Læger* 148/29:1825–1827
- Pridie KH (1959) A method of resurfacing osteoarthritic knee joints. *J Bone Joint Surg [Br]* 41:618–619
- Radin EL (1986) Anterior tibial tubercle elevation in the young adult. *Orthop Clin North Am* 17:297
- Rozbruch JD, Campbell RD, Insall JN (1979) Tibial tubercle elevation (the Maquet operation): a clinical study of thirty-one cases. *Orthop Trans* 3:291
- Sutton ES, Thompson CH, Lipke J, Kettlekamp DB (1976) The effect of patellectomy on knee function. *J Bone Joint Surg [Am]* 58:537
- Tegner Y, Lysholm J (1985) Rating systems in the evaluation of knee ligament injuries. *Clin Orthop* 198:43–49
- West FC (1962) End results of patellectomy. *J Bone Joint Surg [Am]* 44:1089
- Wiles P, Andrews PS, Devas MB (1956) Chondromalacia of the patella. *J Bone Joint Surg [Br]* 38:95–113
- Worrell RV (1979) Prosthetic resurfacing of the patella. *Clin Orthop* 144:91–97
- Worrell RV (1986) Resurfacing of the patella in young patients. *Orthop Clin* 17:303–309