The Richards type II patellofemoral arthroplasty

26 cases followed for 1–20 years

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ABSTRACT – We followed 26 Richards type II patellofemoral arthroplasties in 24 patients (19 women) for a mean of 11 (1–20) years. Their mean age was 59 (22–90) years. The preoperative diagnoses were primary patellofemoral arthrosis in 17 cases and secondary arthrosis in 9 (8 malalignment, 1 patellar fracture). Patellectomy was later performed for persistent pain or patellar malalignment in 3 cases and a conversion to a total knee arthroplasty for progressive tibio-femoral degeneration or patella malalignment in 2. The mean Knee Society knee score for 21 knees at follow-up was 90 (65–100) points. The patients rated the results of surgery in 9 knees as excellent, 7 good, 4 improved, and 1 unimproved at follow-up. None of the implants showed signs of loosening or infection. The Richards type II patellofemoral arthroplasty yields acceptable long-term results in patients with isolated end-stage patellofemoral osteoarthrosis. Patient selection and patella alignment are important.

Isolated patellofemoral osteoarthrosis (OA) may cause severe pain and functional limitations. The treatment options include: closed management, debridement (Insall 1967), the Maquet procedure (Maquet 1976), patellar resurfacing (Insall et al. 1980), patellectomy (De Palma et al. 1960, Kelly and Insall 1986), spongialization (Ficat et al.1979), patellofemoral arthroplasty (PFA), and total knee arthroplasty (TKA, Laskin and van Steijn 1999). The 2–6-year results with various PFA designs are not uniform, with success rates of 42–88% (Table 1). We evaluated the long-term results of the Richards type II PFA performed in our institution.

Patients and methods

Between 1978 and 1997, 35 primary Richards type II PFAs (2% of all knee implants in our institution) were performed on 33 patients. 9 patients (9

Table 1. Reports of PFA

Year	Author	Type of PFA	n	Average age at surgery (years)	Average follow-up (years)	Success rate
1979	Blazina et al.	Richards types I, II	57	39	1.8	0.8
1985	Torner et al.	Lubinus	96	–	5	0.7
1988	Arciero and Toomey	Richards type II, CFS-Wright	25	62	5.3	0.7
1989	Cartier et al.	Richards types II, III	72	65	4	0.9
1994	Witvoet et al.	Guepar	78	67	5	0.8
1995	Argenson et al.	Medinov	66	57	5.5	0.8
1996	Krajca and Coker	Richards types I, II	16	64	5.8	0.9
1999	de Cloedt et al.	Medinov	45	51	6	0.4–0.8
2001	Present study	Richards type II	26	59	11	0.8

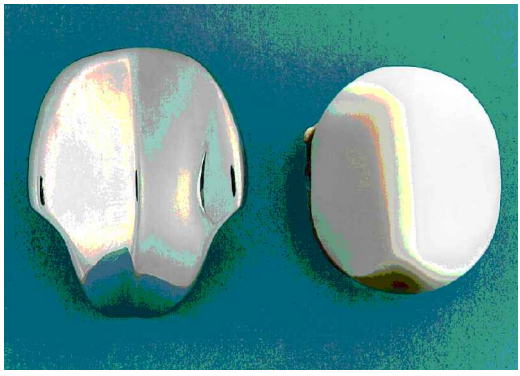
Table 2. Data on 24 patients with 26 Richards type II PFAs

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	f	l	76	STR, STR	s	4	0	0			11	77	65	i	0	0
2 [a]	f	r	65	TTT, AS, AR	s	4	0	0			226	87	50	g	2	0
3 [a]	f	l	73	TTT, AS, STR	s	4	1	0			133	69	50	g	2	0
4	m	r	56		p	4	0	0			185	95	100	e	0	0
5	f	r	71	STR	s	3	0	0			137	100	100	e	0	0
6	f	l	45		p	3	0	0	PAT	57	94					
7	f	l	42		p	2	0	0	NET	6	183	83	65	i	0	0
8	f	l	33	STR	p	2	0	0	NET	12	135	95	80	i	0	0
9	f	r	73	MEN, STR	s	4	0	2			134	73	40	u	0	2
10	f	r	83	STR	s	4	2	0	TKA	37	37					
11	f	r	76		p	4	1	0			42	100	95	e	2	0
12	f	r	73		p	4	0	0			35	88	60	g	0	0
13	f	r	90		p	4	0	0			43	100	0	g	0	0
14	f	r	65		p	4	0	0			51	100	100	e	0	0
15	f	l	55		p	3	2	0	NET	24	237	100	100	e	2	0
16 [b]	f	r	55		p	4	0	2			137	85	80	g	0	2
17 [b]	f	l	57		p	4	0	0			121	94	80	g	0	0
18	f	l	63		p	3	3	0	TKA	92	95					
19	m	l	60	AS	p	4	0	0			199	90	100	g	0	0
20	m	l	43	AS, AS, MEN	p	3	0	0	STR, TTT	8, 17	194	65	80	i	0	0
21	f	r	46		p	4	0	0			237	100	100	e	0	0
22	m	r	25	AS, MEN	p	3	0	0			233	95	90	e	0	0
23	f	l	66		p	4	0	0			237	95	95	e	0	0
24	m	l	39	PFO	s	4	0	0	PAT	36	93					
25	f	r	22		p	3	0	0	PAT	72	87					
26	f	l	78	TTT, AS	s	4	0	0			142	97	100	e	0	0

[a] and [b] were bilateral cases,

A No.
B Gender
C Side
  l left
  r right
D Age at surgery, years
E Previous surgery
  AR arthrotomy
  AS arthroscopy
  MEN meniscectomy
  PFO patellar fracture osteosynthesis
  STR soft tissue patella realignment procedure
  TTT tibial tuberosity transposition
F Type of arthrosis
  s secondary
  p primary
G Preoperative PF-OA grade
H Preoperative medial OA grade
I Preoperative lateral OA grade
J Reoperation, see also legend E
  NET nettoyage
  PAT patellectomy
  TKA total knee arthroplasty
K Interval from PFA to reoperation (months)
L Follow-up (months)
M Knee Society knee score (points)
N Knee Society functional score (points)
O Subjective opinion
  i improved
  g good
  e excellent
  u unimproved
P Follow-up medial OA grade
Q Follow-up lateral OA grade

PFAs) had died of unrelated causes without prosthetic reoperations. The remaining 24 patients (26 PFAs) were followed for a mean of 11 (1–20) years after the operation. 19 were females and 5 males with a mean age of 59 (22–90) years at the time of operation. The indication for PFA was primary patellofemoral OA in 17 cases, secondary OA due to a patellar fracture in 1, secondary OA due to malalignment with or without dysplasia in 8. Surgery had already been performed on 12 knees (Table 2): tibial tuberosity transposition in 3, soft tissue patella realignment procedure in 7, arthroscopy in 7, meniscectomy in 3, arthrotomy in 1, and patellar fracture osteosynthesis in 1. The clinical follow-up examination (21 knees) was done by an independent physician (M.d.W.), using the Knee Society clinical rating system (Insall et al. 1989). The patients were asked to give their opinion at follow-up (21 knees) about the outcome of surgery as compared to their preoperative status: worse,



The Richards type II patellofemoral arthroplasty.

unimproved, improved, good or excellent.

The preoperative tibiofemoral and patellofemoral grades of OA on the radiographs were determined with Altman et al.'s (1986). Preoperative patellofemoral OA was rated as grade 2 (2 cases), grades 3 (7 cases) and 4 (17 cases). At follow-up, standing AP and lateral radiographs, and axial patella views at 30° of flexion were taken to assess the position of the PFA and detect signs of loosening or lateralization. The grade of OA of the medial and lateral compartments was determined and compared to the preoperative findings to assess progression.

Implant

The Richards type II PFA (Richards Medical Company, Memphis, TN, USA), as described by Blazina et al. (1979), consists of an all-polyethylene (9 mm) patellar component with a vertical cam and a cobalt chromium femoral component, both for cemented use alone (Figure). The Richards type I was designed to replace the patellofemoral joint in patients who received a tibiofemoral arthroplasty; type III was intended for replacement of the trochlea in patellectomized patients.

Operative technique

In all patients, the knee was approached via a medial parapatellar arthrotomy. After lateral eversion of the patella, the femoral component size (short or long) was determined by placing templates over the groove, to avert placement too far caudally, which could cause impingement of the anterior cruciate ligament. The trochlear cartilage with subchondral bone was removed by a chisel and burr and a hole was drilled to fix the femoral component. Care was taken to avoid anterior notching of the distal femur. The patella was debrided and the remaining cartilage and subchondral bone resected. A drill guide for fixation holes was placed on the patella and we tried to prevent rotational malposition of the patellar component. The patella tracking was tested through a full range of motion with trial components to ensure stability before the definitive components were cemented. The postoperative management was the same as the TKA protocol with continuous passive motion for 1 week and protected weightbearing with crutches for 6 weeks.

Results (Table 2)

2 knees were manipulated under general anesthesia, and 2 realignment procedures were required in 1 case. Arthroscopic debridement was done in 3 cases. A patellectomy was performed for persistent pain or patella malalignment at a later stage in 3 cases. Conversion to a TKA for progressive tibiofemoral OA or patella malalignment was done in 2 cases. None of the 5 removed polyethylene components showed macroscopic signs of wear. None of the implants were revised for loosening. At follow-up, the mean Knee Society knee score for the 21 knees was 90 points (65–100), the functional score 78 points (0–100). 17 of 21 patients could ride a bicycle. In the patients' view, 9 knees were excellent, 7 good, 4 improved, and 1 unimproved at follow-up. Radiographically, none of the implants showed signs of loosening, lateralization or infection. Mild progression of tibiofemoral OA was noted in 3 of 21 knees.

Discussion

The patellofemoral joint is sometimes referred to as the forgotten joint of the knee. Isolated degeneration of the patellofemoral joint, with or without dysplasia or instability, may cause severe functional limitations that warrant surgery. However, prosthetic replacement of the patellofemoral joint should be performed only in selected cases of isolated end-stage OA, if closed management has

failed (Blazina et al. 1979, Krajca-Radcliffe and Coker 1996). Mild tibiofemoral OA and patellofemoral chondromalacia are a contraindication for PFA (Arciero and Toomey 1988, Argenson et al. 1995). Only 2% of all knee implants used in our institution were PFAs, suggesting that the indication is narrow. Preoperative stress radiographs were suggested to prevent implantation in cases of mild tibiofemoral OA with possible deterioration, as shown by 3 cases in our series (Argenson et al. 1995). Progressive tibiofemoral OA required conversion to a TKA in 2 of our patients after a mean follow-up of 11 years. PFA is a technically demanding procedure and care should be taken to avoid superior or inferior placement of the femoral component, causing maltracking, catching or impingement of the patellar component (Cartier et al. 1990). Since some patients have patella instability preoperatively, special attention should be paid to intraoperative testing of patella alignment and stability. Blazina et al. (1979) reported a one third reoperation rate (mainly realignment procedures) in their series of PFA. The short- to medium-term results of several types of PFAs varied (Table 1), and comparison of implants was difficult since different objective and subjective scoring systems were used. The success rates of the Richards I and II, Lubinus (Waldemar Link, Hamburg, Germany), Medinov Autocentric (Roanne Cedex, France), CFS-Wright (Wright-Dow Corning MFG, Arlington, TN, USA), and Guepar (Benois girard Bagneux, France) varied between 0.4 and 0.9 after 2–6 years, and none of the PFAs seemed to be better. Laskin and van Steijn (1999) advocated TKA with patella resurfacing over PFA in older patients with isolated patellofemoral OA. They followed 53 patients (mean age 67 years) for a mean of 7 years. 1 knee was revised and 4 of the knees caused residual anterior knee pain. Our long-term study indicates that the Richards type II PFA yields acceptable results in selected cases of isolated end-stage patellofemoral OA, although reoperations are common.

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