Survival of the Townley knee

360 cases with 8 (0.1–15) years' follow-up

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We evaluated 360 Townley arthroplasties in 167 OA and in 193 RA knees, performed between 1978–1986. 35 revisions were performed during the follow-up time. The main reasons for revision were aseptic loosening (18 knees), instability (6 knees), and infection (5 knees). The durability of different prosthesis components and of different tibial trays in relation to loosening were analyzed separately. The probability of the prosthesis remaining in situ was 94 percent after 5 years and 89 percent after 10 years. The success rate at 10 years was not significantly higher in arthrosis (94 percent) than in rheumatoid arthritis (85 percent). The other patient-related factors, age, sex, weight, did not influence the results. Comparing the different prosthesis components and the different designs of the tibial tray, we found no differences in success rates.

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The Anatomic Total Knee (Townley) was one of the first bicondylar endoprostheses to become widely used in numerous countries, including Scandinavia. We report our overall survivorship of the cemented Townley prosthesis and the reasons for revisions.

Patients and methods

From 1978 to 1986, 280 cemented primary total knee arthroplasties with the Townley prosthesis (DePuy, Warsaw, Indiana, U.S.A.) were performed at the Middle-Finland Central Hospital and 80 arthroplasties at the Tampere University Hospital in 167 arthrosis (OA) and in 193 rheumatoid arthritis (RA) patients (Table 1).

Originally the all-polyethylene tibial component of the Townley prosthesis had a horseshoe shape, saving both cruciate ligaments. The more recent total plateau model requires resection of both the ligaments. Since 1981, both these models were also available with metal-backing (Table 2). The design of the femoral component has remained the same throughout the study period. For the resurfacing of the patella, an all-polyethylene dome-shaped patella prosthesis was used in 88 (46 percent) RA knees and in 63 (38 percent) OA knees.

All operations have been carried out by a senior orthopedic surgeon. All patients were given antibiotic prophylaxis, but thrombosis prophylaxis was not given as a routine. The data for this study were gathered from the patient records and the national population register (date of death). Information about possible revision operations in other hospitals was solicited from all living patients by postal and telephone questionnaires. 119 patients (133 knees) died during the follow-up period, 48 OA and 71 RA patients. The mean follow-up period for the whole patient material was 8 (0.1–15) years.

The survivorship analyses were performed as standard actuarial life tables, with 1-year intervals. The survival curves were constructed using the standard Kaplan-Meier technique. Each knee arthroplasty was entered only once and had 1 of the 3 possible outcomes for each particular interval: success, failure or withdrawal (Armitage 1990). In our

Table 1. Clinical data of the 360 patients

	OA	RA
Men	24	21
Women	127	135
Knees	167	193
Mean age (range)	69 (41–85)	63 (33–80)
Mean weight, kg, (range)	71 (47–107)	64 (41–92)
Follow-up time, yrs, (range)	8 (0.2–15)	8 (0.1–16)

Table 2. The distribution of the different tibial components and the number of the revisions

Tibial model	n	OA	RA	Number of revisions	
				For tibial components	All
Horseshoe, polyethylene	153	73	80	8	19
Horseshoe, metal-backed	50	24	26	2	4
Total plateau, polyethylene	60	24	36	2	6
Total plateau, metal-backed	97	46	51	4	6
Total	360	167	193	16	35

Table 3 . Overall survival of the Townley knees

Interval years	Entering	Removed interval	Withdrawn	At risk	Survival percent
0–1	360	7	7	357	100
1–2	346	6	10	341	98
2–3	330	2	7	327	96
3–4	321	1	13	315	96
4–5	307	6	12	301	95
5–6	289	4	15	282	94
6–7	270	1	31	255	92
7–8	238	0	43	217	92
8–9	195	3	56	167	92
9–10	136	1	38	117	90
10–11	97	2	23	86	89
11–12	72	2	17	64	87
12–13	53	0	20	43	85
13–14	33	0	22	22	85
14–15	11	0	10	6	85
15–16	1	0	0	1	85
16–17	1	0	1	1	85

present study, a 95 percent confidence interval has been estimated at given times (Nelissen et al. 1992).

We have used revision as the end-point for survivorship. Revision was defined as the removal, replacement or additon of prosthetic components during the observation period. The overall survivorship was estimated for the whole prosthesis and separately for the different components (femoral, tibial, patellar). Regarding the durability of different prosthesis components and the different tibial trays, the revisions because of other reasons (infection, instability, fracture) were excluded from this analysis. The well-fixed components, which were removed at the revisions, were transferred to the withdrawal group at the date of the revisions. The Mantel-Cox test was used in the statistical analysis.

The patient-related variables—diagnosis, sex and weight—were subjected to survivorship analysis to determine their influence on the revision rate of the total knee arthroplasty. Both diagnostic groups were assessed separately. To evaluate the influence of age at the time of surgery, the patients were divided into 2 categories: 65 years and younger or over 65 years.

According to body weight, the patients were divided into 2 groups, the light and the heavy (both sexes separately), the median being the divisor; the median was 66 kg for women and 76 kg for men.

Results

During the observation period, 35 knees (10 percent) were revised (Table 2), 15 OA (9 percent) and 20 RA (10 percent). 3 knees were revised twice.

In the revision operations, a re-arthroplasty was performed in 25 knees. In 8 of these a hinge-type prosthesis was used, 8 knees were arthrodesed. In 1 knee the patellar component was removed due to aseptic loosening, and in 1 knee patellar resurfacing was performed because of anterior knee pain.

Deep infection occurred in 8 knees (2 percent), 3 OA and 5 RA, 2 of the latter were hematogenic. 1 infected knee was treated by re-arthroplasty, 5 required arthrodeses, and in 2 knees a debridement

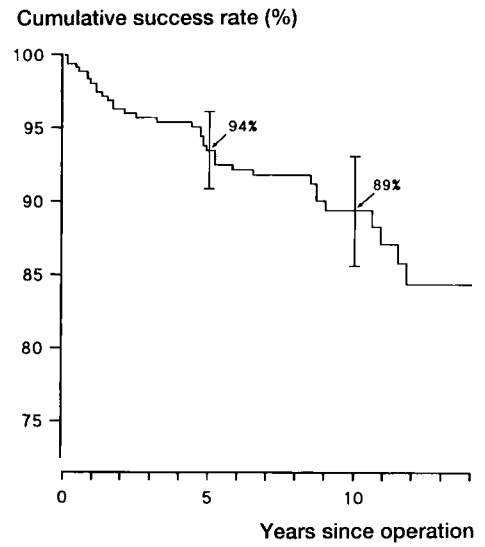

Figure 1. The overall survival curve of the Townley knee. Cross-bars indicates 95% confidence interval.

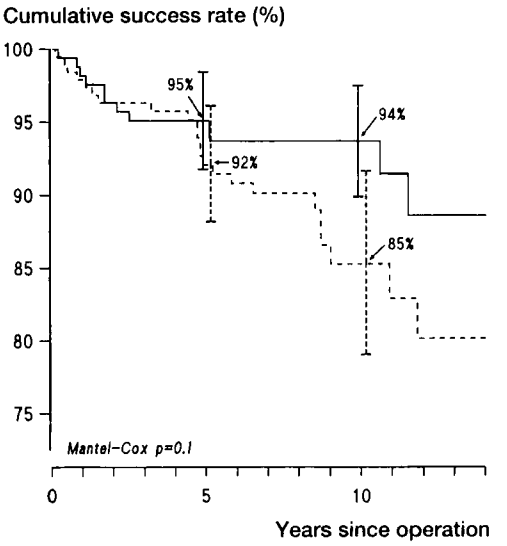

Figure 2. The overall survival curves of the Townley knee performed for arthrosis (solid line) and for rheumatoid arthritis (hatched line). Cross-bars indicates 95% confidence interval.

Table 4. Indications for revisions

Indication	OA	RA	Total
Aseptic loosening	6	12	18
Infection	1	4	5
Instability	4	2	6
Condylar fracture of the femur	1	1	2
Fracture of the patella	–	1	1
Rupture of the wound	1	–	1
Anterior knee pain	1	–	1
Malrotation of the femoral component	1	–	1
Total	15	20	35

and application of Septopal® beads were performed. 1 of these cases healed, and the other patient died of an unrelated disease 1 month after the revision.

The overall CSR curve is presented in Figure 1. The overall cumulative survival rates (CSR) were 94 percent at 5 years and 89 percent at 10 years (Table 3, Figures 1 and 2). No significant difference in the CSR of different patient-related subgroups (sex, age, and body weight) was found.

The overall CSR of the femoral component was 96 percent at 5 years and 92 percent at 10 years; that of the tibial trays (all designs) was 94 percent and 91 percent, respectively. The overall CSR of the patellar component was 95 percent at both 5 and 10 years.

No difference was found between the subgroups of the tibial component at 5 years. Except for the subgroup of the all-polyethylene "horseshoe" knees, the number of the other component groups were too few for valid analysis at 10 years.

Discussion

Our overall CSR (93 percent at 5 years and 89 percent at 10 years) is comparable to the multicenter study of Knutson et al. (1986) where 932 Townley knees had an 89 percent CSR at 6 years and in the whole 2- or 3-compartmental group 87 percent. Scuderi et al. (1989) reported 90 percent success in posterior condylar knees at 15 years and 98 percent in posterior stabilized knees with a metal-backed tibial component at 7 years. There are many reports with a much lower CSR: Tew and Waugh (1982) reported 72 percent at 6 years in 365 knees, using the Freeman, Sheenan and Manchester prostheses, Grimer et al. (1984) 80 percent at 7 years and Lettin et al. (1984) 83 percent at 8 years with the Stanmore hinged prosthesis.

In many earlier series (Aglietti and Buzzi 1988, Goldberg et al. 1988), loosening of the tibial component has been a major reason for revision and this was confirmed in our series. Knutson et al. (1986) and Rand and Ilstrup (1991) reported a higher CSR in RA than in OA. We detected no significant difference between these 2 diagnostic groups. Scuderi et al. (1989) also found no significant difference based on diagnoses.

We noted no difference in the CSR between any other patient-related subgroups. There were no differences in the CSR due to sex, age or weight in the study by Scuderi et al. (1989). In the study by Knutson et al. (1986), however, there was a higher CSR in those older than 65 years and a similar finding was reported by Rand and Ilstrup (1991).

We conclude that the long-term durability of this bi/tricompartmental cemented Townley knee is satisfactory and comparable to many other bicondylar designs. We emphasize that in analyzing a knee arthroplasty series by the survivorship method the overall CSR can be misleading, if the aseptic loosening of some implant is the topic of study. In analyzing the material and interpreting the results, one must consider how many revisions were performed for other indications than aseptic loosening and how many well-fixed components were removed.

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