

Soft-tissue procedures for the exposed knee arthroplasty

18 cases followed for 7 (1-17) years

Elsebeth Siim, Isa Elizabeth Jakobsen and Sandor Medgyesi

Reconstructive surgery was performed in 18 knee arthroplasties because of wound-healing problems or skin necrosis. The procedure, after debridement, included myocutaneous, muscle flap, and split-skin grafts. Revision was necessary in 6 cases. After 1-17 years, 6 patients had died, 2 had had a low femur amputation, and 5 had had an arthrodesis. Five

patients had retained the prosthesis, although 3 of them had considerable pain and poor mobility; only 2 patients were tolerably painfree and had acceptable mobility. Patients with an exposed knee endoprosthesis should be referred to centers with special competence in plastic reconstructive surgery.

Department of Plastic and Reconstructive Surgery, Rigshospitalet, 9 Blegdamsvej, DK-2100 Copenhagen, Denmark
Tel +45-31-396633 ext 3035
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Salvage of an infected knee arthroplasty or of an exposed prosthesis is a difficult problem: it is costly and time-consuming, and there is a considerable risk that the prosthesis will have to be removed and an arthrodesis performed. Recently, several authors (Bengtson et al. 1987, Greenberg et al. 1989, Lesavoy et al. 1989) have reported good results following coverage with muscle and musculocutaneous flaps. These achievements have prompted our present review of the long-term results of similar operative procedures performed at our department during the past 17 years.

Patients

Between 1972 and 1988, 18 patients (5 men and 13 women) with knee arthroplasties were referred to our department because of either skin necrosis of the knee or infections/fistulas around their prosthesis. The age of the patients ranged from 31 to 91 years, and the primary diagnosis was arthrosis in 11 cases and rheumatoid arthritis in 7 cases.

Reconstructive procedures were carried out 3 weeks to 10 months after skin problems following arthroplasty had become evident (Table 1). All the patients received prolonged, intensive, systemic antibiotic treatment, and some of the patients also received local application and/or suction/irrigation drainage.

Methods

Four patients had their skin problems solved with a mesh graft. Because of only a partially successful graft, 2 patients underwent reoperations with a fasciocutaneous and a gastrocnemius flap. The other 14 patients had a primary fasciocutaneous flap and/or a gastrocnemius flap. In 10 of these patients, a single procedure provided stable coverage, whereas the 4 remaining patients required reoperations: 1 had a supplementary mesh graft, and 3 had various types of flap surgery (Table 1). The patients were usually immobilized for 10-14 days postoperatively. The observation period ranged from 1 to 17 years.

Results

The immediate results of the reconstructive surgery were promising, for a solid skin cover was achieved in 10 patients shortly after a single operation. However, 6 patients underwent a second reconstructive procedure; in 1 of these patients, the second operation was not required until 7 years later.

The late follow-up revealed that the complications recurred (Table 1). Due to infection 2 patients had had a femur amputation, and 5 patients had had an arthrodesis due to infection and/or intractable pain. The arthrodesis did not provide pain relief in 3 patients, whereas the other 2 patients were free from pain. None

Table 1. Observations in 18 patients with total knee arthroplasties

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	64	M	R	4	+		4	1	2	1		6	+		+					1
2	73	F	A	2		+	6	3										+	70	6
3	71	M	A	4	+	+	4	1					+			i/2				4
4	68	F	R	6	+	+	5	4		2						p/2	+	+		8
5	47	F	A	2	+	+	12	1		3				i/3					90	13
6	49	F	R	1	+		4	5, 6	3	2			+							1
7	31	M	R	9	+	+	10	4, 6	4	4	2	108				i/2	+			17
8	39	M	A	3, 4	+		5	3	4	4	3	4		p, i/2			+		90	9
9	58	F	A	6	+		9	3		-						i/5		+		6
10	61	F	A	2	+	+	4	4		-					+			+	20	6
11	63	F	A	8	+	+	6	1					+							2
12	45	F	A	8	+	+	44	1	6	5		5	+							1
13	39	F	A	4	+		8	2		-						p, i/4	+	+		7
14	56	F	R	1	+		3	1		-						p, i/3	+	+		6
15	66	F	A	1	+	+	10	1		-					+				70	2
16	91	F	A	2	+	+	45	1		-					+			+	50	5
17	37	M	R	6	+		6	3	1	4		2								1
18	55	F	R	5	+		28	2	5, 6	3		364			+				90	7

A	Patient no.	I	Type of first operation	M	Weeks from the first to the second reconstructive operation
B	Age	1	medial fasciocutaneous flap	N	Died during the observation period
C	Sex	2	lateral fasciocutaneous flap	O	Femur amputation/indication/time after reconstructive surgery in years
D	Diagnosis	3	mesh graft	i	infection
E	Type of prosthesis	4	medial gastrocnemius flap	im	immobility
1	Kinematic	5	lateral gastrocnemius flap	p	pain
2	Guepar	6	split-skin graft	P	Retained prosthesis
3	Geomedic	J	Type of second operation	Q	Prosthesis removed/indication/time after reconstructive surgery in years
4	Insall-Burstein	K	Complications after first operation	R	Arthrodesis
5	Marmor	1	infection	S	Pain
6	St George	2	fistula	T	Mobility, degrees
7	Walldius	3	partial flap necrosis	U	Years of follow-up
8	unknown	4	no take		
F	Skin necrosis	5	partial take		
G	Infection (positive swab cultures)	6	painful fibrosis		
H	Weeks from evident skin necrosis/infection to reconstructive surgery	L	Complications after second operation		

of these arthrodectic patients had skin problems. Among the 5 patients who retained their prosthesis, 2 suffered from very limited mobility, and 2 others had acceptable mobility but painful function of the knee. Only 1 patient had neither pain nor reduced knee function. Six patients died during the observation period, and none of them had been referred for further reconstructive surgery or other hospital treatment.

Discussion

The superficial position of the knee prosthesis, the need of early active motion, the possible increased skin tension, and the compromised blood supply due to previous arthrotomy incisions may lead to failure, because infection is easily contracted when wound healing is disturbed.

It is well known that fasciocutaneous flaps and muscular tissue have proved to be of great value in reconstructing problem wounds due to their rich blood supply and superior resistance to infection (Arnold and Prunes-Carrillo 1981, Tobin 1985, Lesavoy et al. 1989).

Despite the promising immediate results in our series, late follow-up did not reveal much success. In general, when exposure of the prosthesis is impending or complete, early reconstructive surgery is crucial to salvage the jeopardized prosthesis, because prolonged infection may lead to bone loss and poor quality of the remaining bone and surrounding soft tissue. Solid coverage of the jeopardized knee is best done within 1 week after the infection has become evident (Greenberg et al. 1989).

All of our 18 patients waited at least 3 weeks for reconstructive surgery after skin problems had made their debut, and 2 patients had to wait for 10 months.

Successful arthrodesis after failed total knee arthroplasty is also difficult to achieve (Knutson et al. 1984, Behr et al. 1985). In our series, 4 out of 5 patients with an arthrodesis continued to experience pain.

Infection of a total knee arthroplasty is hazardous, and successful salvage is a major challenge to the surgeon. Early reconstructive surgery with sufficient solid skin coverage and elimination of the infection offer the patient the best chances of obtaining a good functional result and a shorter stay in the hospital. Such complicated arthroplastic problems should be referred to experienced surgeons.

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