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Soft tissue cover for the exposed knee prosthesis

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Abstract This study assess the use of muscle flaps to cover exposed knee prostheses and emphasises the need for early plastic surgery consultation. In five of the six patients studied the wound was successfully covered and the knee prosthesis salvaged with a reasonable functional outcome.

Résumé Cette étude montre l'intérêt des lambeaux musculaires pour couvrir les prothèses de genou exposées, et insiste sur la nécessité d'une consultation précoce de chirurgie plastique. Dans cinq des six cas étudiés la prothèse de genou a été préservée avec une fonction satisfaisante.

Introduction

Approximately 25000 knee replacement operations are performed in the United Kingdom each year [2]. A 5% wound dehiscence and infection rates associated with this operation [6].

This study describes our experience of muscle flaps used to cover exposed knee prostheses and the functional outcome associated with these procedures.

Patients and methods

Six consecutive patients seen between 1991 and 1994 with wound dehiscence following knee replacement were studied. Five patients had undergone total knee replacement for primary osteoarthritis, and one patient had a knee replacement following excision of a giant cell tumour of the proximal tibia. The duration of wound breakdown was recorded. All patients had received systemic antibiotics prior to referral. Microbiological wound swab cultures

Table 1 Grade of knee prosthesis exposure [8]

Grade	Extent of wound dehiscence
0	Simple erythema, no superficial necrosis
1	Skin necrosis and wound breakdown, no sinus into the joint
2	Extensive skin necrosis with a wound sinus into the joint
3	Deep wound dehiscence with a sinus, little or no prosthesis exposure
4	Deep wound dehiscence, with overt prosthetic exposure

were taken prior to any procedure. Patients' wounds were graded according to the Laing classification [7] (Table 1).

All wounds were irrigated with 1 l normal saline mixed with 160 mg of gentamicin instilled over 24 h each day for 5 days. Systemic antibiotics were administered preoperatively on the basis of wound swab culture results: if no growth was found on wound swabs, broad-spectrum cephalosporins were administered.

Soft tissue cover was achieved using either a medial gastrocnemius muscle flap or a free rectus abdominis muscle flap (Figs. 1, 2).

Patients were followed for minimum 12 months. Functional outcome was assessed using the Hospital for Special Surgery Knee Rating System [5].

Results

The mean follow-up was 24 months. There were no early or late complications related to the wound in five patients. In one patient the flap as a result of thrombosis at the anastomosis. In this case the prosthesis was removed and an above-knee amputation was performed (Table 2).

Each of the five patients who had retained the knee prosthesis had a good knee score (range 74–83 points, mean 79 points). The function scores, however, were more disappointing (range 10–85 points, mean 47 points; Table 2).

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Table 2 Patient characteristics (*Rectus* free rectus abdominis flap; *Gastroc* medial gastrocnemius flap; *OA* Osteoarthritis)

Case No	Age	Sex	Indication	Duration of exposure (months)	Wound grade	Wound swab culture	Flap type	Complications	Follow-up (months)	Knee score at follow-up	Function score at follow-up
1	35	M	Tumour	3	4	none	Rectus	None	20	78	80
2	73	M	OA	1	3	non	Gastroc	None	35	83	85
3	82	F	OA	1,5	3	none	Gastroc	None	26	82	-10
4	72	M	OA	1	3	<i>Streptococcus faecalis</i>	Rectus	Flap Thrombosis	12	N/A	N/A
5	69	F	OA	1	3	<i>Streptococcus faecalis</i>	Gastroc	None	26	74	45
6	88	F	OA	1	3	Haemolytic Streptococcus	Gastroc	None	27	78	35

Fig. 1 Preoperative grade IV wound breakdown in case 1 **Fig. 2** Postoperative soft tissue cover in case 1

Discussion

With the growing use of total knee arthroplasty associated with an ageing society, large numbers of wound complications are inevitable. Eradication of deep infection in total knee replacement is very difficult [6]. The findings of this study confirm the observations of earlier workers that, even in patients with chronic infection, salvage of the prosthesis is still possible [1–3, 4, 8].

Flap surgery was considered in accordance with the recommendations of Laing et al. [7] for grade III and IV wound dehiscence only. There was a delay in referral of 1–3 months in our patients. In only half the cases were wound swab cultures positive at the time of referral, and in no case was *Staphylococcus aureus* isolated. This was probably because all patients had received systemic broad-spectrum antibiotics prior to referral. Clearly, early liaison between orthopaedic and plastic surgical teams is necessary.

There is very little information in the literature about the functional outcome of salvage surgery for an exposed knee prosthesis. In only two cases was there any correlation between the knee and functional scores. The results

of this study confirm the findings of Adam et al. [1]: although flap cover may salvage an exposed prosthesis, the functional outcome is not as good as in the uncomplicated situation. However, the short-term results of these procedures support the use of this form of surgery over arthrodesis or amputation.

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