

Title:-

Soft tissue cover for the exposed knee prosthesis

Authors:-

**(1) Mr. Jig. V. Patel FRCS
Senior house officer
Department of Plastic & Reconstructive Surgery
Charing Cross Hospital
London**

**(2) Mr. O. Fayomi FRCS
Senior house officer
Department of Plastic & Reconstructive Surgery
Charing Cross Hospital
London**

**(3) Mr. N. Percival FRCS
Consultant Plastic Surgeon
Department of Plastic & Reconstructive Surgery
Charing Cross Hospital
London**

Correspondence Address:-

**Mr. Jig. Patel FRCS
10 Sutherland Avenue
Ealing
London W13 8LE
England**

Soft tissue cover for the exposed knee prosthesis

Abstract:-

Exposed knee prosthesis following wound dehiscence after knee replacement remains a formidable problem. The use of free or local muscle flaps has successfully led to wound healing, eradication of infection and thus preservation of the knee prosthesis.

This study assesses the use of muscle flaps to cover exposed knee prosthesis 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 good functional outcome.

Soft tissue cover for the exposed knee prosthesis

Introduction:-

Approximately 25,000 knee replacement operations are performed in the United Kingdom each year (1). There is a 5% wound dehescience and infection rate associated with this operation (2). Advances in the use of local and free muscle flaps have allowed soft tissue cover in cases of exposed knee prosthesis (3).

There are few reports in the literature about the experience of muscle flaps to cover exposed knee prostheses. As well as soft tissue healing a good level of functional outcome is desirable. This study describes our experience of muscle flaps to cover exposed knee prostheses and the functional outcome associated with these procedures.

Soft tissue cover for the exposed knee prosthesis

Patients & Methods:-

Six consecutive patients between 1991-94, with wound dehiscence following knee replacement were studied. There were 3 men and 3 women. Five patients had undergone total knee replacement for primary osteoarthritis, one patient had a knee replacement following excision of a giant cell tumour of the proximal tibia. The age range was 35-88 years (mean 70 years). The duration of wound breakdown was recorded. All patients had received systemic antibiotics prior to referral. Microbiological wound swab cultures were taken prior to any procedure. Patients wounds were graded according to the Laing classification (4). Table 1.

All wounds were irrigated with 1 litre of Normal saline mixed with 160 milligrams of Gentamicin instilled over 24 hours for a period of 5 days. Systemic antibiotics were administered pre-operatively 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.

Patients were followed up for between 12 and 35 months. Postoperative complications were recorded. Functional outcome was assessed using the Hospital for Special Surgery Knee Rating System (5). This scoring system gives a knee score and a function score. The knee score assess levels of pain, range of motion and stability of the knee. The function score assess the ability of the patient to walk distance and negotiate stairs. Appendix 1.

Soft tissue cover for the exposed knee prosthesis

Results:-

According to the Laing grading system (4) five patients had grade 3 and one patient grade 4 wound dehiscence. The duration of wound breakdown ranged from 1-3 months. Wound swab cultures were positive in half the cases. No staphylococcus aureus was isolated. To gain soft tissue cover, a medial gastrocnemius muscle flap was used in 4 cases and a free rectus abdominis flap used in the remaining 2 cases. **Figs. 1 & 2.**

The mean follow up was 24 months. There were no early or late complications related to the wound in 5 patients. In one patient who had had an exposed prosthesis for 3 months, the flap failed due to thrombosis at the anastomosis. In this case the prosthesis was removed and an above knee amputation was performed. **Table II & III.**

The five patients who had retained their knee prosthesis had good knee scores (range 74-83 points, mean 79 points). The function scores however were more disappointing (range 10-85 points, mean 47 points). **Table IV.**

Soft tissue cover for the exposed knee prosthesis

Discussion:-

With the growing use of total knee arthroplasty associated in an ageing society, the total number of wound complications are inevitable. Eradication of deep infection in total knee replacement is very difficult (2). The findings of this study confirm the work of earlier workers that even in patients with chronic infection, salvage of the prosthesis is still possible (6,7,8).

Flap surgery was considered in accordance with the recommendations of Laing (4) for grade III & IV wound dehiscence only, grades I & II can be treated with conservative measures. There was a delay in referral in our study between 1-3 months. During this time infection may become chronic. In only half of the cases were wound swab cultures positive at the time of referral, and in no case was staphylococcus aureus isolated. This was probably due to the fact that all patients had received systemic broad spectrum antibiotics prior to referral. Clearly early liaison between orthopaedic and plastic surgical teams is necessary.

There is a paucity in the literature about the functional outcome for salvage surgery for the exposed knee prosthesis. Although in only 2 cases was there correlation between the knee and functional scores, the short term results of these procedures would support the use of this form of surgery over arthrodesis or amputation.

Soft tissue cover for the exposed knee prosthesis

References:-

- (1) Black J. The future of polyethylene. *Journal of Bone and Joint Surgery (Br)* 1978; 60-B: 303.
- (2) Johnson D P and Bannister G C. The outcome of infected arthroplasty of the knee. *Journal of Bone and Joint Surgery (Br)* 1986; 68-B: 289.
- (3) Fitzgerald R H, Ruttle P E, Arnold P G, Kelly PJ and Irons G B. Local muscle flaps in the treatment of chronic osteomyelitis. *Journal of Bone and Joint Surgery (Am)* 1985; 67-A:175.
- (4) Laing J H E, Hancock K and Harrison D H. The exposed total knee replacement: a new classification and treatment algorithm. *British Journal of Plastic Surgery* 1992; 45: 66
- (5) Insall J N, Dorr L D, Scott R D and Scott W N. Rationale of the knee society clinical rating system. *Clinical Orthopaedics* 1989; 248: 13.
- (6) Sanders R and O'Neill T. The gastrocnemius myocutaneous flap used as a cover for the exposed knee prosthesis. *Journal of Bone and Joint Surgery (Br)* 1981; 63-B: 383.
- (7) Hallcock G G. Salvage of total knee arthroplasty with local fasciocutaneous flaps. *Journal of Bone and Joint Surgery (Am)* 1990; 72-A: 1236
- (8) Gault D T and Quaba A. Is flap cover of exposed metal work worthwhile? A review of 28 cases. *British Journal of Plastic Surgery* 1986; 39: 505.

Soft tissue cover for the exposed knee prosthesis

Table 1.
Grade of Knee Prosthesis Exposure (Laing et. al 1992)

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 prosthetic exposure
4	Deep wound dehiscence, with overt prosthetic exposure

Table II.
Patient Charecteristics

Case	Age	Sex	Duration of Exposure (months)	Wound Grade	Indication for Arthroplasty
1	35	M	3	4	Bone Tumour
2	73	M	1	3	Osteoarthritis
3	82	F	1.5	3	Osteoarthritis
4	72	M	1	3	Osteoarthritis
5	69	F	1	3	Osteoarthritis
6	88	F	1	3	Osteoarthritis

Table III.

Outcome Following Salvage Surgery				
Case	Wound Swab Culture	Flap Type	Complications	Follow-up (months)
1	None	Free rectus abdominis	None	20
2	None	Medial Gastrocnemius	None	35
3	None	Medial Gastrocnemius	None	26
4	Srep. Feacalis	Free rectus abdominis	Flap thrombosis, conversion to amputation	12
5	Strep. Feacalis	Medial Gastrocnemius	None	26
6	Haemolytic Strep.	Medial Gastrocnemius	None	27

Soft tissue cover for the exposed knee prosthesis

Table IV
Functional Outcome

Case	Knee Score	Function score
1	78	80
2	83	85
3	82	-10
4	n/a/	n/a/
5	74	45
6	78	35

Soft tissue cover for the exposed knee prosthesis

Appendix 1.

The Hospital for Special Surgery Knee Rating System

Patient category:-

- A Unilateral or bilateral (opposite knee successfully replaced)**
- B Unilateral with symptomatic other knee**
- C Multiple arthritis or Medical infirmity**

KNEE SCORE:-

PARAMETER	POSITIVE SCORE	PARAMETER	NEGATIVE SCORE
Pain		Flexion contracture	
None	50	5-10 degrees	2
Occasionally mild	45	10-15 degrees	5
Mild on stairs only	40	16-20 degrees	10
Mild on walking & stairs	30	>20 degrees	15
Occasionally moderate	20	Extension lag	
Continuos moderate	10	<10 degrees	5
Severe	0	10-20 degrees	10
		>20 degrees	15
Range of Motion (5' per point)	<i>Max 25 ponits</i>	Alignment	
		5-10 degrees	0
Stability (max. motion per plane)		0-4 degrees	3 points per degree
Anteroposterior		11-15 degrees	3 ponits per degree
< 5 mm	10	Other	20
5-10 mm	5		
10 mm	0		
Mediolateral			
< 5 degrees	15		
6-9 degrees	10		
10-14 degrees	5		
15 degrees	0		
SUB TOTAL	X		Y
GRAND TOTAL KNEE SCORE:-		X-Y	

Soft tissue cover for the exposed knee prosthesis

Appendix 1(cont.).

The Hospital for Special Surgery Knee Rating System

KNEE FUNCTIONAL SCORE:-

PARAMETER	POSITIVE SCORE	PARAMETER	NEGATIVE SCORE
Walking		Walking Aid	
Unlimited	50	Cane	5
>10 blocks	40	Two canes	10
5-10 blocks	30	Crutches or	20
		Walker	
<5 blocks	10		
Housebound	0		
Stairs			
Normal up & down	50		
Normal up: Down with	40		
rail			
Up & down with rail	30		
Up with rail: unable down	15		
SUB TOTAL			
TOTAL FUNCTION SCORE			

Figure 1.

Pre-op grade IV wound breakdown in Case 1.

Figure 2.

Post-op soft tissue cover in Case 1.