



Free myocutaneous latissimus dorsi flap transfer in total knee arthroplasty

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KEYWORDS

Free flap; Knee; Total knee prosthesis; Operative technique; Results **Summary** The purpose of this article is to present our experience with free myocutaneous latissimus dorsi flap transfer in total knee arthroplasty in case of insufficient soft tissue prior to operation ('prophylactic indication').

Fourteen patients who underwent simultaneous flap surgery in the context of total knee arthroplasty because of insufficient soft tissue are reviewed in a retrospective clinical study. The following criteria were examined: (1) aetiology of the soft-tissue defect, (2) number of previous operations, (3) status of the knee extensor mechanism classified as complete, partial or missing, (4) primary wound healing, (5) complications and (6) active range of motion (ROM).

Insufficient soft tissue resulted from multiple previous operations in 10 patients and large posttraumatic defects in four patients. All patients had 5–23 (mean 10.2) previous operations before free latissimus dorsi transfer. The status of the extensor mechanism was complete in one, partial in nine and missing in four patients. Primary wound healing could be achieved in eight patients. After free latissimus dorsi transfer, skin breakdown at the recipient site occurred in five patients. Secondary skin grafting was carried out in four patients and a fasciocutaneous flap in one patient. There were three late recurrences of infection, with ultimate removal of the knee prosthesis and conversion to arthrodesis. Average active ROM prior to surgery was for extension/flexion $0-9-28^{\circ}$. One year after surgery the average active ROM was $0-6-75^{\circ}$.

A free myocutaneous latissimus dorsi flap transfer is rarely indicated in total knee arthroplasty and should only be considered for defects which cannot be covered by a pedicled (medial gastrocnemius) flap. Free latissimus dorsi transfer makes prosthesis implantation possible, prevents postoperative knee stiffness because of soft tissue and/or scar constriction and shows a low rate of severe complications in patients with a high risk of wound-healing problems. Moreover, transfer of well-vascularised tissue will improve trophicity in the knee region, and thus make future operations in this region easier.

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The free latissimus dorsi (LD) flap is indicated for defects around the knee which cannot be covered by a pedicled flap. For small-to-medium soft-tissue deficiencies, the medial gastrocnemius muscle is the first choice of treatment.^{1–3} A variety of fasciocutaneous flaps have also been described for this indication.^{4–7} Furthermore, skin expansion has been successfully used in selected cases.^{8,9}

With regards to coverage of total knee prosthesis, two different indications for pedicled- and free-flap transfer can be distinguished (Table 1): (1) insufficient soft tissue prior to prosthetic implantation ('prophylactic indication') and (2) impaired wound healing after implantation of prosthesis ('complication management indication'). Type I defects can be further subclassified into Ia defects, with closed soft tissue, and Ib defects, with a contaminated or infected open soft-tissue defect. Depending on the depth and extent of the defect, type II defects can be further classified into subtypes, according to Fansa et al.¹⁰

This article covers the prophylactic indication (type Ia and type Ib defects).

Operative technique and postoperative care

Operative steps of soft-tissue reconstruction using the myocutaneous LD flaps are as follows: (1) planning and dissection of the myocutaneous LD flap in lateral decubitus, (2) turning the patient in dorsal decubitus, keeping the LD flap pedicled at the axilla to avoid prolonged ischaemia time (Figure 1d), (3) dissection of the superficial femoral vessels, (4) transfer of the myocutaneous LD flap to the knee, (5) insetting of the flap and (6) microvascular anastomoses.

Insetting of the flap is done 'in layers', that is, the muscular part of the flap is fixed under the undermined medial and lateral knee skin. By doing so, dehiscence of the

Table 1Personal classificoccurring in the context of t	cation of soft-tissue defects otal knee arthroplasty
Type I: insufficient soft tissue prior to prosthetic implantation	
A B	closed soft tissues contaminated or infected open soft defect.
Type II: impaired wound hea implantation	ling after prosthetic
A	Epitheliolysis, superficial wound dehiscence, patellar ligament not exposed
В	Patellar ligament exposed, synovialitis
C	Necrotic patellar ligament, synovialitis, exposed prosthesis
D	Necrotic patellar ligament, synovialitis, exposed prosthesis
	Deep prosthetic infection with loosening

wound edges does not mean exposure of the prosthesis, and, if skin necrosis occurs, there will be a well-vascularised muscular tissue available for skin transplantation. If the flap has to be raised ever again, care must be taken to dissect the muscular part from the overlying knee skin (Figure 2f).

Microvascular anastomoses are done under magnifying loupes (5×5 times) using 8/0 monofile sutures in an end-toside technique on high-flow vessels. Our preferred donor vessels are the superficial femoral artery and vein.

Postoperative flap monitoring can be done easily using the cutaneous paddle as an indicator flap. Antibiotics are given for 5–7 days. Passive motion ($<60^\circ$) is started at day 5 after free-flap surgery on a continuous passive movement (CPM) device. Active motion is started on day 7 after the operation under the supervision of a physiotherapist ($<60^\circ$ on 7th postoperative day and 90° on 8th postoperative day, if there is no vascular problem). Physiotherapy is continued for several months following a standard protocol. Compressive treatment is started when the patient stands up or starts walking. It is continued for up to 12 months in order to prevent swelling and to improve the aesthetic result of the flap. Additionally, a silicone sheet is placed under the compression garment in order to improve the scar (Figure 1h).

Case report

Case 1

A 34-year-old active young man, who had sustained a traumatic knee defect in a motorcycle accident 6 years earlier, presented with a completely stiff and loosened knee prosthesis. He had undergone two revision knee arthroplasties before and two closed and four arthroscopically assisted knee mobilisations previously. There was no open wound, but there was abundant scarring around the anterior, lateral and medial aspect of the knee (type Ia defect) (Figure 1a). After complete open release of the soft tissues around the knee, and replacing the total knee prosthesis (Figure 1b), a soft-tissue defect (20 cm in length and 8 cm in width) resulted (Figure 1c). A free myocutaneous LD flap from the non-dominant side was designed (Figure 1d) and raised (Figure 1e). Microanastomoses were done by end-toside technique using the superficial femoral vessels (Figure 1f). The postoperative course was uneventful (Figure 1g). The patient was discharged on day 8. An intensive physiotherapy program and a compression therapy (Figure 1h) were started. Six months after implantation of the knee prosthesis, the patient could walk without crutches and had an active range of motion (ROM) of extension/flexion $0-10-110^{\circ}$ (Figure 1i-k).

Case 2

A 77-year-old man sustained an open proximal tibia fracture (C III according to the AO classification) in a road accident as a pedestrian. The fracture was primarily reduced and fixed with bilateral osteosynthesis plates (Figure 2a). On the second postoperative day, a haematoma had to be removed. Secondary skin necrosis occurred, and nine soft-tissue debridements followed by topic Download English Version:

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