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Distally based anteromedial thigh flaps pedicled on the rectus femoris branch of the lateral circumflex femoral artery for reconstruction of soft-tissue defect of the knee

Shan Zhu ^a, Mengqing Zang ^a, Shengji Yu ^b, Boyang Xu ^a, Yuanbo Liu ^{a,*}

^a Department of Plastic and Reconstructive Surgery, Plastic Surgery Hospital, Chinese Academy of Medical Sciences, Peking Union Medical College, No. 33 Ba-Da-Chu Road, Beijing, 100144, China

^b Cancer Institute and Hospital, Chinese Academy of Medical Sciences, 17 Panjiayuan Nanli, Beijing, 100021, China

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KEYWORDS

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Summary Background: Anteromedial thigh flaps are far less clinically appealing than their anterolateral counterparts, and are occasionally considered as an alternative to the anterolateral thigh flap. Herein, we report the study of soft-tissue defects reconstruction in the knee using a distally based anteromedial thigh flap pedicled on the rectus femoris branch of the descending branch of the lateral circumflex femoral artery.

Patients and methods: Between July 2008 and September 2016, a distally based anteromedial thigh flap was used to reconstruct soft-tissue defects of the knee in 5 patients (3 males, 2 females; age range at surgery 4–55 years old). The perforating vessels supplying anteromedial thigh were derived from the rectus femoris branch of the lateral circumflex femoral artery. The rectus femoris branch shared a common trunk with the descending branches of the lateral circumflex femoral artery. Defect etiologies included malignant neoplasms in 2 cases and post-burn scar contracture in the remaining 3 cases.

Results: The average flap size was 19.6 × 9.2 cm (range: 15–24 × 6–12 cm). There was no flap loss. Postoperative muscle weakness occurred in one case. The average follow-up time was 17.8 months (range: 5–36 months). No recurrence of tumor or scar contracture was noted.

Conclusions: Distally based anteromedial thigh flaps pedicled on the rectus femoris branch of the descending branch of the lateral circumflex femoral artery may serve as an alternative option to the distally based anterolateral thigh flap for soft-tissue defect reconstruction of the knee.

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* Corresponding author. Department of Plastic and Reconstructive Surgery, Plastic Surgery Hospital, Chinese Academy of Medical Sciences, Peking Union Medical College, No. 33 Ba-Da-Chu Road, Beijing, 100144, China.

E-mail address: ybpumc@sina.com (Y. Liu).

Introduction

Reconstruction of soft-tissue defects of the knee remains a challenge for reconstructive surgeons. Although many locoregional, pedicled muscle, and free flap techniques have been applied in knee reconstruction, each technique has specific indications and drawbacks, including limited pedicle length, insufficient area and volume of the donor site, and lack of recipient vessels. Among these techniques, the anatomical basis, arterial supply, venous drainage, and clinical application of the distally based anterolateral thigh (dALT) flap are better understood.^{1,2} However, the dALT flap may have anatomical variations, pedicle length limitations, and sporadic venous congestion.

In 1984, Song *et al.*³ first reported the anteromedial thigh (AMT) flap, suggesting it was based on an innominate branch of the lateral circumflex femoral artery (LCFA). Thereafter, there were ongoing debates regarding the nomenclature and anatomical basis of this flap. Reported arterial sources for the AMT flap included the superficial femoral artery,⁴⁻¹⁰ common femoral artery,¹⁰⁻¹³ descending branch of the LCFA,¹⁴⁻¹⁹ the LCFA itself,^{10,20} and rectus femoris branch (RFB) of the LCFA.^{5,8,21,22} Now, this flap is commonly used to reconstruct various kinds of defects, as a single free flap,^{19,21,23} a component of a combined flap^{16-18,21} a chimeric flap,^{6,21} or as a backup to the ALT flap.^{8,10,24,25}

Since the RFB and descending branch are both derived from the LCFA and share a common trunk, a distally based AMT (dAMT) flap may be harvested in a fashion similar to that of a dALT flap. A dAMT flap can be based on perforating vessels from the RFB of the LCFA, and is supplied by reverse flow through the descending branch. Homonymous flaps have been described in the literature, however, these flaps are based on the saphenous artery from the medial inferior genicular artery²⁶ or the saphenous branch of the descending genicular artery,²⁷ and thus differ from the flap reported in this article. To the best of our knowledge, this is the first report of clinical application using a dAMT flap based on RFB.

Patients and methods

Between July 2008 and September 2016, 18 patients underwent reconstruction of defects around the knee using distally based thigh flaps pedicled on perforating vessels from the descending branch of the LCFA. Of these, 5 patients underwent dAMT flap procedure. These five patients (3 males and 2 females) ranging in age from 4 to 55 years at the time of surgery (mean age: 34 years) were included in the present study. Two patients were diagnosed with malignancies, while the other 3 had post-burn scar contractures. In one patient, the donor site for the ALT flap was not available due to previous injuries (case 5). Pre-transfer expansion of the flap donor site was performed in 2 patients (cases 2 and 5). All the procedures were approved by the institutional review board of the Plastic Surgery Hospital, Chinese Academy of Medical Sciences prior to the execution of the study. The present study strictly abided by the Declaration of Helsinki and adhered to the STROBE guidelines. Detailed patient data are summarized in Table 1.

Table 1 Patients' information.

No.	Sex/Age (years)	Side	Cause of defect	Defect location	Perforator		Flap size (cm)	Pedicle length (cm)	Length of the AP line (cm)	Pivot point: Distance to the superolateral angle of the patella (cm)	Outcome
					Pattern	Source vessel					
1	F/55	Left	Malignant fibrous histiocytoma	Anteromedial knee	S	RFB	15 × 8	19	40	12	Survival
2	F/4	Right	Post-burn scar contracture	Left leg	S	RFB	18 × 12	10	26	8	Survival
3	M/30	Left	Liposarcoma	Popliteal fossa	M	RFB	20 × 8	24	44	12	Survival
4	M/50	Left	Post-burn scar contracture	Posterior knee	S	RFB	21 × 6	20	42.5	13	Survival
5	M/31	Left	Post-burn scar contracture	Lateral knee	M	RFB	24 × 12	25	43	12	Survival

M, male; F, female; S, septocutaneous; RFB, rectus femoris branch; AP, anterior superior iliac spine to the superolateral angle of the patella.

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