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Closure of large defects after microcystic lymphatic malformations using lateral intercostal artery perforator flap

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Received 19 February 2014; accepted 15 May 2014

KEYWORDS

Lymphatic malformations;
Lateral intercostal artery perforator;
Axilla;
Chest wall;
Reconstruction

Summary *Background and aim:* The surgical treatment of microcystic lymphatic malformations (LMs) has historically been difficult and frustrating because of a high recurrence rate due to incomplete resection. However, complete removal of the multifocal and extensive lesions rely on accurate imaging diagnosis and effective repair methods for the resulting large defect. The purpose of this study was to repair large skin defects due to complete resection of microcystic LMs using lateral intercostal artery perforator (LICAP) flap.

Patients and methods: Between January 2009 and June 2012, tissue defects in the axillary chest wall region of eight patients aged 13–22 years after microcystic LMs resections were closed using the LICAP flap. Flap donor sites in all patients were closed primarily except in one patient who underwent skin grafting. Before surgery, ultrasound and magnetic resonance imaging (MRI) examination were used to confirm the diagnosis and determine the scope and level of the abnormality for complete resection.

Results: All defects after microcystic LM excision were successfully closed using LICAP flaps. The follow-up period ranged from 1 to 3 years (mean 2.1 years). All flaps survived postoperatively. No recurrence occurred. Ultrasound and MRI follow-up also demonstrated flap survival without recurrence of microcystic LMs. No functional loss attributable to the LICAP flap harvest was identified in any case.

Conclusions: Surgical resection is necessary for microcystic LMs. Imaging assists in the diagnosis and identification of the scope and level of lesions. The LICAP flap provides good coverage for the large defects and achieves acceptable morphology without functional deficits

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at flap donor sites. Ultrasound and MRI are safe and accurate diagnostic imaging methods for the pre- and postoperative evaluation of microcystic LMs in patients undergoing surgery.

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Introduction

Microcystic lymphatic malformations (LMs) are congenital malformations of the lymphatic system that involve the skin and subcutaneous tissues.¹ The axillary chest wall is one of the most common sites for the occurrence of these lesions in our clinic. Patients with microcystic LMs who have involvement of the skin can often be diagnosed by history and physical examination. Microcystic LMs present in deeper planes are often diagnosed with magnetic resonance imaging (MRI) or ultrasound.² These imaging modalities will confirm the diagnosis and allow accurate determination of lesion extension for subsequent treatment. The various treatment modalities for LMs are surgical excision, radiation therapy, cryotherapy, electrocautery, sclerotherapy, steroid administration, embolization and ligation, laser surgery, radio-frequency tissue ablation technique, and combinations of these treatments.^{3,4} At present, macrocystic LMs respond well to sclerotherapy, but the response of microcystic or cavernous LMs to sclerotherapy is disappointing and surgical excision remains the definitive treatment for these microcystic LMs.⁵ In surgical excision, accurate delineation of lesion extension is important for preoperative diagnosis, surgical planning, and assessing recurrence. The scope and level of microcystic LMs resection can be localized by MR imaging and ultrasound examination.^{6,7} Due to the often large size of the lesions, the reconstruction of large skin defects after complete resection of these microcystic LMs presents a challenge. The soft tissue alternatives for closure of this defect include skin graft, random flaps, and perforator flaps.

Over the past decade, perforator flaps have gained acceptance as alternative methods of reconstruction. The use of these flaps is associated with minimal donor-site morbidity as the underlying muscle is preserved. Recently, perforator flaps and perforator-based pedicled flaps have been described that can be raised from the trunk for reconstruction of various defects.^{8,9} Near the axilla, the intercostal artery perforator flap is the best choice.¹⁰ The lateral

intercostal artery perforator (LICAP) flap, raised from the lateral and posterior thorax, has been used for chest or upper extremity defect reconstruction.¹¹ However, a LICAP-based flap raised from the thoracic area to reconstruct axillary defects after microcystic LM resection has never been described in the literature. In this article, repair of large skin defects due to resection of microcystic LMs has been performed using LICAP flaps, and the results are discussed.

Patients and methods

Between January 2009 and June 2012, tissue defects in the axillary chest wall region of eight patients aged 13–22 years after microcystic LM resection were closed using the LICAP flap (Table 1). All these patients had one to two previous attempts at surgical excision and had subsequent recurrences. Preoperative ultrasound and MRI were used to confirm the diagnosis and provide excellent information regarding the extent of the abnormality to enable complete resection. Surgical excision including the involved surrounding and subfascial normal tissue was planned to prevent further recurrence. Patients were positioned laterally with the arm on the affected side elevated and abducted. Ultrasound was used preoperatively in all patients to map the perforator arteries (Figure 1A). Having marked the locations of the perforators, a flap was designed with slightly larger dimensions than the defect. The flap was removed from the distal edge by subfascial dissection, and attention was given so as not to damage the fasciocutaneous perforators while dissecting in the dorsal portions of the flaps. Pedicles were observed and protected by careful dissection (Figure 1B). The flap was turned into an island in all patients for better mobilization. The flap was moved to the defect site, and multilayered tension-free closures were performed (Figure 1C). The flap donor site was then primarily closed in all patients except one who required split-thickness skin grafting for donor-site closure (Figure 1C).

Table 1 Patient data.

Patient number	Age (yr)	Gender (F/M)	The number of operations before recurrence	LICAP flap dimensions (cm)	Follow-up (yr)
1	13	F	1	15 × 7	1.5
2	16	M	1	16 × 8	3
3	16	M	2	15 × 10	3
4	17	M	2	26 × 21	2.5
5	14	F	1	17 × 8	1
6	18	F	1	20 × 12	2
7	19	F	2	11 × 8.5	3
8	22	M	3	12 × 7	1

*M, male; F, female; Yr, year; LICAP, lateral intercostal artery perforator.

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