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Ultrasound-guided scraping of fibrous capsule plus bilayered negative pressure wound therapy for treatment of refractory postmastectomy seroma

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KEYWORDS
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Summary *Introduction:* Seroma is a frequent complication of breast cancer surgery. Treatment of prolonged or refractory seroma remains a clinical challenge. This study aimed to evaluate the efficacy of a novel approach for refractory seroma treatment; the method combines minimally invasive scraping for fibrous capsule removal and self-designed bilayered negative pressure wound therapy (b-NPWT) to achieve favorable wound healing.
Methods: Twenty-four patients with refractory seroma received ultrasound-guided scraping of fibrous capsule around the refractory seroma, and then a bilayered NPWT system simultaneously allowing for fluid drainage and dynamic topical pressure was manually implemented immediately. The time of NPWT application and wound healing was recorded, and pathological examination was conducted for the removed fibrous tissues.
Results: Removal of the fibrous capsule was securely achieved by minimally invasive scraping through a 1.5-cm incision guided with ultrasound scanning. All refractory seromas in the 24 patients healed uneventfully after an average application of NPWT for 7.2 ± 3.3 days without recurrence during the 3—12 months of follow-up. Biopsy of the removed fibrous tissue demonstrated that single-layered endothelial cells stained with CD31, D2-40, and Ki-67 existed both on the surface of and inside the fibrous tissue.

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Conclusions: The combination of fibrous capsule removal by ultrasound-guided scraping with successive bilayered NPWT therapy is effective and minimally invasive for promoting wound healing of refractory postmastectomy seroma.

Introduction

Seroma is an abnormal collection of serous fluid in the dead space between the chest wall and skin flaps following radical mastectomy and is the most common early wound sequela. The reported incidence of seroma formation varies between 15% and 81%.[1–6] Several studies indicate that some of the complications of breast surgery such as flap necrosis, lymphedma, delayed wound healing, impaired shoulder function, and infection are more likely to develop in the presence of seroma or as a consequence of measures used to prevent the occurrence of seroma.[7,8] Furthermore, it generates substantial workload for the surgeons as well as a tremendous amount of anxiety and inconvenience for the patients.

Persistent seroma has traditionally been treated with repeated aspiration, local pressure dressing, and occasionally surgical ablation.[9–13] In some patients, seroma may become refractory with no signs of improvement following long-term standard treatment. In such patients, the formation of thick fibrous capsules around the seroma was considered as a breach of wound healing recommended for complete surgical removal.[14,15] However, the fragile blood supply of local tissue following radical mastectomy, which was usually deteriorated by subsequent radiotherapy,[16,17] might greatly risk the outcome of extensive debridement.

In this study, we developed a new strategy for refractory seroma treatment, which employs minimally invasive scraping of fibrous capsule under ultrasound guidance and immediate bilayered negative pressure wound therapy (b-NPWT) to achieve both continuous drainage and dynamic topical pressure simultaneously. For 24 postmastectomy patients with prolonged seroma, we used this method and achieved a favorable result. Herein, we reported our experience.

Patients and methods

From 2009 to 2012, 24 patients with refractory seroma after radical mastectomy were eligible for this study. The inclusion criteria included persistence over 3 months following repeated aspiration and fibrous capsule formation confirmed by ultrasonic examination. All these patients were pathologically diagnosed with breast cancer including mastoscirrhus ($n = 19$), medullary carcinoma ($n = 4$), and mucinous carcinoma ($n = 1$). Modified radical mastectomy was employed with transverse incision in nine patients and vertical incision in 15 patients. Axillary lymph node dissection was routinely performed. At 2–3 weeks after surgery, radiotherapy and/or chemotherapy with CMF protocol (cyclophosphamide, methotrexate, and 5-fluorouracil) were administered. Seroma was defined once focal subcutaneous effusion was noted by ultrasonography.

All these patients received scraping of the fibrous capsule under ultrasound guidance and subsequent bilayered NPWT. Before the new combined treatment, patients had received traditional aspiration (46 ± 18.4 aspirations) and compression therapy with a mean duration of 5.5 ± 2.3 months (maximum: 8 months). Among these 24 patients, seven developed closed seroma, and 17 had wound

Table 1 Patients' clinical and pathological characteristics.

Item	Result
Body mass index (Mean ± standard deviation, kg/m^2)	28.4 ± 4.5
Age (Mean ± standard deviation, years)	62.4 ± 12.8
Hypertension (Cases)	15/24
Diabetes (Cases)	10/24
Pathology	
Mastoscirrhus (Cases)	19
Medullary carcinoma (Cases)	4
Mucinous carcinoma (Cases)	1
Surgical modality	
Modified radical mastectomy (Cases)	18
Extended radical mastectomy (Cases)	4
Axillary lymph node dissection (Cases)	24
Number of dissected lymph nodes	
<10 (Cases)	8
10–20 (Cases)	12
≥20 (Cases)	4
Number of metastatic lymph nodes	
<3 (Cases)	12
≥3 (Cases)	9
No (Cases)	3
Postoperative radiotherapy (Cases)	24 (Dose: 25 GR)
Number of aspirations	
20–30 (Cases)	8
30–50 (Cases)	11
≥50 (Cases)	5
Duration of aspirations	
15–20 W (Cases)	9
20–35 W (Cases)	10
≥25 W (Cases)	5
Complications	
Sinus (Cases)	6
Wound dehiscence (Cases)	5
Partial necrosis of flaps (Cases)	6