Case Report

Lymphatic contribution in a chronic breast seroma: a case report

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Abstract: A seroma is a common complication of any surgical procedure that creates dead space allowing for fluid collection. The etiology of seroma formation is not uniform and has been attributed to fibrosis, a subclinical infection, aberrant behavior of lining cells, or lymphatic leak. Contribution of lymphatic flow as the main cause of a persistent seroma seems particularly relevant if the surgery involved damage to adjacent lymphatic structures. We describe a case of a 61-year-old female who presented with a chronic breast seroma despite 13 months of intermittent drainage and attempts at sclerotherapy. Previously, the patient underwent right breast reconstruction with a tissue expander and latissimus dorsi flap following a modified radical mastectomy and failed right sided reconstruction with a deep inferior epigastric perforator flap for breast cancer. To address the chronic seroma, reverse axillary lymphatic mapping was performed prior to seroma excision to visualize a suspected lymphatic contribution. A single lymphatic collector connecting to the seroma cavity was visualized. After ligation of the lymphatic vessel and replacement of the latissimus dorsi and tissue expander, the seroma was finally cured. With this report, we would like to emphasize that identification and elimination of contributing lymphatic vessels appears to be the key component in management of persistent seromas in the basin of major lymphatic drainage.

Keywords: Seroma; lymphatic; breast cancer reconstruction; case report

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Introduction

Seroma is common complication that can occur secondary to any surgical procedure that creates a dead space. It clinically presents with a palpable, fluctuant mass which can be confirmed by ultrasonography (1). Though a seroma is typically not life-threatening, it can be a frustrating post-operative complication, resulting in prolonged recovery times, extended hospital stays, and increased costs (2). The undesired fluid accumulation can lead to wound dehiscence and infection, the unfavorable outcomes that can end with failed breast reconstruction (1).

Mastectomy is associated with seroma formation in many cases, particularly, if combined with immediate prosthetic insertion (3). Placement of a prosthetic in mastectomy cavity adds to the risk of potential fluid accumulation due to sheering forces irritating the rough tissues (3). Additionally, partial or complete breast removal is frequently coupled with lymphatic surgery which can also contribute to seroma risk (4). There are several reports in the literature describing successful use of sclerosing agents to treat breast seroma (5). Sclerosing agents, such as doxycycline, alcohol, or chemotherapy drugs slough off the inner layer of the capsule promoting its adherence and healing but do not directly address the potential lymphatic inflow (5).

Here, we present a case of a chronic breast seroma after mastectomy and prosthetic reconstruction that was treated by seroma excision and ligation of a feeding lymphatic vessel while preserving a reconstruction. We present the following case in accordance with the CARE reporting checklist (available at http://dx.doi.org/10.21037/abs-20-135).

Case presentation

A 61-year-old female presented with a chronic right breast

Figure 1 Pre-operative photograph with right sided drain in place for chronic seroma, status post multiple breast surgeries.

Figure 2 Reverse axillary mapping using lymphazurin injection.

seroma cavity. Her extensive breast history began with a lumpectomy and radiation therapy for left breast cancer. Four years later, the patient was diagnosed with ER/PR+, HER2+ right breast invasive ductal adenocarcinoma and underwent right partial mastectomy with axillary lymph node dissection (2/6 nodes positive) and adjuvant chemotherapy. One month following, she underwent bilateral completion mastectomy with immediate reconstruction using deep inferior epigastric perforator (DIEP) flaps performed by another plastic surgeon. Venous compromise to the right flap was noted in the acute post-operative period requiring return to the operating room on post-operative day 6 for irrigation and debridement of the right DIEP flap. On ensuing post-operative visits there was noted appropriate healing of her right breast incisions, healthy/appropriate healing of her left DIEP flap, and no clinical concerns for seroma or wound breakdown. 7 months later the patient underwent a second attempt at breast reconstruction with a right latissimus flap and tissue expander placement by the same plastic surgeon who performed her bilateral DIEP flaps. Following this procedure, she was noted to have fluid accumulation in the right reconstructed breast necessitating several in-office aspirations. Subsequently, a drain was placed by interventional radiology and alcohol sclerotherapy was commenced 3 times per week for 2 months. After 8 more months of intermittent drainage and sclerotherapy, she palpated a right axillary mass. Subsequent right axillary node dissection revealed 7/23 nodes positive metastatic ER/PR/HER2 + ductal carcinoma. In the setting of this new diagnosis she required additional radiation therapy. However, this treatment needed to be postponed until resolution of her chronic seroma of 13 months duration. It was in the setting of this complex surgical history, persistent seroma, frustration with minimal improvement despite the drain, and need for radiation therapy that the patient presented to the senior author's plastic surgery office (*Figure 1*). Consequently, she underwent reverse axillary mapping with ligation of the draining lymphatic vessel, excision of right chest wall seroma and reconstruction using her previous latissimus flap and tissue expander placement. The procedure used her prior mastectomy incision, with careful dissection carried down to her reconstructed latissimus flap, which was sutured superiorly to her pectoralis major muscle. The latissimus muscle flap was elevated off the seroma cavity capsule. Next, 5 mL of lymphazurin was injected 10 cm from the right axillary crease intradermally, subdermally and deep along the medial bicipital groove (*Figure 2*). This served to map out the lymphatics coming from the arm. A single blue lymphatic collector was identified at the apex of the dissected seroma cavity (*Figure 3*). The lymphatic channel was ligated, and the seroma cavity with its contributing vessel was removed en-bloc (*Figure 4*). The latissimus flap was partially re-elevated and separated from the pectoralis major muscle. The latissimus flap was then scored to allow for advancement into the previous seroma cavity. A 14 cm base width tissue expander was positioned under the pectoralis major muscle. The inferior portion of the tissue expander was covered with a Vicryl mesh and attached to the infra-mammary fold inferiorly and to the inferior edge of the repositioned muscle flap superiorly to prevent lamp shading effect. Surgical drains were placed and removed after 10 days with no signs of recurrent seroma. The patient was then able to undergo radiation therapy and subsequent tissue expander exchange for permanent implants achieving satisfactory reconstructive outcome. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient.

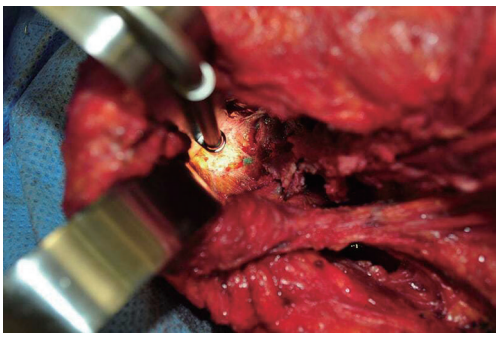

Figure 3 Single lymphatic collector vessel with blue dye identifier.

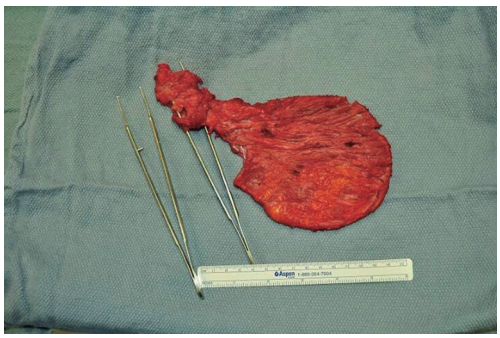

Figure 4 Right chest wall seroma cavity with collecting lymphatic vessel.

Discussion

The reported rates of seroma formation after mastectomies range from 25% to 50% and reach 25% after axillary dissection alone (6). Several potential etiologies have been described regarding the pathogenesis of seroma (2). Gonzalez *et al*. (7) and Hashemi *et al*. (8) investigated seroma formation and reported higher seroma rates after mastectomy and axillary lymphadenectomy compared to breast conserving surgery. In another study of 119 patients, the authors concluded that higher seroma rates occurred due to extensive vessel and lymphatic damage during mastectomy and lymphatic removal (9). Other studies have reinforced this notion, showing that the degree of lymphatic channel interruption increased rates of seroma formation (10). The chances of fluid accumulation are even greater if mastectomy is combined with immediate placement of breast prosthesis: shearing forces from the blunt trauma of surgery and/or the implant itself lead to seroma due to separation of subcutaneous tissue from the underlying fascia, thus creating a dead space and preventing tissue apposition and adhesion (11). Seroma formation is multifactorial, and in this patient, her surgical history, lymph node dissection and recurrent metastatic disease and multiple reconstructive surgeries were considered as possible causes. Given the persistence of her seroma despite appropriate and lengthy outpatient management, a contributing lymphatic was deemed worthy of investigation.

Injection of sclerosing agents, known as sclerotherapy, is often used to obliterate this space, preventing fluid accumulation. Sclerotherapy involves filling the seroma cavity with an irritating substance, inducing a fibrotic response to seal the dead space. This strategy can also be useful when treating lymphatic leaks and lymphoceles (11-13). However, this treatment was ineffective in our patient, whose seroma was supplied by a working lymphatic vessel requiring direct ligation.

There are many potential causes to consider when treating a seroma, such as the implant itself or subclinical infection. However, if a seroma is located in the basin of a draining yet injured lymphatic, one must strongly consider a lymphatic vessel contribution. Turfe *et al*. (14) describe a patient with a history of modified radical mastectomy who developed a seroma following a chemotherapy port placed along the remaining ipsilateral subclavian lymphatic pathway. Shortly after the seroma was obliterated, the patient developed lymphedema on the ipsilateral upper extremity, as the limb-draining lymphatics contributing to the seroma were no longer patent. Although lymphatic mapping was never performed in their patient, the occurrence of lymphedema was an indirect confirmation of lymphatic contribution to the described seroma around a chemotherapy port.

A case report is inherently limited in its ability to make statistically significant conclusions, but our case does add to and strengthen the literature of treatment for chronic seromas following breast surgery. Successful management of a seroma in our patient included ligation of a contributing lymphatic. It is possible that the development of the chronic seroma in our patient could have been avoided by appropriately addressing the lymphatics at the time of axillary dissection. Through lymphatic mapping one could delineate the major lymphatic channels and perform adequate ligation or lymphatic rerouting, in a form of lymphaticovenous bypass (15).

Supermicrosurgical lymphaticovenous anastomosis, a form of lymphaticovenous bypass, consists of linking a lymphatic vessel to a nearby vein diverting the lymph flow into the systemic circulation past the obstruction. Lymphatic

tissue transfer is an alternative option, incorporating the lymphatic vessels already present into the flap to regenerate the physiological lymph pathway in the resected part (16). Yamamoto *et al*. (17) reported successful surgical resection in the groin of seven patients with lymphatic tissue preservation using lymphaticovenous anastomosis without lymphedema sequalae. Lymphorrhea, a severe form of lymphedema, is often difficult to treat. Most cases can be treated conservatively, but some cases are refractory to conservative treatments, requiring further surgical interventions. Intractable lymphorrhea is an issue because it is prone to infection due to skin tissue breakdown (18). Yamamoto *et al*. (19) described successfully treating patients with lymphoedema and severe lymphorrhea using simultaneous multi-site lymphaticovenous anastomoses. Morihisa *et al*. (20) also showed supermicrosurgical lymphaticovenous anastomosis and microsurgical lymphaticovenous implantation were effective procedures to treat axillary lymphorrhea that developed after the treatments for lymph node metastases of esophageal carcinoma.

Though lymphovenous bypass surgery was not possible in our patient due to a large cavity with scarce available veins, reverse lymphatic mapping was key in identifying and eliminating the contributing lymphatic. Lymphatic mapping can be a useful tool to aid in investigation of potential cause of seroma. Lymphatic mapping consists of intradermal injection of lymphazurin (patent blue dye) or indocyanine green (ICG) distal to the seroma with observation of dye effluence from transected or injured lymphatics draining into area of seroma. The application of ICG employs infrared visualization technology and allows lymphatic tracing in real time, which allows proper identification and ligation of the contributing lymphatics.

Based on our experience and the body of existing literature, we postulate that in treatment of chronic seromas, lymphatic mapping and ligation should be strongly considered.

Conclusions

In treatment of chronic seromas, particularly in areas of increased lymphatic presence, lymphatic mapping and ligation should be strongly considered.

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Footnote

Reporting Checklist: The authors have completed the CARE reporting checklist. Available at http://dx.doi.org/10.21037/abs-20-135

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient.

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