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CASE REPORT

Breast

Repeated Fluid Accumulation around a Breast Implant Related to Synovial Metaplasia of the Capsule

Ayano Honda, MD*
Itaru Tsuge, MD, PhD*
Kyohei Kitamura, MD†
Hiroaki Ito, MD†
Hiroki Yamanaka, MD, PhD*
Motoki Katsube, MD, PhD*
Michiharu Sakamoto, MD, PhD*
Naoki Morimoto, MD, PhD*

Summary: We must take special care when treating postoperative fluid accumulation around breast implants (BIs) to exclude any serious complications, including BI-associated anaplastic large cell lymphoma. However, most late-onset fluid accumulation is caused by other conditions, such as traumatic hematoma and residual postoperative seroma. Surgeons must choose whether to conservatively observe or remove such BIs, while also determining whether to perform partial capsulectomy or total capsulectomy to solve the problem of fluid accumulation. We treated a 72-year-old woman who noticed swelling in her right breast 4 years after undergoing bilateral BI reconstruction. Before she was referred to our hospital, the fluid had been drained by needle aspiration five times, but the swelling returned to a similar size within a month. No malignant findings were observed by needle-aspirated cytology or flow cytometry. The patient requested the simultaneous removal of the left BI. Therefore, we performed both BI removal with total capsulectomy on the right side and partial capsulectomy of the superficial layer on the left side. A pathological examination of the capsule on the right side indicated a chronic expanding hematoma and synovial metaplasia characterized by papillary projections rich in CD68-positive cells, thus indicating reactive synovial cells. In contrast, the left superficial capsule was much thinner and showed less synovial metaplasia. Our findings indicate the advantages of total capsulectomy to solve the problem of repeated serous fluid accumulation around BIs, according to histological changes in the capsule. *(Plast Reconstr Surg Glob Open 2024; 12:e5759; doi: 10.1097/GOX.0000000000005759; Published online 19 April 2024.)*

Late-onset seroma around a breast implant (BI) requires a fluid analysis using needle aspiration to rule out any serious BI complications, such as BI-associated anaplastic large cell lymphoma.[1] However, only 9% of late seroma cases were diagnosed with BI-associated anaplastic large cell lymphoma,[2] which means that surgeons have to discuss and select the treatment policy for individual suspected benign cases: for example, performing a histological diagnosis by surgery or follow-up observation using image tests. Moreover, the surgical strategy to perform either a partial capsulectomy or total capsulectomy should be considered based on the importance of minimizing the risk of surgical damage or treating capsule-related diseases, including malignant tumors. We herein report a case of late-onset fluid accumulation around a BI with no malignant findings on needle-aspirated cytology or flow cytometry. We performed a total capsulectomy to treat repeated serous fluid accumulation, which resulted in the diagnosis of a chronic expanding hematoma (CEH) with synovial metaplasia.

CASE

The patient was a 72-year-old woman who had undergone a bilateral total mastectomy, sentinel lymph node biopsy, and tissue expander placement for breast cancer at another hospital 6 years previously. Nine

*From the *Department of Plastic and Reconstructive Surgery, Graduate School of Medicine, Kyoto University, Kyoto, Japan; and †Department of Diagnostic Pathology, Kyoto University Hospital, Kyoto, Japan.*

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months after the first surgery, the tissue expanders were replaced with BIs, Natrelle 410 macrotextured silicon-filled implants (Allergan Aesthetics, Dublin, Ireland). For 4 years, she had no trouble with the BIs; however, she noticed a swollen area in the right reconstructed breast 1 year previously. A computed tomography scan image showed fluid accumulation in the right BI, and a plastic surgeon at the hospital obtained fluid samples by needle aspiration. A total of 30-40 mL of yellow and brown fluid were obtained; however, the fluid accumulated again within a month. Needle aspiration was performed five times. All tests, including four cytology tests and two flow cytometry tests or CD30-positive cells, showed no malignant findings. In fact, none of the tests revealed any malignancy. Contrast-enhanced magnetic resonance imaging showed fluid accumulation in the right BI and an enhanced contrast effect on the superficial capsule. The patient was admitted to our hospital for diagnostic and treatment purposes. Blood tests at our hospital revealed no inflammatory findings, coagulation abnormalities, or low platelet counts. A computed tomography scan showed fluid accumulation between the superficial capsule and implant, and there was an area of soft tissue density inside the superficial capsule (Fig. 1). The possibility of malignant disease could not be excluded; therefore, we decided to perform a total capsulectomy and obtain a histopathologic diagnosis. She requested simultaneous removal of the left BI; therefore, we removed the BIs with total capsulectomy on the right side and partial capsulectomy of the superficial layer on the left side.

Intraoperatively, we first performed needle aspiration for bacterial testing, which showed a yellowish-brown fluid (**See figure, Supplemental Digital Content 1,** which shows the fluid specimen. **http://links.lww.com/PRSGO/D164**). The right BI was then removed from the superficial capsule. The back wall capsule was then removed with costal periosteum and costochondral membrane (Fig. 2). We found a bloody fluid when we peeled off the superficial capsule of the right BI (Fig. 3). A pathological examination of the superficial capsule on the right BI revealed both a fresh hemorrhage and hemosiderin phagocytosis by macrophages of the old hemorrhage,

Fig. 1. A preoperative computed tomography scan image showing a low-absorption area between the right BI and the superficial capsule, which was suspected to be fluid accumulation. A soft tissue density lesion was found inside the low-absorption area (white arrowheads).

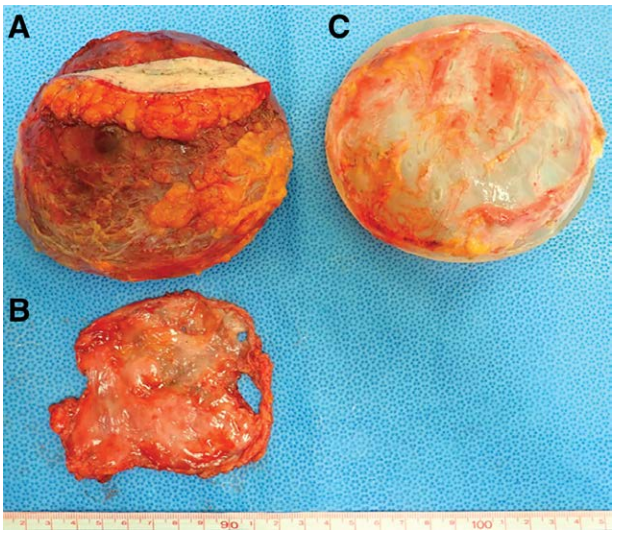

Fig. 2. The right BI was removed with the superficial capsule (A) and the back wall capsule (B). The left BI was removed with the superficial (C) capsule in partial capsulectomy.

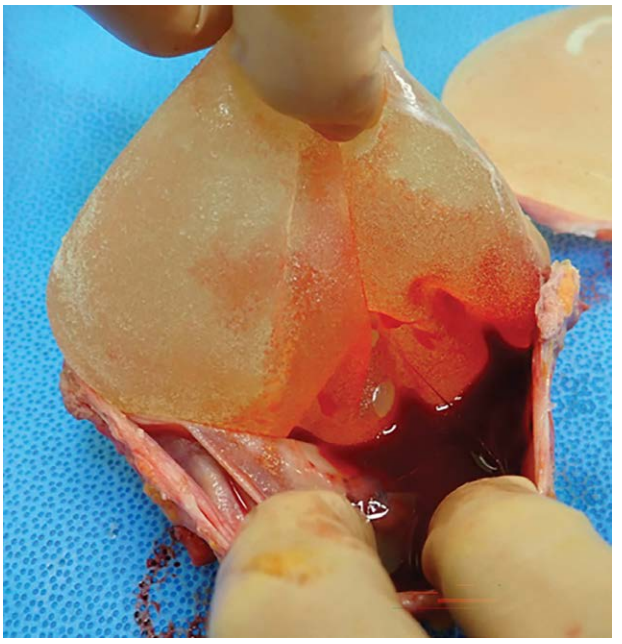

Fig. 3. Bloody effusion was found between the right BI and the superficial capsule.

thus suggesting CEH. Inflammatory cell infiltration and increased intracapsular vascularity supported a diagnosis of CEH. Moreover, there were numerous areas of synovial metaplasia characterized by papillary projections rich in CD68-positive cells, thus indicating reactive synovial cells (Fig. 4). The back-wall capsule on the right side showed similar findings. However, the superficial capsule on the left side was thin and had less synovial metaplasia. Needle aspiration performed for bacterial testing yielded negative results. No postoperative bleeding, skin necrosis, or pneumothorax were observed. Magnetic resonance imaging

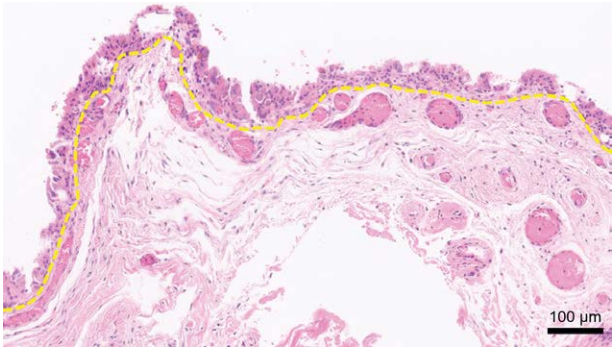

Fig. 4. Histopathologic findings (hematoxylin-eosin staining) of the superficial capsule in the right breast. The contacted capsule of the BI showed papillary protuberances composed of collections of synovial-like cells, which were identified as synovial metaplasia (yellow dotted line).

performed 6 months later showed no fluid recurrence in either breast. (**See figure, Supplemental Digital Content 1, http://links.lww.com/PRSGO/D164**.) [**See figure, Supplemental Digital Content 2,** which shows a pathological image of the superficial capsule on the left side with less synovial metaplasia (red dotted circles). **http://links.lww.com/PRSGO/D165**.]

DISCUSSION

We encountered a case of repeated fluid accumulation around a BI 5 years after insertion surgery. CEH and synovial metaplasia are both common capsular problems after BI insertion as well as double capsules, but it is sometimes difficult for surgeons to decide whether to perform surgery, and also whether to perform a partial capsulectomy or total capsulectomy.

There are three reasons why repeated fluid accumulation around the BI should be treated with a total capsulectomy. First, the residual capsule can secrete synovial fluid due to synovial metaplasia, which is known to occur in 40%–77% of BI insertion cases.[2] The presence of synovial metaplasia decreases as the duration of BI insertion increases, but breast swelling occurs when synovial fluid secretion increases.[3] A histological examination of the capsule revealed cell-rich papillary projections lining the contact surface between the capsule and implant.[4] Young et al suggested that a partial capsulectomy may result in seroma formation owing to synovial fluid secretion by residual capsular synovial metaplasia.[5] Second, the residual BI capsule may lead to recurrent hemorrhage, thus resulting in persistent CEHs.[6] The capsule resulting from CEHs has predisposing changes, such as increased inflammatory cell infiltration and capsular constriction, which are factors of repeated bleeding from vascular disruption due to friction, external force, or inflammation.[7] Thirdly, cytology and flow cytometry with aspirated fluid alone may have missed malignant cases. A histological examination of capsules obtained from 2574 capsulotomies showed invasive carcinoma in four cases (0.16%) and in situ carcinoma in five cases (0.2%).[8]

A CEH is a hematoma that persists and enlarges for more than 1 month.[9] It is characterized by findings of gradual enlargement on physical examination and imaging, and mixed findings of old and new hemorrhages on histopathologic examination. This case showed a similar course; however, the fluid obtained from multiple aspirations was yellow or brown, which is different from the general color of the hematoma. This suggests that synovial fluid is thus caused by synovial metaplasia. Textured implants are reported to be associated with a higher risk of CEH and synovial metaplasia in comparison with smooth implants, and total capsulotomy is recommended for such cases.[3,7]

Our findings suggest the advantages of total capsulectomy for successfully treating repeated serous fluid accumulation; however, we need to be aware of the risks, such as postoperative bleeding, skin necrosis, and pneumothorax.[10] Particular attention should be paid to cases of severe capsular contracture and postradiation therapy cases with thinned intercostal muscles because the rate of complications in total capsulotomy is unknown. Moreover, further cases should be accumulated to investigate the extent to which synovial metaplasia is related to repeated instance of fluid collections.

Itaru Tsuge, MD, PhD
Department of Plastic and Reconstructive Surgery
Graduate School of Medicine, Kyoto University
54 Shogoin Kawahara-cho, Sakyou-ku
Kyoto 606-8507, Japan
E-mail: itsuge@kuhp.kyoto-u.ac.jp

DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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