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Contralateral Axillary Lymph Node Enlargement in a Woman with Silent Silicone Breast Implant Rupture 30 Years After Breast Cancer Diagnosis: A Lesson to Be Learnt

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ABSTRACT

Background: Silicone lymphadenopathy is a recognized complication of silicone implant rupture. It occurs when silicone droplets migrate from breast implants to lymph nodes, resulting in the formation of granulomas (known as siliconoma) and lymph node enlargement. The ipsilateral axillary lymph nodes are most commonly involved but it can also affect contralateral axillary, supraclavicular, internal mammary and mediastinal lymph nodes.

Case presentation: A 60-year-old woman with a history of left breast cancer who had undergone modified radical mastectomy (MRM) followed by left breast reconstruction with implant (30 years ago) presented with right axillary lymph nodes enlargement. An excisional biopsy of the two larger lymph nodes was performed to rule out malignancy. Pathologic examination showed features of silicone lymphadenopathy. Further examination with Ultrasound and MRI confirmed breast implant rupture.

Conclusion: Silicone lymphadenopathy following breast augmentation and reconstruction primarily affects the ipsilateral axillary nodes. Contralateral lymph node involvement is rare and may occur several years after breast cancer diagnosis and can be the first sign of breast implant rupture. Although, the need to exclude malignancy in such cases is of outmost importance, silicone lymphadenopathy should also be considered in the differential diagnosis.

Introduction

Breast implants have been in use since the early 1960s.[1] Every year, thousands of women undergo implant surgery for augmentation or reconstruction following mastectomy. As the age of the implant increases, so does the risk of silicone leaking. This is responsible for most local complications as well as for silicone migration beyond breast tissues. Therefore, the number of women who develop palpable axillary masses can be expected to increase. Unilateral axillary lymphadenopathy is a worrisome finding in women with implant-based breast reconstruction since it can be the first sign of breast carcinoma recurrence. Most palpable axillary lymphadenopathies in patients with implants are silicone granulomas due to leakage and migration of silicone particles through lymphatics. This case report stresses the fact that similar considerations should be taken in a case of contralateral axillary lymph node enlargement in women with breast implants. On this occasion, diagnostic investigation must be meticulous since both silicone granulomas and breast cancer metastases may coexist in the same lymph node.

Case presentation

A 60-year old woman with a history of left breast cancer 30 years ago who had undergone modified radical mastectomy (MRM) followed by implant-based breast reconstruction 12 years later presented

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with right axillary. lymphadenopathy. The woman had undergone total mastectomy and axillary lymph node dissection level I and II. The pathology report of cancer was invasive ductal carcinoma, T=1cm, Grade 2, with no nodal involvement in 26 dissected lymph nodes (LNs). She further underwent oophorectomy and chemotherapy with 3 cycles VAC (vincristine, adriamycin, cyclophosphamide). The reconstruction was done twelve years after diagnosis; therefore, it was delayed one stage. The implant was compounded with a the latissimus dorsi musculocutaneous flap. The type of prosthesis was SilitexR® Low Bleed Gel-filled, round moderate profile, size: 275cc, rounded raw surface (Mentor Company).

Current clinical and radiological examination (CT, US, Mammography, MRI) showed no local or regional recurrence, apart from enlarged, movable, rounded, painless axillary lymph nodes, of maximum diameter of 2 and1cm, in the contralateral axilla.

The patient underwent excisional biopsy of two larger LNs to rule out malignancy. On pathologic evaluation, the specimen consisted of two fibro-fatty fragments, which included two lymph nodes with 1,3cm and 3,5cm of larger dimension.

Histological Features

Both lymph nodes demonstrated extensive involvement by diffuse follicular hyperplasia with interspersed foamy histiocytes with clear, bubbly, vacuolated cytoplasm corresponding to silicone and foreign body type giant cells with refractile, non-birefrigent particles, with a small peripheral rim of preserved lymphoid cells (Figure 1a, b). Asteroid body was evident inside giant cell (Figure 1-c). Therefore, the diagnosis of silicone gel lymphadenopathy was made.

Clinical Features

After histological diagnosis and requesting the clinical history of the patient, the clinician confirmed the history of breast silicone augmentation mammoplasty. Further review with Ultrasound and MRI confirmed breast implant rupture. The patient was referred to a plastic surgeon for removal of the implant. She refused any further treatment due to social-economic factors.

Discussion

Silicone gel implants have been widely used for breast augmentation and reconstruction since 1963 and are made of silicone shells filled with either saline or silicone gel.1 Rupture is a late complication and consists of intracapsular rupture (when the gel remains within tissue capsule surrounding the implant), extracapsular rupture (when the gel moves outside the capsule but remains within the

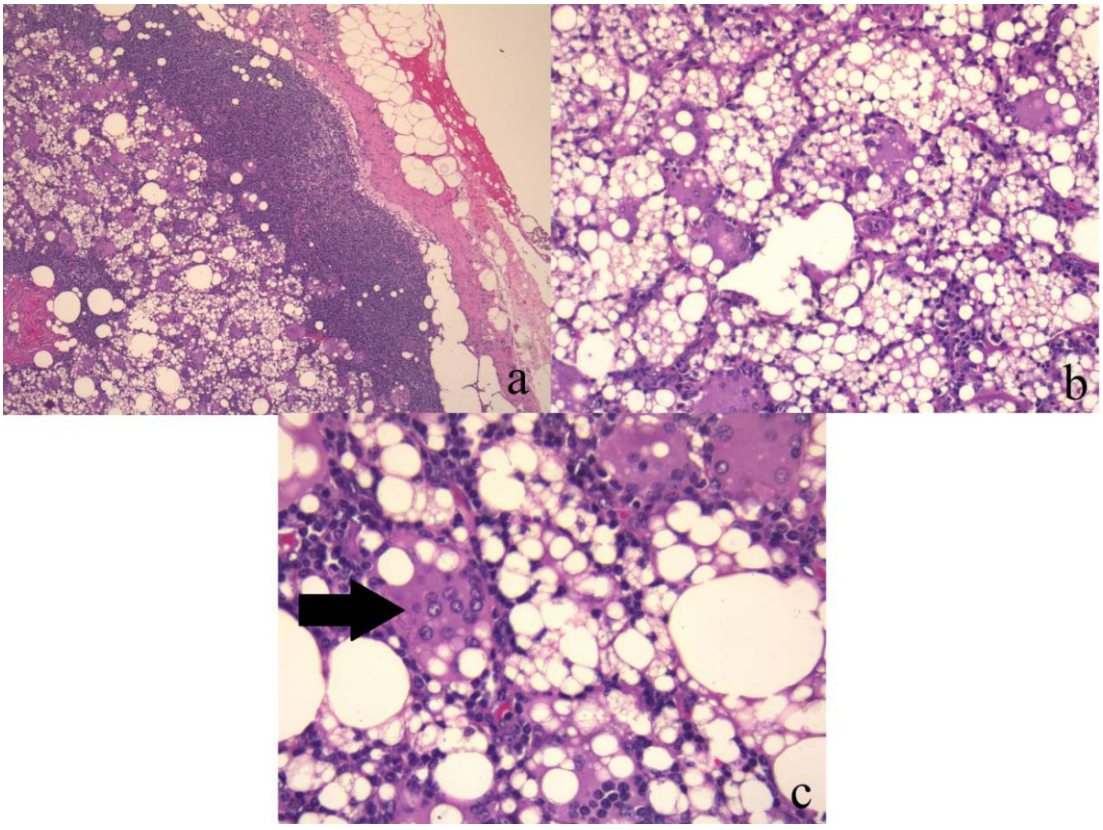

Figure 1. a, b. Lymph node involvement of the medullary sinuses by interspersed foamy histiocytes with clear, vacuolated cytoplasm and foreign type giant cells (H&E, in different magnifications, X100, X200) c. Multinucleated histiocytes with occasional intracytoplasmic asteroid body (arrow) (H&E, X400)

breast tissue) and migrated gel (when the gel moves beyond the breast).[2] Silicone particles can migrate through tissues following overt breast implant rupture or slow gel 'bleed' through an apparently intact outer implant shell. The exact prevalence of implant rupture remains unclear and is estimated to be between 0.3% and 77%.[3] The incidence increases with implant duration[4] and depends on the site of implantation (most likely if subglandular as opposed to retropectoral), the presence of local tissue contractures and type of implant used.[2] The sensitivity of physical examination for detecting silicone implant rupture may be as low as 30%5, although the diagnosis is easier when capsular contracture is present.[6] Magnetic resonance imaging (MRI) techniques have made the diagnosis of previously undetected implant rupture possible.[7] The FDA advises removal of ruptured breast implants[8], but silicone lymphadenopathy does not warrant treatment unless it is symptomatic or interferes with breast cancer detection.[9] Silicone leak can remain confined to the breast or spread to draining axillary lymph nodes, and all across the body[10-14], and even to remote organs, lung parenchyma, chest wall muscles, where silicone leads to foreign body inflammation[15-19], and sometimes mimics neoplastic disorders on imaging studies.[20, 21] Subcutaneous siliconomas have also been reported in more distal areas such as the abdominal wall, inguinal region and lower limbs.[22] This occurrence can be attributed to the fact that silicone polymer is lipid soluble, which facilitates its migration in fatty tissues. Once outside the confines of the implant, silicone particles may be transported to regional lymph nodes by macrophages and generate a granulomatous reaction which may present as lymphadenopathy with the ipsilateral axillary lymph nodes being most commonly involved.[11] Involvement of ipsilateral intramammary, internal mammary, supraclavicular as well as contralateral internal mammary and axillary lymph nodes has also been reported.[10] Although studies have analyzed the pathologic features of silicone lymphadenopathy and accuracy of imaging modalities in detecting breast implant rupture, there are relatively few reports that describe the clinical correlates and the distribution of involved lymph nodes in patients with ruptured silicone breast implants. The latter was attempted by Fernando Collado-Mesa et al.[10], who described for the first time the silicone spread to mediastinal lymph nodes and the use of endobronchial ultrasound (EBUS)-guided biopsy to confirm it.

The lymphatic drainage of the breast occurs through three principal routes: the axillary, transpectoral, and internal mammary pathways.[23] The axillary lymph nodes involvement is easily explained by the major lymphatic drainage system of the breast toward the axilla. More than 75% of the lymph drainage, particularly from the outer quadrants, drains to the ipsilateral axillary lymph nodes. The remainder drains to either the internal mammary lymph nodes, the opposite breast inner quadrants or to the inferior phrenic nodes (particularly from the lower quadrants).[24] The intra-mammary involvement, first reported in 1994[12], can be explained by the other important lymphatic drainage system of the breast.[25] Silicone migration may occur through the same routes but may also spread in retrograde direction or use other pathways, once the jugular-subclavian venous confluence has been reached. Silicone migration can occur in a retrograde direction through collateral pathways when the normal lymphatic flow is obstructed because of scarring from surgery, including lymph node dissection.[25, 26] These include contralateral internal mammary[13] and mediastinal lymphatics.[15, 16] Our case demonstrates that in a patient with disrupted lymph drainage due to prior mastectomy and axillary lymph node dissection, silicone particles can migrate in a retrograde fashion and reach the contralateral axilla. Notably, silicone migration can occur due to gel bleed with intact envelope in the absence of implant rupture.[27] Therefore, patients with silicone lymphadenitis can be asymptomatic and a history of silicone breast implant may be all the history that is provided. In our case, there was no knowledge of the clinical history at the time of diagnosis. Most implant ruptures are not clinically apparent nor are they readily visible on routine mammographic/sonographic imaging. MRI is the most accurate imaging modality to evaluate the integrity of breast silicone implants. However, lymph node morphology is better evaluated by ultrasound. Current FDA recommendations for silent implant rupture screening are breast MRI implant protocol three years following implant placement and every two years thereafter.

Cytological and pathological findings of silicone lymphadenopathy are well described.[28, 29] Foreign body giant cells with birefrigent, granular material and one or more asteroid bodies located peripherally in the cell cytoplasm, are described cytologically.[28] Differential diagnosis includes other granulomatous disorders, which can be easily excluded if birefrigent particles are found within the macrophages in an appropriate clinical setting. Fat necrosis and lipogranuloma are among differential diagnoses too. Most cases of fat necrosis occur postoperatively or after radiation therapy, usually within a periareolar or superficial location.

Fine needle aspiration of palpable lesions in the axilla and breast after breast augmentation is useful in differentiating between cancer recurrence and silicone granulomas.[29] It is well known that FNA is an accurate and cost-effective method of ruling out malignancy and diagnosing implant disruption in patients with silicone prostheses presenting with an axillary mass. Although cytological investigation

can produce an unequivocal diagnosis and thus help alleviate patient's anxiety and lead to patient's confirmation, excisional biopsy is advisable to exclude concomitant malignancy.

Histologically, silicone lymphadenopathy involves accumulation of silicone gel, firstly in the medullary sinuses (unlike metastasis, which primarily involves the lymph node cortex). The histologic appearance can vary widely, ranging from no involvement to global involvement of the lymph node. Histologic features include diffuse follicular hyperplasia with interspersed histiocytes with clear, vacuolated cytoplasm. Foreign-body type giant cells, some containing refractile material, may accumulate in areas where clusters of clear cells have formed empty vacuoles[9, 30] As there is no histochemical or immunohistochemical procedure that can stain silicone, a definitive identification of silicone in lymph nodes and other tissues can be confirmed by electron microbe analysis using transmission or scanning electron microscopy.[31]

Although silicone migration to the contralateral lymph nodes has been described in the literature, in most cases there was also symmetrization with bilateral mammoplasty and bilateral breast implant insertion.[10] This is in contrast to our case where only unilateral ipsilateral breast implant insertion was done.

The development of lymphadenopathy, particularly in patients with a history of breast cancer, raises concern regarding new or recurrent malignancy. Imaging is important in distinguishing reactive lymphadenopathy related to silicone deposition from metastatic disease, since some of these patients may have a history of breast cancer. MRI of the breast is the imaging study of choice in the diagnosis of silicone breast implant rupture for most women.[7] Alternatively, mammography, breast ultrasonography, and breast CT may diagnose silicone breast implant ruptures when MRI is contraindicated.

Silicone within lymph nodes can appear dense on mammogram, can have a snowstorm appearance on ultrasound, may demonstrate color mapping on (dual energy) DECT, and can be hyperintense on silicone-sensitive MRI sequences. The most accurate method to distinguish reactive versus metastatic lymphadenopathy is using ultrasound, as it can show a classic snowstorm ("sandstorm") appearance in cases of silicone deposition within the node.[32] Silicone-sensitive MRI may not always exhibit high signal intensity as silicone may variably infiltrate the node.[33]

In addition, PET scanning may demonstrate positive FDG uptake in silico3ne-induced lymphadenopathy and further heighten the suspicion for malignant disease.[34] FNA can lead to the correct diagnosis. Nevertheless, confirmation by excisional biopsy should be done to exclude coexistent malignancy, specifically in a patient with a history of breast carcinoma.[35] Once malignancy is excluded, treatment consists of conservative approach or excision of the affected lymph nodes with an excellent prognosis.

In this case report, we presented a rare case of silicone migration to the contralateral axillary lymph nodes post mastectomy and reconstruction with silicone implant. Silicone axillary lymphadenopathy due to leakage from silicone breast implant is a rare occurrence that presents 6-10 years after implant placement.[9] The actual incidence and prevalence are unknown with less than 180 cases noted in the literature.[36] To the best of our knowledge, there have been only 5 case reports concerning silicone migration to the contralateral lymph nodes.[10, 11, 36, 37] Factors that lead to aberrant lymphatic flow include prior breast or axillary surgery or irradiation, bulky tumor in breast or heavy burden disease in the ipsilateral lymph nodes.[38, 39] Our case and the few published similar cases indicate that involvement of the contralateral lymph nodes can happen due to aberrant drainage and not necessarily via hematogenous spread. The implications of these findings are important as they can be the underlying mechanism in the case of metachronous contralateral axillary metastasis (CAM), in the absence of a contralateral breast cancer or an ipsilateral breast cancer recurrence (IBCR), therefore representing a regional event rather than a systemic disease. After treatment of breast cancer, 3,6% to 6% of patients present with contralateral axillary lymph node metastasis.[40] According to AJCC staging manual, CAM is considered an M1, stage IV disease, even in the absence of distant organ metastasis, such as bone, liver or lung. Studies have shown that patients with CAM have a better prognosis than patients with distant stage IV metastatic disease[41-44] and better OS when CAM is subjected to surgical and systemic treatments with a curative intent.[43] Therefore, arguments have been made that CAM should be classified as locally advanced (N3) disease, rather than metastatic (M1, stage IV) disease.[45]

In conclusion, axillary lymphadenopathy in any patient with a history of breast cancer should raise the concern for recurrence. However, migration of silicone to the regional lymph nodes in patients with implant-based breast reconstruction is a well-known condition too. This is not always limited to the corresponding axillary lymph nodes and can also affect the contralateral axillary lymph nodes. Our case demonstrates that in a patient with disrupted lymph drainage due to prior mastectomy and axillary lymph node dissection, silicone particles can migrate in a retrograde fashion and reach the contralateral axilla. On encountering enlarged lymph nodes in a patient with silicone breast implants, the possibility of silicone lymphadenopathy should be considered, even in the case of contralateral axillary lymph node

involvement. Biopsy is the only definite way to rule out malignancy.

Ethical considerations

Written informed consent was obtained from the patient.

Conflict of Interest

The authors have no conflict of interests to declare.

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