

A case study of breast siliconoma

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Abstract

Background: Silicone or foreign materials injection is widely used for aesthetic breast augmentation and reconstructions in many countries. Once injected, it will stimulate a foreign body reaction between body tissues and silicone. This reaction can cause the formation of a granuloma known as siliconoma, which represent by the lumping at the breast. This symptom usually mimics breast cancer and sometimes be the origin of breast cancer. This paper is focused on the discussion on radiographic appearance of silicone and a case study of breast siliconoma. Case Study: A 66-year-old Chinese female with a family history of cancer presents with palpable painless lumps in her breasts. The lumps were present in both breasts without any mobility and other inflammatory processes. Mammographic examination demonstrated a dense bilateral mass towards the chest wall and asymmetrical rounded densities in both breasts. There are no breast cancer indications were reported. The pathology demonstrated a siliconoma.

Keywords: Study case of breast siliconoma, silicone granuloma

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Introduction

Definition

Silicone granuloma is a skin condition that occurs as a reaction to silicone, and the formation of nodules characterizes it. The foreign material injection of silicone was a popular technique for cosmetic purposes, especially in breast augmentation in many countries. Silicone has become popular in medical use due to its compatibility and limited rejection by organisms [1]. Furthermore, its physiological inertness, water insolubility, oxidation resistance, nonvolatility, and non-crystalline silicone property make it useful for medical applications [2]. A foreign body reaction occurs when silicone is injected subcutaneously in liquid form. The formation of giant cells and the substance's phagocytosis led to a granuloma known as siliconoma. This reaction can occur due to direct silicone injection into the breast tissues as a part of a cosmetic procedure or silicone implants leaking.

Other than siliconoma, there are also other complications of silicone injection including painful nodularity, skin erosions, and migration of free silicone along tissue planes or distant locations with embolism [2]. The injected silicone can cause siliconoma and fibrosis with hard, nodular breast masses and architectural distortion mimicking carcinoma. Some patients complained of pain, induration, or palpable nodules [3]. Hence, the role of conventional methods, such as physical, mammographic, and ultrasonographic examination, is limited for the diagnosis of breast cancer in patients with breasts augmented by foreign materials, which causes a delay in the diagnosis [2]. Therefore, the objective of this study is to present a case study of breast siliconoma as well as discussing a radiographic appearance of silicone.

Literature review

Siliconoma is usually stated as a benign breast mass. However, some studies had revealed the breast siliconoma could lead to carcinoma [4][5]. The role of imaging modalities in the diagnosis of breast masses secondary to silicone injection is limited. The mammography and ultrasonography examination could not help in diagnosing whether the masses are cancerous or not because it is challenging to distinguish granulomas from masses of epithelial or stromal origin [6]. Most studies agreed that mammography and ultrasonography could detect the presence of silicone but not in diagnosis. Leibman & Misra (2011) studied the spectrum of imaging findings in the silicone injected breasts and the found the presence of injected silicone may first be revealed on mammography as high-density silicone granulomas as shown in Figure 1 [5]. Mammography is technically difficult to perform in patients who had undergone silicone injection because the silicone-injected breast increases in thickness and makes it difficult during compression. Penetration of the breasts also increased radiation exposure towards patients. Another study conducted by Manasori *et al.* (2007) stated that the mammographic appearance of breasts augmented with liquid silicone injection might show the various size of dense nodules defined as the presence of micro macronodular patterns [6]. Other than that, ultrasonography examination also contributes to detecting free silicone in the breasts. Harris *et al.* (1993) described the sonographic appearance of free silicone in the breast as a "snowstorm"

appearance [7]. According to Etxeberria *et al.* (2016), ultrasound appearance is a highly echogenic pattern of scattered and reverberating echoes with a well-defined anterior margin and loss of detail posteriorly and this pattern has been described as "echogenic noise," appearing similar to a "snowstorm" [2].

In the case of siliconoma, the clinical appearance may mimic to breast cancer and may appear on mammogram. MRI is usually recommended in addition to mammogram and ultrasonogram to evaluate extension of the lesion and confirm oncologic assessment [8]. MRI findings include collapse of implant and free silicone particle outside the shell.

Case study

Patient History

A 66-year-old Chinese female patient, referred by another private centre, came for clinical mammographic screening with no complaint of pain at all, and the shape of both breasts was still good. However, the ultrasound reported from the previous hospital shows existing of multiple cysts on both breasts. She has a brother with a history of gastrointestinal cancer (GIT Cancer). The patient also said that she had undergone a breast augmentation procedure with an injection of silicone fluid ten years ago. The procedure was not performed in a hospital in the absence of a certified medical personnel and appropriate techniques. However, she could not provide any documentation or report regarding the exact type and amount of silicone used during the procedure. However, the patient stated that his mammography examination performed in 2010 showed normal findings.

Sign and Symptoms

The patient denied having any other symptoms regarding her breasts instead of lumps on both breasts. After performing the initial examination, the technologist noticed palpable painless firm masses on both breasts without any mobility and another inflammatory process during breast self-examination (BSE). There are no palpable axillary lymph nodes. She also did not present with any nipple discharge or skin changes on both breasts.

Procedure

Patient preparation

Before the mammographic procedure, the radiographer interviewed the patient to confirm the patient's history include:

- i. Patient identification
- ii. Family history of cancer
- iii. Current medications
- iv. Previous procedure breast-related
- v. Previous mammograms findings
- vi. Reason for the current visit

Next, the radiographer asked the patient's last menstrual period (LMP) before the examination to determine the possibility of pregnancy and briefly explain the procedure to ensure the patient can understand the examination. Then the patient needs to change into the hospital gown and remove any jewellery, piercing, talcum powder, deodorant, lotion, or perfume at the breast and axillary region that may cause artifacts on the radiographic image. It is also necessary for the radiographer to locate the scars, palpable mass, warts, tattoos, and moles to avoid misdiagnosis.

Mammographic procedure

Four images will be captured in standard mammographic views, two images from each side of the breast. The mammographic procedure can be performed in standing or sitting. However, the standing position is more common and preferable. The standard two mammography procedure views are the craniocaudal (CC) view and the mediolateral (MLO) view.

The first mammographic procedure done in CC view on each side of the breast separately. In this procedure, the bucky is positioned 90° to the chest wall. The radiographer pulled the breast forward onto the detector and ensured the inframammary fold (IMF) is lifted as high as natural immobility allowed. The patient was asked to turn their head from the side of being imaged before compressing the breast until the breast tissues are taut.

For the MLO view procedures, the tube was rotated about 40° to 70° until the bucky is parallel to the pectoral muscle. The angulation of the tube depends on the size of the breast. The radiographer adjusted the Bucky's height and positioned the patient until the edge of the bucky fits at the axilla level. The breast tissues of a pectoral muscle anteriorly were pulled and hold up and out away from the chest wall to avoid overlapping breast tissues. The compression started with the upper corner of the compression paddle below the clavicle and ensured it is central to the breast base.

Findings

Radiologist's report and findings

The results stated in the radiologist's report as BI-RADS Category 2 presented as normal findings without breast cancer indications. However, the radiologist noticed dense bilateral masses towards the chest wall, mainly on the right side with filler material used in breast augmentation and several asymmetrical rounded densities of various sizes in both CC and MLO view in Figure 1 and Figure 2, respectively. There are no macrocalcifications or any clustered microcalcification noted in both breasts. There was no stromal distortion, skin changes, or nipple retraction of the breasts seen. Also, no significant axillary lymphadenopathy was reported. Radiologists suggest bilateral benign breast masses secondary to the breast augmentation due to filler material already mixed with the breast tissues.

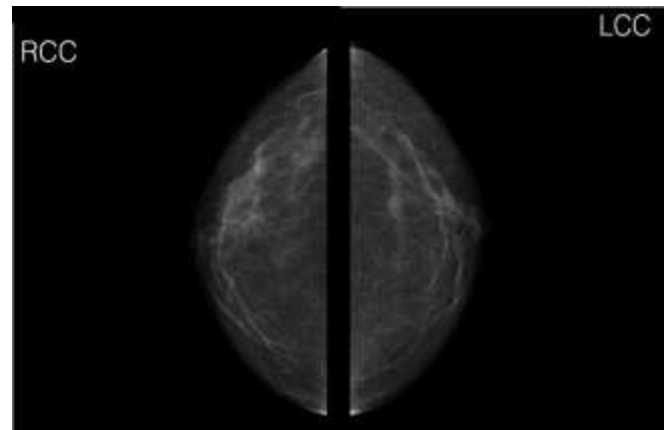


Figure 1. The right craniocaudal (RCC) and left craniocaudal (LCC) view of the breast. There are Dense bilateral masses towards the chest wall, mainly on the right breast in craniocaudal (CC) view

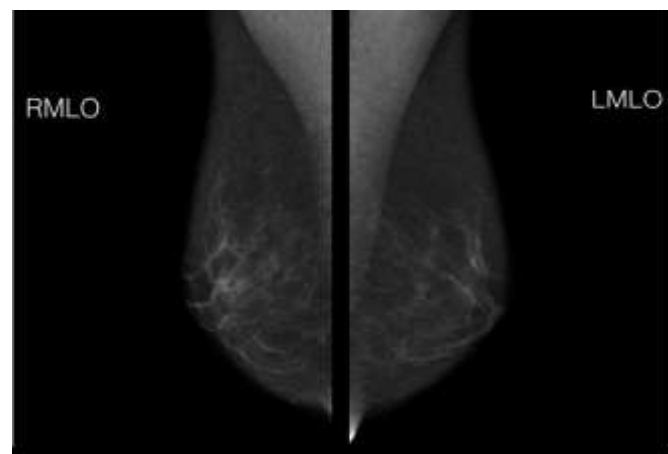


Figure 2. The right mediolateral (RMLO) and left mediolateral (LMLO) view of the breast. There are dense bilateral masses towards the chest wall, mainly on the right breast in mediolateral (MLO) view.

Prognosis or any relevant issues

There is no exact prognosis in siliconoma. The association of siliconoma formation and the occurrence of carcinoma determine the outcome of the disease. Therefore, the prognosis might be poor if the siliconoma originate the formation of breast carcinoma.

Discussion

In this study, the accurate occurrence of foreign material injection for breast augmentation is challenging because the procedures were performed illegally by non-certified medical personnel. As a result of breast silicone injection, many females may develop inflammatory changes and granulomas, facilitating breast cancer screening. Most patients usually present with late complications ranging from mild inflammations or small breast lumps to severe mastitis or skin necrosis [8]. According to radiologist reports, mammography examination results in this patient show several asymmetrical rounded densities of various sizes in

bilateral breasts. In contrast, the ultrasonography findings of the patient reported the presence of multiple cysts in both breasts. The radiologists reported that the patient had benign breast masses; however, she suggests performing MRI to confirm the malignancy.

Most mammographic appearances show multiple high-density nodules that are already diffused with breast tissues³. The ultrasonographic images as shown in Figure 3, the silicone sometimes appears as hypoechoic masses almost indistinguishable from breast cysts^[2]. The majority of ultrasonographic findings regarding the silicone breast injection revealed the presence of marked echogenicity with snowstorm patterns, which was reported as a typical appearance of free silicone. According to Maia & Scaranelo (2006), both mammographic and ultrasonographic findings frequently showed macronodular and mixed macro-and micronodular patterns^[3]. They also stated that both modalities play a role in identifying free silicone in breast tissues but have low sensitivity in detecting occult carcinoma. Patients must proceed with a more sensitive modality as there are cases reported that carcinoma can also occur secondary to breast silicone injection^[3].

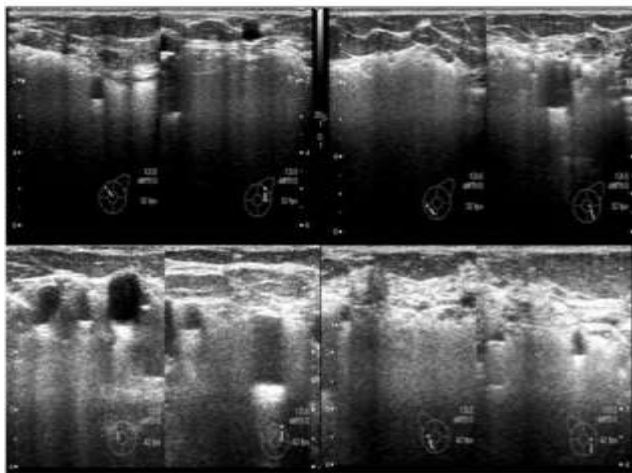


Figure 3. Ultrasonographic images of a patient who underwent free silicone injection show multiple and bilateral hypoechoic masses surrounded by echogenic noise mimic the appearance of breast cysts².

MRI examination is suggested for follow-up in a patient with breast augmentation by silicone injection to evaluate the occurrence of carcinoma. According to Chuangsuwanich *et al.* (2013), MRI examination is usually recommended in addition to mammography and ultrasonography to evaluate the extension of the lesion and confirm the oncologic assessment^[8]. Also reported that MRI has successfully detected breast carcinomas in breasts injected with free silicone and MRI is high sensitivity and high accuracy modality for diagnosis compared to mammography and ultrasonography^{[9][10]}. According to Vanwambeke *et al.* (2012), the fibroglandular tissue appeared hypointense and surrounded by T2 hyperintense on fat-suppressed turbo spin-echo T2-weighted-image, indicates the accumulation of liquid silicone diffusely dispersed in the subcutaneous and prefectoral fat. However, with an additional sequence of T2 with fat and water suppression, the high signal of silicone

distinguishing it from the fluid content of breast cyst on the left side, as shown in Figure 4^[11]. On the other hand, some authors reported that MRI contributes as an additional screening tool to confirm the diagnosis and exclude the presence of malignancy in breast injected with silicone^[12].

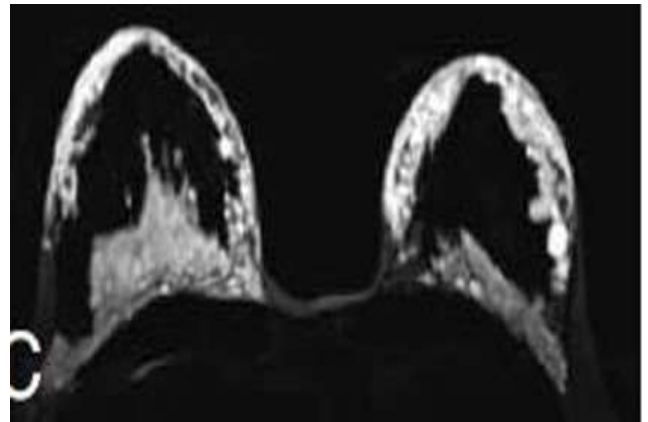


Figure 4. MRI T2 weighted image with fat and water suppression^[11].

Conclusion

In conclusion, all patients with a history of breast silicone injection should undergo surgery due to symptoms or inability to rule out the cancer cells. In the future, there should be a guideline for diagnosis, evaluation, and treatment of these specific cases since breast augmentation has become common among women. The formation of siliconoma can be the cause of breast carcinoma to occur. Thus, the association between the cancer risk and granulomatous disease secondary to foreign material injection should be studied. Besides, the controversy regarding the management of this case should be focused mainly on an asymptomatic patient.

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