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### RESEARCH ARTICLE

## SILICONE-REACTIONAL AXILLARY LYMPHADENOPATHY RESULTING FROM BREAST PROSTHESIS RUPTURE: A RARE CASE REPORT

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### Abstract

**Introduction:** Silicone reaction lymphadenopathy occurs due to the leakage of silicone particles into the breast cavity as a result of breast prosthesis rupture. These particles cause foreign body-like granulomatous reactions and are transported to the regional lymph nodes, especially the axillary lymph nodes, resulting in lymphadenopathy. Although rupture is a harmless condition, it is essential to rule out any degree of malignancy through biopsy.

**Aim:** To describe a rare case of intracapsular rupture of a breast prosthesis with silicone infiltration in the axillary lymph nodes.

**Methodology:** An observational study with data collected through a review of medical records and clinical examinations, with informed consent obtained in advance. The study was assessed by the Research Ethics Committee, ensuring compliance with all ethical standards and the protection of patient data.

**Case Report:** A 66-year-old female patient, who had been wearing bilateral breast implants for 20 years, presented with a palpable, painless right axillary lump at a routine appointment. An ultrasound of the right axilla revealed an enlarged, inaccurate and thickened cortical lymph node with echoes inside. Breast MRI showed signs suggestive of intracapsular rupture and the presence of atypical lymph node enlargement in the right axilla. Core biopsy of the right axilla showed chronic granulomatous lymphadenitis of the foreign body type.

**Discussion:** Silicone lymphadenopathy involving axillary lymph nodes is an uncommon complication. It is believed that macrophages are responsible for transporting the material particles to the lymph nodes, where the granulomatous reaction occurs.

**Conclusion:** This is a rare case of silicone lymphadenopathy, an uncommon complication related to ruptured breast implants.

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**Introduction:-**

Plastic surgeries are indicated to remodel body structures, usually for aesthetic reasons idealized by the standards imposed by society, but also with a therapeutic bias, since the change in appearance increases patients' self-esteem<sup>1</sup>.

According to the International Society of Aesthetic Plastic Surgery (ISAPS), there was a 7.4% increase in cosmetic procedures completed in 2019. Despite a 3.6% decrease in the number of procedures in the last year, breast augmentation remains the most common cosmetic surgical procedure, accounting for 15.8% of all procedures<sup>2</sup>.

Silicone prostheses are made of a non-biodegradable prosthetic material that normally causes little inflammation in most people. However, the literature points to some complications arising from implants, albeit rare, including local and systemic granulomatous inflammatory reactions, which affect breast tissue, lymph nodes and other parts of the body<sup>3</sup>. The granulomatous inflammatory reaction of the foreign body type, when caused by silicone, is called siliconoma, a term popularized in 1965<sup>4</sup>.

The rupture of the prosthesis leads to the extravasation of particles into the breast cavity, which cause foreign body granulomatous reactions and fibrosis. Once ruptured, the silicone particles can be transported by macrophages to regional lymph nodes, resulting in lymphadenopathy in the body<sup>3</sup>.

Reactive lymphadenopathy due to breast implants is rare and consists of the deposition of silicone in one or more lymph nodes located in the drainage path of the breast. They are most found in the axillary regions, but can also be found in the mediastinal, cervical and internal mammary chain regions<sup>5</sup>.

Most cases of silicone lymphadenopathy are silent, so they are identified accidentally in routine breast examinations, where the presence of radiological signs is analyzed, but they can also present as a palpable axillary nodule that mimics malignant lymphadenopathy<sup>6</sup>. However, the severity of the condition depends on the number of lymph nodes affected, the degree of lymph node infiltration and the reaction of the surrounding tissue<sup>7</sup>.

The incidence and prevalence of cases of siliconoma remain unknown, with less than 180 cases described in the literature. Most of these cases are directly related to prosthesis rupture and appear around 6 to 10 years after breast reconstruction or augmentation surgery. However, silicone lymphadenopathy can also occur due to the diffusion of particles from the implant<sup>6</sup>.

The incidence of asymptomatic rupture of silicone capsules is between 0.2 and 4% and increases with the age of the implant. The useful life of an implant without rupture is estimated at 98% in 5 years and 83%-85% in 10 years for younger implants<sup>8</sup>.

The risk of implant rupture or leakage increases with the age of the prosthesis, on average between 10 and 13 years, the type of prosthesis used and the implant site. Simple silicone rupture is a harmless condition and rarely shows symptoms or progress. However, it is essential to histologically rule out the presence or absence of malignancy<sup>3</sup>.

Patients with a history of breast cancer are alert to the possibility of a recurrence, which is why a biopsy is so important. After breast cancer treatment, many women undergo breast reconstruction with the addition of a silicone prosthesis; however, when axillary lymphadenopathy develops, one of the differential diagnoses is the possibility of tumor recurrence<sup>8</sup>.

The aim of this study is to describe a rare case of a patient who underwent bilateral adenomastectomy with immediate reconstruction with a bilateral breast prosthesis, which resulted in an intracapsular rupture of the breast implant with silicone infiltration in the axillary lymph nodes.

**Methodology:-**

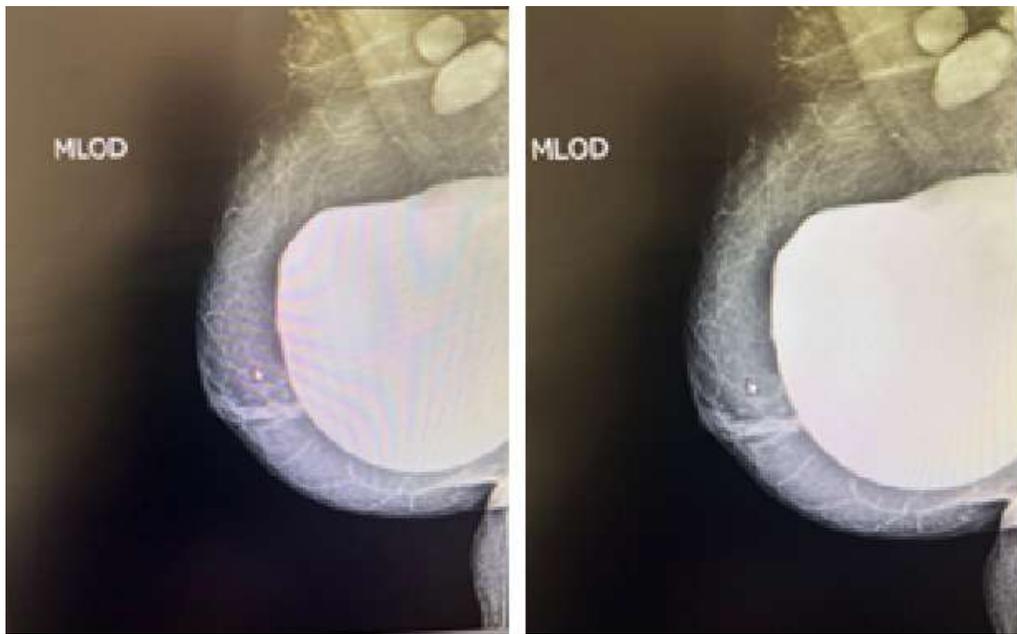
This is a descriptive observational study that has been approved by the Research Ethics Committee under the Certificate of Submission for Ethical Appraisal (CAAE) number 83944624.0.0000.5383. The qualitative bibliographic survey was based on the last 15 years due to the lack of up-to-date literature. The articles found were available in English and Portuguese and were selected from platforms such as Scielo, Science Direct and Pubmed, as well as specialized journals such as the Journal of Medical Case Reports, Revista Brasileira de CirurgiaPlástica, among others. The selection was made by reading the titles and abstracts (inclusion criteria) and excluding opinion articles and editorials that did not deal with the subject studied (exclusion criteria).

Data was collected by consulting the patient's medical records and obtaining a Free and Informed Consent Form (FICF), signed in advance by the patient.

### Case Report

A 66-year-old female patient, G2P2A0, with a personal history of lobular carcinoma in situ, luminal molecular pattern A, who underwent bilateral adenomastectomy with immediate reconstruction with bilateral breast prosthesis 20 years ago. She underwent strict outpatient clinical follow-up every 6 months, with no signs of disease recurrence.

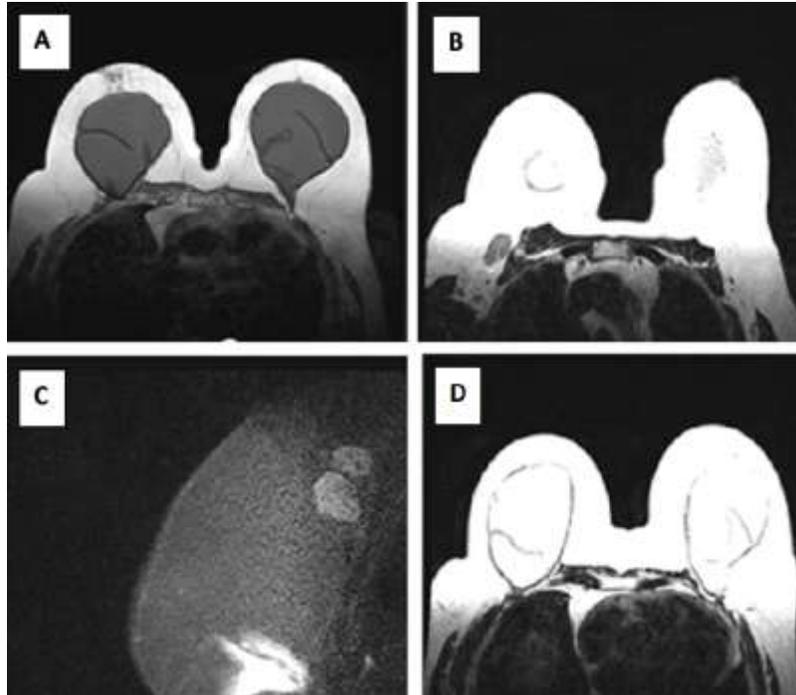
At her current routine appointment, she was found to have a palpable, painless, enlarged right axillary nodule measuring 3.0 cm in diameter. A mammogram (MMG) showed only enlarged lymph nodes in the right axillary area, with the same density as the breast prosthesis (BI-RADS 4) (Photograph 1). Complementary ultrasound (US) of the right axilla revealed an enlarged, inaccurate lymph node with echoes inside. In addition, breast magnetic resonance imaging (MRI) showed breast implants with a single lumen in a pre-pectoral position, containing folds and signs suggestive of intracapsular rupture, and also revealed the presence of atypical lymph node enlargement in the right axilla (level 1), measuring 3.0 x 1.9 cm (BI-RADS 4) (Photograph 2).



**Photograph 1:-** Mammographic image in oblique lateral view of the right breast showing enlarged right axillary lymph nodes, loss of rhiniform shape and density similar to that of the breast prosthesis.

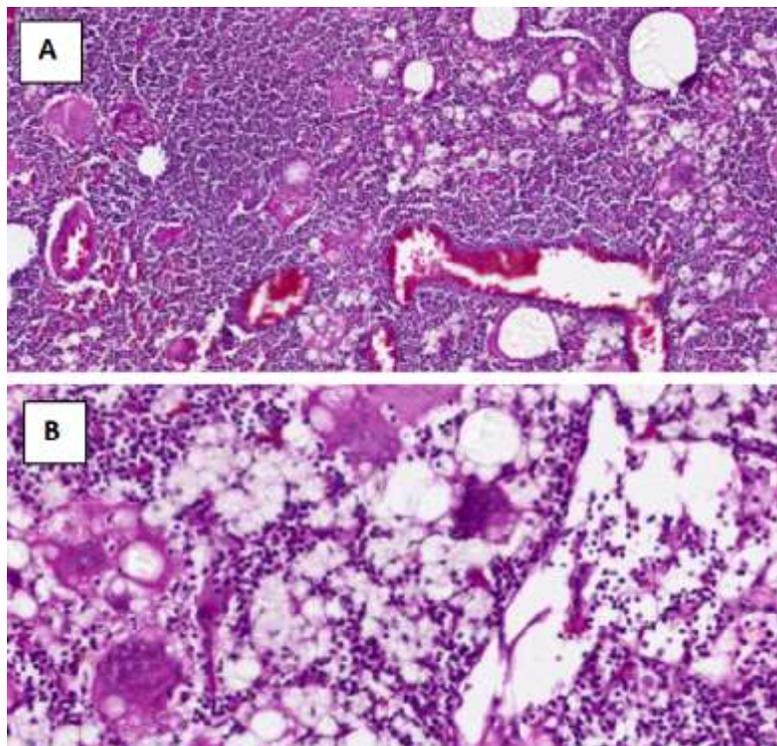
**Source:** the author himself.

Fine-needle aspiration biopsy (FNAB) of the right axillary lymph node revealed multiple multinucleated epithelioid cells, favoring the appearance of giant cells and mature lymphocytes. A Core Biopsy (CB) of the right axilla was therefore carried out, which showed chronic granulomatous (non-caseous) foreign body lymphadenitis, consistent with the clinical hypothesis of silicone rupture (Photograph 3).



**Photograph 2:-** Breast Magnetic Resonance Imaging (MRI) showing significant enhancement of the axillary lymph nodes, similar to the density of the prosthesis (C). Breast prosthesis showing folds, cracks and capsule rupture (A, B, D).

**Source:** the author himself.



**Photograph 3:-**Photomicrograph of axillary lymph node showing multiple multinucleated giant cells and amorphous material (silicon) in lymph node parenchyma (A). Details of multinucleated cells and silicon being phagocytized by macrophages (B).

**Source:** the author himself.

Finally, it was recommended that the axillary lymph nodes be surgically removed and the bilateral breast prostheses replaced. Intraoperatively, there was a significant increase in the right axillary lymph node chain (Photograph 4). The breast prostheses were also deteriorated and broken (Photograph 5).



**Photograph 4:-**Macroscopy of the enlarged and globose lymph nodes in the right axillary chain.  
**Source:** the author himself.



**Photograph 5:-** Right and left breast prostheses showing ruptures and silicone leakage.  
**Source:** the author himself.

The final anatomopathological examination, after the axillary lymph nodes had been removed, confirmed granulomatous lymphadenitis (foreign body reaction, refringent material), confirming the clinical hypothesis of lymph node infiltration by silicone. The patient recovered well from the surgical procedure and was very satisfied with the final aesthetic result (Photograph 6).



**Photograph 6:**-Final result on the tenth postoperative day.

**Source:** the author himself.

### **Discussion:-**

Silicone, which has been used for decades for breast augmentation and is considered a biologically inert material, is associated with numerous complications, such as local and systemic granulomatous inflammatory reactions, which affect breast tissue, lymph nodes, joint capsules, the heart, liver and kidneys<sup>9,10</sup>.

Breast implants can rupture in two ways: extracapsular and intracapsular rupture, which can occur simultaneously. The most common is intracapsular rupture, in which there is a loss of integrity of the implant shell, but it is contained by the fibrous capsule, which remains intact<sup>11</sup>.

Breast implant rupture is one of the most feared conditions and its main complication is gel leakage, leading to migration, fibrosis, granulation and ulceration. Studies have shown that the standard age for implant rupture can vary between 10 and 13 years and is best diagnosed by breast magnetic resonance imaging (MRI)<sup>3,12</sup>.

The mechanism of silicone lymphadenopathy is poorly understood, but it is believed to occur after the material is transported by macrophages and is related to granulomatous reactions<sup>8</sup>.

Granuloma is a way for the immune system to isolate an offensive impurity, which can be a foreign body, chronic infections or necrotic fat. This type of body response is formed by an organized group of macrophages, associated with a variable amount of lymphocytes, epithelioid cells and multinucleated giant cells. Thus, as a defense solution for the body, the isolation of an implant material, for example, would result in the formation of a granuloma<sup>13</sup>.

The reaction to a foreign body, in this case a silicone implant, characterizes a specific type of reaction and is described in the literature as siliconoma. Silicone has an irregular surface and cannot be phagocytized, which facilitates the formation of this immune response. The phagocytosed microspheres, which can be transported to the lymph nodes, are generally smaller than 15 $\mu$ . On the other hand, larger particles of non-absorbable polymers are encapsulated and undergo fibrosis, so phagocytosis doesn't occur<sup>4</sup>.

The presence of silicone droplets in the lymph nodes of patients with breast implants suggests that the passage of various elements, synthetic or biological, from the breast tissue to the lymphatic tissue may have a significant passive component. Granulomatous reactions can present as lymphadenopathy and, when present in the axilla, malignancy of the ipsilateral breast should be ruled out<sup>3,9</sup>.

Silicone lymphadenopathy has been reported more frequently after joint surgery than breast augmentation through silicone implants. When associated with breast augmentation, it mainly affected the axillary nodes, but cases involving intramammary, internal mammary and supraclavicular nodes have been reported<sup>3</sup>.

Thus, chronic complications related to silicone extravasation and migration can present local or distant manifestations, typically found many years after the original placement of the silicone<sup>14</sup>.

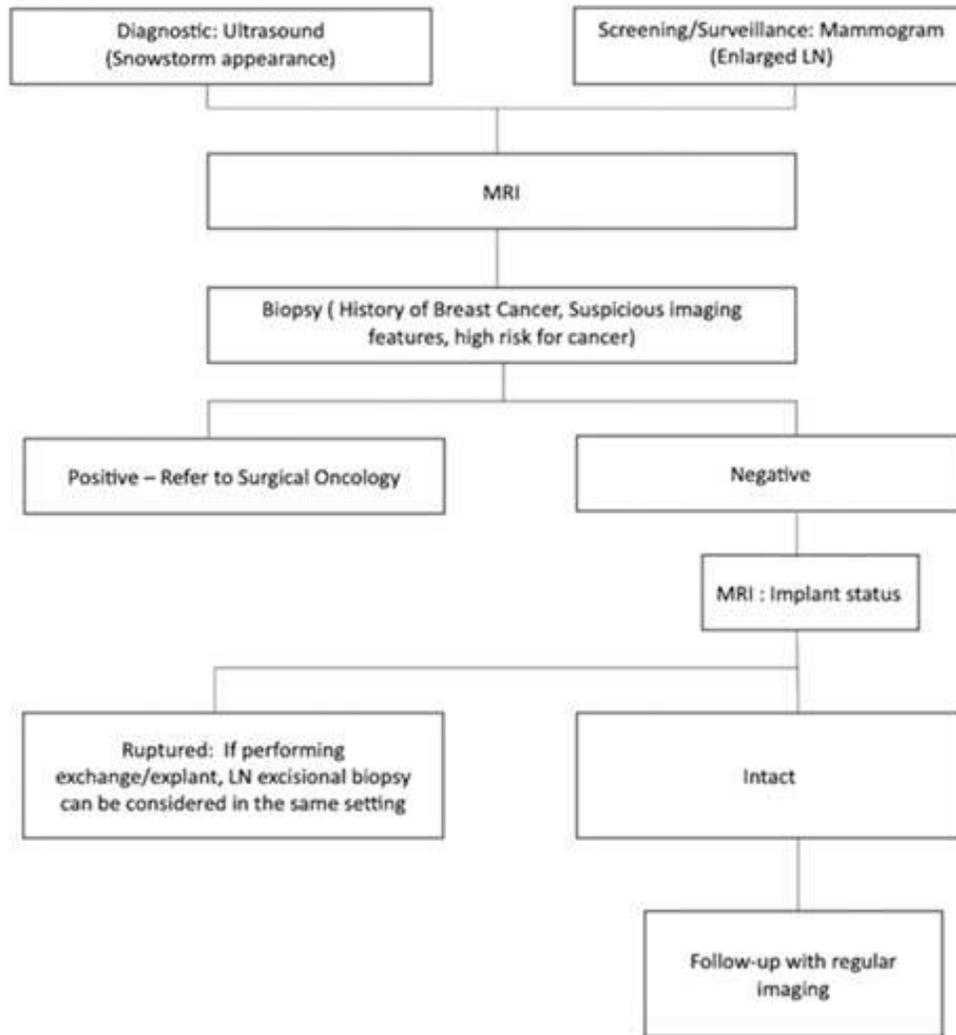
Fine-needle aspiration biopsy (FNAB), an effective and low-cost method, is recommended to rule out malignancy and identify implant rupture in patients with silicone prostheses who have masses in the axillary region. In these situations, FNAB cytology would reveal a foreign body-reactive lymphoid background containing numerous giant cells. More specifically, cystic spaces with multivacuolated macrophages are observed, but with a relatively small number of multinucleated giant cells. Other granulomatous processes can be ruled out if birefringent particles are found in the macrophages, while in silicone-reactive macrophages, the vacuoles contain a non-birefringent, homogeneous, refractory material with a slightly yellowish color<sup>3,7</sup>.

Core needle biopsy is another way of assessing altered lymph nodes and is indicated in cases of lymph node enlargement with thickening of the cortical layer, in which it is necessary to rule out a malignant process<sup>17</sup>.

Other evaluation methods are ultrasound (US) and magnetic resonance imaging (MRI). Ultrasound shows the “snowstorm” sign (diffuse elevation of the echogenicity of free silicone in breast structures), which is more sensitive for detecting silicone lymphadenopathy than MRI. However, US and MRI should be combined in cases of suspected silicone lymphadenopathy<sup>15,16</sup>.

Some studies indicate that an interventional approach, with the removal of axillary lymph nodes, would always be advantageous. The justification for this would be that silicone granulomas have been found in axillary lymph nodes and removed during mastectomy for breast cancer, even when the breast implants were intact. In addition, it has been suggested that silicone may dilute the cellular components in the lymph nodes, which would hide the presence of cancer cells. In the event of intra-breast lymph node involvement, excision would always be recommended, as mammography cannot distinguish between benign and malignant disease in this case<sup>3</sup>.

Regarding treatment, if the biopsy is compatible with silicone lymphadenopathy and the implant is intact on MRI, expectant management and clinical follow-up with imaging tests only is indicated. If rupture is confirmed during the surgical approach to replace the implants, it would be possible to consider excision of the affected lymph nodes (Figure 1)<sup>17</sup>. Excision of the affected lymph nodes is generally reserved for symptomatic patients or when there is no possibility of ruling out malignancy beforehand<sup>18</sup>.



**Figure 1:-** Management flowchart for silicone axillary lymphadenopathy.

Source: Pelegrina P; Tatiana C et al., 2024<sup>17</sup>.

### Conclusion:-

In view of the above, it can be concluded that although silicone is considered an inert, it can cause granulomatous inflammatory complications in the axillary lymph nodes, of the foreign body type called siliconoma. These particles, when transported, result in lymphadenopathy, as the gel is an irregular particle that is not phagocytized. Therefore, the low incidence of axillary reactive lymphadenitis involving breast prosthesis rupture and the lack of knowledge about how silicone moves and settles in the axillary lymph nodes highlight the rarity of this case.

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