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CASE REPORT

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Extracapsular breast implant rupture with silicone migration and lymphadenopathy following a breast augmentation – A case report

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ABSTRACT

Silicone lymphadenopathy and granuloma formation can result from breast implants. A 71-year-old presented with implant rupture 30 years after a breast augmentation, causing left-sided silicone lymphadenopathy and extensive migration to the breast parenchyma and skin. Management included a mastectomy, lymph node resection, implant removal with complete intact capsulectomy, and latissimus-dorsi-based reconstruction.

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KEYWORDS
Silicone breast implant; implant rupture; silicone lymphadenopathy; silicone migration; latissimus dorsi

Introduction

Breast implants are widely used in aesthetic and reconstructive surgery [1], with estimates suggesting as many as 3%–4% of the female population having received them [2]. Breast implant surgery has been largely deemed safe due to the low rate of perioperative mortality [3]. Nonetheless, there is a greater scrutiny on potential implant-associated outcomes, following the acknowledgement of uncommon or rare malignancies [4–6]. Complications may arise from device failure where the implant's elastomer shell ruptures causing a leakage of its contents, especially when silicone is used as gel filler [7]. Implant rupture is directly correlated to the duration of implant indwelling, and occurs with an incidence of approximately 5% of implants per year following implantation [8]. Prevalence has been attested at 36%–68.6% with most cases being asymptomatic [9,10]. This adverse event has been traditionally considered benign, or 'relatively harmless' [11], with some stating there are no health risks associated with implant rupture [12]. Yet, the condition requires surgical intervention, consisting in explantation and capsulectomy with or without replacement for most cases. However, as many as 25% of breast implant ruptures may appear to be extracapsular, where silicone migrates beyond the periprosthetic capsule, having the potential for loco-regional or distant spread [13]. Silicone spread and its potential damage are often irreversible due to the inability of the body to eliminate silicone particles [14]. In fact, silicone-induced granulomas (i.e. siliconomas) can present in the arm, axillary area, chest area or even in more distant parts of the body [15,16]. The consequences of silicone-induced granulomas are not well described or clearly understood [17], but the evolution can include the formation of firm masses which can present similarly to malignancies and require imaging to rule out cancer [18]. Siliconomas can additionally cause local tissue destruction due to chronic inflammation, with soft tissue ulceration, scarring and nerve damage [19]. We present a case of severe silicone migration and lymphadenopathy following bilateral extracapsular breast implant rupture, 3 decades after a breast augmentation. The present case report showcases the risks associated with long-term silicone breast implant indwelling, and has been prepared in accordance with the SCARE guideline checklist [20].

Case presentation

We present the case of a 71 year-old patient of Brazilian descent who underwent a cosmetic breast augmentation in 1994. The patient had no notable comorbidities, received no specific medications and

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she received textured round breast implants in the subglandular plane. No additional information could be retrieved from the original surgery she underwent. The post-operative course was uneventful though the patient performed routine diagnostic imaging up to 2009, when she returned to follow-up for a right palpable lymph node. Ultrasound scans and bilateral magnetic resonance imaging (MRI) found no focal areas of enhancement with pathological characteristics in the breast parenchyma, and revealed no signs of damage to the implants, despite grade II/III capsular contracture according to Baker classification.

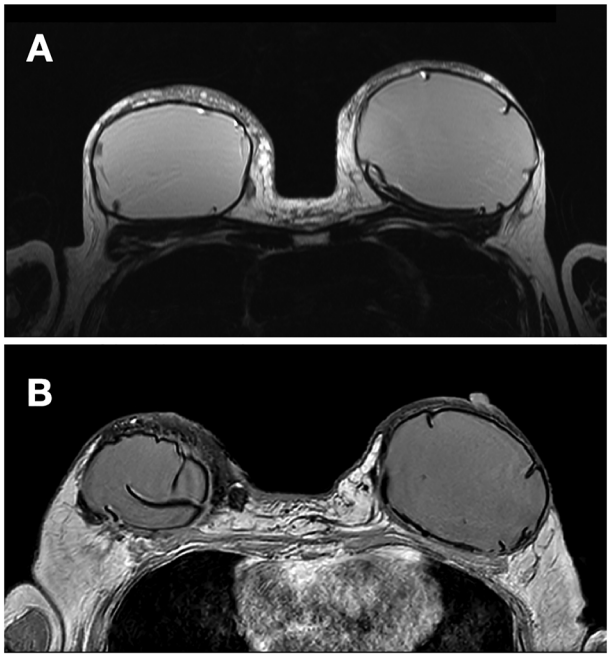

Figure 1. Magnetic resonance imaging (MRI) scans of the patient, from 2009 showing no sign of rupture or silicone spread (a), and later from 2024 with bilateral signs of rupture and extensive silicone migration to breast soft tissues.

Axillary lymph node enlargement was attributed to non-specific inflammation which could not be clinically correlated to any ongoing infectious process. She was offered a breast implant removal which she declined at the time, since replacement could not be performed in a public hospital setting. Thus she was asked to repeat imaging scans the following year but was lost to follow-up. She returned 15 years later, after an overall implant indwelling of 30 years, complaining of worsening breast firmness and onset of skin ulcerations. Upon examination, she presented grade IV capsular contracture, with a palpable 2.5 cm lymph node on the left side, suggesting silicone had spread to the subcutaneous tissues and lymph nodes. She repeated a bilateral breast MRI which showed suspicion of left implant rupture with positivity to the salad oil sign, diffuse siliconoma locations anteriorly in the breasts, chest wall and in the left axilla (Figure 1). No periprosthetic effusions were found. The patient received a bilateral mastectomy and breast implant removal with complete intact capsulectomy, and required an autologous latissimus dorsi flap to achieve tissue closure due to the extensive resections. Skin-sparing mastectomy was not possible due to extensive silicone infiltration of the breast skin, including the nipple. On the right, pectoralis major infiltration was observed, leading to its partial resection as well (Figure 2).

The post-operative outcome was marked by donor site seroma which was managed conservatively, and was otherwise uneventful.

Discussion

The history of silicone breast implant manufacturing from the sixties is characterized by first generation devices which were deemed too firm and unnatural to the touch [7]. This led to a second generation of

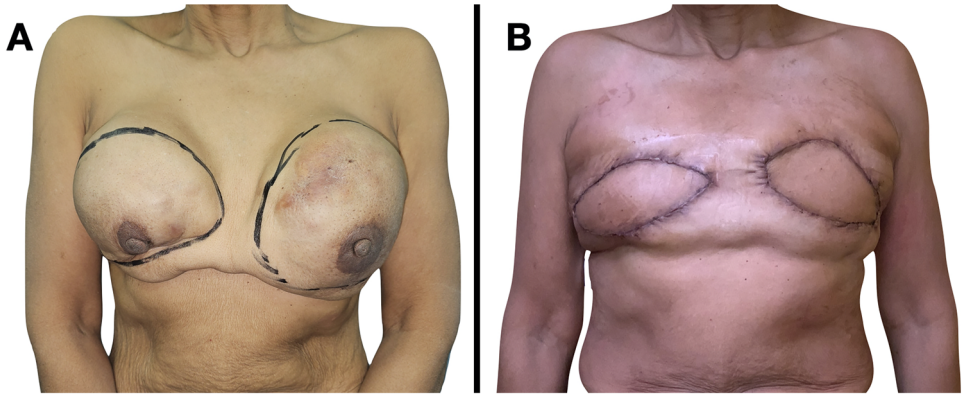

Figure 2. Preoperative (A) and post-operative (B) photographs of the patient from the reported case, showing skin ulcerations and severe capsular contracture on the left side, and bilateral resection and reconstruction with a latissimus dorsi flap.

implants in the seventies with a much softer, less cohesive gel filler (i.e. lower polydimethylsiloxane crosslinking) [7]. While more natural to the touch, these second generation implants were plagued by a higher rate of silicone bleeding and migration, which contributed to bringing attention to the risk of loco-regional and systematic spread [21–24]. Subsequent devices were developed with a thicker elastomer shell and more cohesive gel filling to combat this issue. In fact, fourth generation implants from 1987 introduced outer shell texturing in combination with cohesive silicone gels, while fifth generation implants from 1993 introduced highly cohesive silicone gels to maintain their intended distribution within an implant and provide form stability, allowing anatomical implants to retain their shapes [25]. However, recent findings seem to suggest that silicone gel cohesivity may not be associated with a lower rate of silicone extravasation and might not protect from silicone spread and siliconomas, as opposed to what several authors have suggested [26–28], Including Larsen et al. [29] who recently published a retrospective study on 493 patients, using a mathematical model based on histological findings to quantify silicone content in the breast implant capsule of implants with varying gel cohesivity. In their assessment, the authors found that highly cohesive implants were superior to low-cohesive implants in preventing silicone leakage. Nevertheless, the dichotomic subdivision in high and low cohesivity for gel implants was arbitrary, and not based on the composition of high and low molecular weight chain components of the polydimethylsiloxane silicone which characterized specific generations of breast implants. Subgroup analysis was only performed for a single manufacturer. Indication for the revisional surgery (i.e. capsular contracture, suspicion of rupture, etc.) showed statistically significant differences among low cohesivity and high cohesivity groups, potentially skewing the findings. Additionally, the study used histologic samples based on excision biopsy specimens (1 cm^2) which could mean that the calculations were not an accurate depiction of the true distribution of silicone particles.

Of note, due to damage on the posterior aspect, we were unable to identify the specific make and model of the explanted devices. However, from the combination of a textured surface, round shape and cohesive gel, we believe the patient had received 4th generation implants. As such, we speculate that our case report could add to the body of evidence which has been demonstrating that silicone gel cohesivity may likely not contribute to breast implant safety as commonly believed [30–32].

One retrospective study from Seigle-Murandi et al. [33] on cosmetic and reconstructive patients has suggested that round textured implants may have a higher likelihood of rupture compared to anatomical ones. However, another study from Khavanin et al. [34] in a similarly sized cohort found no difference in reconstructive patients. Additionally, a higher likelihood of rupture in patients with round implants could not be corroborated by data from prospective core studies, where implant rupture rate was consistently similar between both shapes, if not slightly higher for anatomical implants in some studies over a ten-year period [35,36]. Several studies have investigated potential causes for implant rupture, finding most commonly 'spontaneous' damage due to chronic wear-and-tear over a long period of implant indwelling [37], and iatrogenic damage during the primary placement or revisional procedures [38]. The retrospective study from Paolini et al. [10] investigated on other potential causes in reconstructive patients with textured implants, identifying the use of underwire bras, seatbelts and mammographies as additional risk factors. Rosenthal et al. [39] reported in another retrospective study that severe capsular contracture and some specific manufacturers, namely Mentor (Mentor Worldwide LLC, Santa Barbara, California, USA) and Poly Implant Prothèse (La Seyne-sur-Mer, France), were also independent risk factors for a higher incidence of silicone spread. Nevertheless, it should be duly stated that silicone spread occurs even without rupture, as demonstrated by Dijkman et al. [40] according to whom silicone gel bleed and migration outside of the capsule respectively occurred in 98.8% and 86.6% of women, regardless of cohesivity.

Most approaches suggest leaving siliconomas in place once the diagnosis is confirmed, should they not cause any symptoms [41]. Nevertheless, we chose to remove the large axillary siliconoma due to the fear that it might cause tissue destruction over time, as the patient had already developed skin ulceration and chronic wounds over the breast area. Of note, there are several other studies discussing silicone spread requiring explantation surgery and resection of siliconomas [25,42–46]. Some cases reported on the possibility of adverse pulmonary involvement due to silicone deposition in the lungs or pleura [47–49]. One case report showed silicone lymphadenopathy so severe it caused thoracic outlet syndrome [50]. Another one by Ahmed et al. [51] reported on silicone migration which caused a chest wall abscess and sternal osteomyelitis which required chest wall resection and a unilateral latissimus dorsi (LD) flap. Our case is the first reported in the literature with silicone migration

to the breast parenchyma and skin so extensive it required bilateral mastectomy and closure with a bilateral autologous LD flap. The only other case we could find of bilateral subtotal breast tissue resection and LD-based reconstruction following a breast augmentation was due to necrotizing fasciitis [52,53].

Finally, findings of this case report should be used to highlight actionable recommendations for clinicians and patients, and namely the need for standardized and consistent surveillance for all patients with breast implants using diagnostic imaging, as this could help with the early detection of damaged devices and the prevention of extensive silicone migration which could result in necessary maiming procedures. Surveillance should be lifelong, as the risk of rupture increases with continued implant indwelling [3], and average breast implant lifespan is estimated at around 10–15 years [54]. In fact, the Food and Drug Administration (FDA) published their 2022 Breast Implant Guidance, recommending patients with breast implants to undergo appropriate monitoring using MRI or ultrasound beginning at 5–6 years post-insertion and every 2–3 years thereafter [55]. Despite awareness of FDA guidelines, compliance among plastic surgeons appears to be low in publicly funded healthcare systems, which may be due at least in part to concerns over the potential burden of increased costs in contrast with a perceived lack of satisfactory evidence qualifying these guidelines [56].

Conclusion

This report should be used as a cautionary tale about the possible effects of long-term implant indwelling, even with high cohesivity devices, thus challenging the prevailing safety narrative, even when implant-associated malignancies are not suspected. Promotion of consistent implant monitoring with diagnostic imaging should be encouraged in order to enhance the early detection of potentially severe outcomes of silicone migration, to avoid extensive resections whenever possible.

Ethical approval

This article does not contain research performed on human subjects or animals. Not applicable. For this type of study informed ethical review board approval consent is not required.

Informed consent

Informed consent was requested and received from the patient depicted in this case report.

Disclosure statement

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