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COMPLICATIONS ASSOCIATED WITH BREAST IMPLANTS IN AESTHETIC BREAST AUGMENTATION: A NARRATIVE LITERATURE REVIEW

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ABSTRACT

Introduction: *Breast augmentation using implants is one of the most commonly performed aesthetic surgical procedures worldwide. Despite advances in implant design and materials, complications may occur, affecting aesthetic outcomes, patient satisfaction, and, in some cases, patients' health.*

Objective: *To describe the main complications associated with breast implants used in aesthetic breast augmentation, addressing their clinical characteristics, associated factors, diagnostic methods, preventive measures, and therapeutic options.*

Methods: *A narrative review of the scientific literature was conducted using the PubMed/MEDLINE, Scopus, and SciELO databases, supplemented by Google Scholar. Publications addressing complications associated with breast implants in aesthetic breast augmentation were considered. Search terms in English, Spanish, and Portuguese included breast implants, breast augmentation, breast implant complications, capsular contracture, implant rupture, breast implant infection, seroma, hematoma, implant malposition, and breast implant-associated anaplastic large cell lymphoma.*

Results: *The main complications identified were capsular contracture, implant rupture, infections, hematomas, seromas, and implant malposition. Breast implant-associated anaplastic large cell lymphoma (BIA-ALCL), a rare but clinically significant complication, was also addressed. The occurrence of these complications was associated with patient-related factors, implant characteristics, and aspects of surgical technique.*

Conclusions: *Breast implants used in aesthetic augmentation surgery may be associated with complications that can manifest in both the short and long term. Individualized preoperative assessment, appropriate implant selection, careful surgical technique, and regular follow-up are essential for preventing, identifying, and managing these complications in a timely manner.*

KEYWORDS: *Breast implants; breast augmentation; postoperative complications; capsular contracture; implant rupture; breast implant-associated anaplastic large cell lymphoma.*

INTRODUCTION

Breast augmentation using implants is one of the most frequently performed procedures in aesthetic plastic surgery worldwide. Over the years, advances in implant design, materials, and surgical techniques have contributed to improved aesthetic outcomes and procedural safety. However, breast implant placement is not without risks, as it may be associated with complications that can occur during the immediate postoperative period or several years after surgery(1).

Complications associated with breast implants represent a challenge for plastic surgeons due to their clinical diversity and the possibility of requiring medical treatment or additional surgical procedures. The most common complications include capsular contracture, implant rupture, infection, hematoma, seroma, and implant malposition. These conditions may compromise aesthetic outcomes, cause physical discomfort, and affect patients' satisfaction and quality of life(2).

Among the complications described, capsular contracture is one of the leading causes of unsatisfactory aesthetic outcomes and surgical reintervention. It occurs as a result of an exaggerated fibrotic response around the implant, leading to progressive breast hardening, which may be accompanied by deformity and pain. Its development is multifactorial and has been associated with implant characteristics, individual patient factors, bacterial contamination, biofilm formation, and aspects of surgical technique(1).

In addition to local complications, rare events requiring special attention may occur, such as breast implant-associated anaplastic large cell lymphoma (BIA-ALCL). This uncommon

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malignancy has been primarily associated with a history of exposure to textured-surface implants. Its recognition is important because it may develop years after implantation, usually presenting with late-onset seroma, breast enlargement, or changes involving the implant capsule(3).

Considering the frequency of breast augmentation procedures and the variety of complications that may arise, it is important to understand their main clinical characteristics, associated factors, and management options. Therefore, this article aims to provide a narrative review of the scientific literature on complications associated with breast implants used for aesthetic purposes, offering an updated and organized description to facilitate their recognition, prevention, and clinical management(2)

METHODS

This study consisted of a narrative review of the scientific literature on complications associated with breast implants used for aesthetic purposes. The literature search was conducted using the PubMed/MEDLINE, Scopus, and SciELO databases, supplemented by Google Scholar. Search terms in English, Spanish, and Portuguese included *breast implants*, *breast augmentation*, *breast implant complications*, *capsular contracture*, *implant rupture*, *breast implant infection*, *seroma*, *hematoma*, *implant malposition*, and *breast implant-associated anaplastic large cell lymphoma*, combined using the Boolean operators AND and OR.

Publications published between January 2015 and November 2026 were considered, including original studies, observational studies, clinical trials, and scientific reviews addressing complications associated with breast implants in aesthetic surgery. Priority was given to articles published in English, Spanish, and Portuguese with a verifiable DOI. Publications focused exclusively on breast reconstruction, experimental animal studies, editorials, letters to the editor, and articles not directly related to the aim of this review were excluded. Finally, the selected information was organized according to the type of complication, associated factors, clinical manifestations, diagnosis, prevention, and therapeutic options.

DEVELOPMENT

Capsular Contracture

Capsular contracture is one of the most important complications associated with breast implants. Following implant placement, the body develops a fibrous tissue capsule around the implant as part of its normal response to a foreign body. However, when an excessive fibrotic response occurs, this capsule may thicken, contract, and deform the implant, resulting in breast firmness, asymmetry, aesthetic changes, and, in some cases, pain.

The severity of this complication is commonly classified using the Baker scale, which comprises four grades: grade I, a soft breast with a normal appearance; grade II, a slightly firm breast with a normal appearance; grade III, a firm breast with visible changes in appearance; and grade IV, a hard, deformed, and frequently painful breast. Treatment depends on the severity and symptoms and may include clinical follow-up or surgical management through capsulectomy, capsulotomy, and possible implant replacement(1).

Breast Implant Rupture

Breast implant rupture consists of a loss of integrity of the implant's outer shell, which may result in the leakage of its filling material. In saline implants, rupture generally causes an evident reduction in breast volume due to the loss of the implant contents. In contrast, silicone implant rupture may remain clinically silent, particularly when the material remains contained within the fibrous capsule surrounding the implant. Associated factors include implant aging, trauma, material wear, and damage related to surgical procedures.

Diagnosis is based on clinical evaluation and imaging studies, primarily ultrasound and magnetic resonance imaging (MRI), the latter being particularly useful for detecting silicone implant ruptures. Treatment depends on the type of rupture, symptoms, and the patient's clinical condition. In confirmed cases, implant removal or replacement may be indicated, along with assessment of the capsule and surrounding tissues(2).

Infection

Infection is a potentially serious complication of breast augmentation surgery and usually occurs during the first days or weeks after the procedure, although it may also develop later. Its main clinical manifestations include pain, erythema, edema, increased local temperature, and, occasionally, surgical wound discharge and fever. The microorganisms involved are primarily bacteria from the skin flora, such as *Staphylococcus aureus* and coagulase-negative staphylococci.

Treatment depends on the severity of the clinical presentation and includes antibiotic therapy and, when a collection is present, surgical or percutaneous drainage, as appropriate. In severe or persistent infections, particularly when the implant is compromised and there is no response to treatment, implant removal may be necessary. Timely diagnosis and treatment are essential to prevent further complications and reduce the need for additional surgical procedures(2).

Hematoma and Seroma

Hematoma and seroma are complications associated with fluid accumulation in the periprosthetic space. A hematoma is a collection of blood that generally develops during the early postoperative period and may present with increased breast volume, pain, bruising, and asymmetry. In contrast, a seroma consists of an accumulation of serous fluid around the implant and may occur either early or late. Both conditions may alter implant positioning and increase the risk of other complications.

Diagnosis is based on clinical evaluation and imaging studies, primarily ultrasound. Small hematomas may resolve with observation, whereas significant or progressive collections may require drainage or surgical revision. In the case of seroma, treatment depends on its volume, progression, and clinical characteristics. Late-onset seromas require particular attention and investigation, as they may be associated with implant rupture, infection, or, less frequently, breast implant-associated anaplastic large cell lymphoma(2).

Implant Malposition

Breast implant malposition is characterized by displacement of the implant from its original anatomical position, potentially resulting in asymmetry and unsatisfactory

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aesthetic outcomes. This displacement may occur in an inferior, superior, medial, or lateral direction. Associated factors include inappropriate implant size selection, the patient's anatomical characteristics, incorrect dissection of the implant pocket, weakness of the supporting tissues, and capsular contracture.

Treatment depends on the direction and extent of displacement, as well as the condition of the surrounding tissues. Clinical follow-up may be considered in mild cases, whereas significant abnormalities may require surgical correction through reconstruction or modification of the implant pocket, capsulorrhaphy, and possible implant replacement. Appropriate preoperative planning and individualized implant selection are essential to reduce the risk of this complication(4).

Breast Implant-Associated Anaplastic Large Cell Lymphoma (BIA-ALCL)

Breast implant-associated anaplastic large cell lymphoma (BIA-ALCL) is a rare malignancy of the lymphatic system that develops primarily in the fluid and fibrous capsule surrounding the implant. It has been particularly associated with the use of textured-surface implants. Its onset is usually delayed, frequently occurring several years after implant placement. The most common clinical manifestations include sudden breast enlargement, periprosthetic fluid accumulation, pain, and, in some cases, the presence of a mass or regional lymphadenopathy.

When clinically suspected, the evaluation should include imaging studies and analysis of the periprosthetic fluid obtained through aspiration, with cytological and immunohistochemical assessment, particularly to identify CD30 expression and evaluate ALK status. Treatment depends on the extent of the disease; however, in localized cases, it generally involves implant removal and complete capsulectomy, followed by specialized follow-up. Early recognition of this complication is essential for establishing an accurate diagnosis and improving therapeutic outcomes(5,6).

DISCUSSION

Frequency and Impact of Complications

Observational studies conducted in patients undergoing aesthetic breast augmentation demonstrate that, although most procedures have a favorable outcome, local complications and the need for additional interventions remain relevant aspects of long-term follow-up. In a study based on the Danish Registry for Plastic Surgery of the Breast, which included 5,373 women who underwent primary breast augmentation, Henriksen and colleagues identified adverse events in 16.7% of patients over a mean follow-up period of 3.8 years, while 4.8% experienced complications requiring surgical treatment. These findings demonstrate that the assessment of implant safety should not be limited to the immediate postoperative period but should also consider medium- and long-term outcomes(7).

Implant Characteristics and Surgical Technique

The choice of implant characteristics and placement plane may influence the occurrence of certain complications, particularly capsular contracture. In a meta-analysis published by Haas and colleagues in 2025, which included 24 studies on breast augmentation, a lower incidence of capsular contracture was observed with textured implants compared with smooth implants, as well as a lower incidence when implants were placed in the subpectoral position compared with the prepectoral position. However, these findings should be interpreted considering that textured surfaces have been associated with the development of BIA-ALCL. Therefore, implant selection should consider not only the reduction of a specific complication but also the overall safety profile of the implant and the individual characteristics of each patient(8).

Long-Term Outcomes and the Need for Reoperation

The importance of long-term follow-up is also demonstrated by multicenter clinical studies evaluating the safety of silicone implants. In the study by Coroneos and colleagues on MemoryGel implants, with a ten-year follow-up period, the estimated cumulative incidence of Baker grade III/IV capsular contracture was 12.1% among patients undergoing primary breast augmentation. Furthermore, the estimated incidence of reoperation for any reason reached 25.5%. These findings demonstrate that the need for additional surgery is not always related to a serious complication but may also result from aesthetic dissatisfaction, changes in patient preferences, or implant-related problems. Therefore, it is important to inform patients in advance about the possibility of revision surgery during the lifetime of their implants(9).

Risk of BIA-ALCL in Aesthetic Surgery Patients

Regarding rare complications, BIA-ALCL represents an important consideration in the selection and monitoring of breast implants. Kolasiński and colleagues conducted an observational study involving a cohort of 1,501 patients who underwent aesthetic breast augmentation with textured implants, in which five cases of this disease were identified. The authors reported a particularly significant association with certain macrotextured devices. Furthermore, Santanelli di Pompeo and colleagues, in a systematic review of epidemiological studies, highlighted that risk estimates vary considerably according to implant surface type and the population studied. These findings reinforce the importance of careful implant selection, informed consent, and long-term clinical follow-up(10,11).

General Interpretation of the Evidence

Despite technological advances and improvements in surgical techniques, the literature still presents considerable differences in the reported frequency of complications. These variations may be related to the type of implant used, the placement plane, follow-up duration, patient characteristics, and the criteria used to define each adverse event. Furthermore, many studies have observational designs and different follow-up periods, limiting direct comparisons of their results. For this reason, it is important to critically interpret the available evidence and consider that breast implant safety depends on multiple factors, ranging from preoperative planning to postoperative follow-up(8)

CONCLUSIONS

Breast implants used for aesthetic purposes are a widely employed option for breast augmentation; however, their placement may be associated with various complications that affect aesthetic outcomes and patients' quality of life. The main

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complications include capsular contracture, implant rupture, infections, hematomas, seromas, and implant malposition. Although less frequent, breast implant-associated anaplastic large cell lymphoma represents a complication of particular clinical significance.

The prevention and appropriate management of these complications require individualized preoperative assessment, proper implant selection, careful surgical technique, and long-term clinical follow-up. Furthermore, it is essential to inform patients about potential risks, the occurrence of late complications, and the possibility of requiring additional surgical procedures during the lifetime of their implants.

Finally, early recognition of complications and the selection of individualized treatment strategies are essential to improving clinical and aesthetic outcomes. Therefore, breast implant safety depends not only on implant characteristics and technological advances but also on appropriate surgical planning, patient education, and continuous medical follow-up.

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Conflict of Interest Statement

The authors declare no conflicts of interest.

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