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ORIGINAL ARTICLE BREAST SURGERY

Winged Ribs: An Underestimated Problem That May Compromise Breast Augmentation Outcomes

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Abstract Chest wall shape is an important aspect to consider when planning a breast augmentation. Minor chest wall deformities are usually underestimated by the patient and surgeon and may compromise postoperative outcomes. Lower costal cartilage dysmorphia or winged rib is one of these minor underestimated chest wall deformities characterized by a visible and palpable cartilaginous prominence under the inframammary fold and causes discomfort in patients decreasing the satisfaction with the breast augmentation surgery. For these patients, the author utilized an innovative surgical technique that allows resection of the protruding cartilages and placement of breast implants through the same surgical incision. Six patients with winged ribs underwent breast augmentation and costal cartilage resection via this method and there were no intraoperative or early postoperative complications, and all patients were satisfied with the aesthetical result after 6 months of follow-up. The presented surgical technique has a short learning curve with excellent postoperative results. Cases are presented to demonstrate the improved postoperative chest wall contour combined with breast augmentation outcome.

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Keywords Winged ribs · Breast augmentation · Chest wall deformities · Thoracic wall contour

Introduction

Breast augmentation is one of the most frequently performed cosmetic procedures around the world [1]. To obtain a good result in breast augmentation, many factors must be assessed like choice of incisions, pocket plane, implant characteristics, patient's preferences and expectations [2]. One element that is usually forgotten and may compromise outcomes is the chest wall contour. In patients seeking breast augmentation, the incidence of chest wall deformities (CWDs) is around 10% [3]. Preoperative awareness of breast and chest asymmetry is crucial for adequate planning and enables the physician to be more realistic in stating limitations of the expected outcomes [4].

The most accepted CWDs classification was published by Acastello et al. [5–9]. In this classification, there are five types of CWDs based on the affected structure and the location of the malformation (type I: cartilaginous, type II: costal, type III: chondro-costal, type IV: sternal, type V: clavicle-scapular). Pectus excavatum is the most common chest wall deformity in childhood and between patients who seek breast augmentation (Fokin, PRS REF 1). Besides pectum excavatum, other major deformities like pectum carinatum, sunken chest and Polland syndrome are frequently described in breast surgery [3]. Nevertheless, in an underestimated group of patients, there are minor CWDs like rib irregularities and other rib dysmorphias. These patients often do not realize the presence of these problems

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and usually refuse reconstruction that may include major additional surgery. Patients with obvious deformities are aware of problematic reconstruction, whereas patients with mild deformities often are not aware of their condition and fail to note that standard breast augmentation will lead to unsatisfying results [10]. Consequently, it is very important to realize that in patients undergoing augmentation mammaplasty, recontouring or sculpturing of these minor abnormal costal cartilages may correct or improve the underlying chest wall deformity and thus enhance the final aesthetic outcome.

One of the most trivial and ignored CWDs is the protrusion of the lower edge of the thoracic cage known as lower cartilaginous dysmorphia Acastello type I deformity [5]. In this type of malformation, the lower costal cartilages project anteriorly creating a bulge under the inframammary fold that patients refer to as a "lower rib outstanding." Due to the similarity of the protuberant lower anterior ribs aspect with wings, we called this aesthetic problem "winged ribs." The purpose of this article is to describe the surgical technique for treating winged ribs in patients undergoing breast augmentation.

Materials and Methods

Surgical Technique

All the procedures were done by the senior author. Prominent winged ribs are marked preoperatively with the patient in the standing position (Figs. 1, 2). Under general anesthesia and with the patient in dorsal decubitus, a 6–7 cm incision is performed in the central portion of inframammary fold. Then, a 2–3 cm subcutaneous dissection is made caudally. At that point, the anterior abdominal rectus sheet and the rectus abdominis muscle are transected and the lower thoracic cartilage border is exposed. Once the involved cartilages are identified, they are carefully undermined preserving the perichondrium and avoiding pleural lesions. Finally, the winged ribs are resected using a standard technique and paying special attention in the amount of resection to obtain adequate symmetry and thoracic contour (Figs. 3, 4). A water-sealed test is performed and closure of the perichondrium and anterior abdominal rectus sheet is completed. Next, a standard breast augmentation is accomplished through the same incision. The inframammary fold is reconstructed based on preoperative landmarks with absorbable synthetic suture. At the end of the procedure, closure is achieved in a way that the implant pocket and cartilage resection pocket are completely separated.

In the postoperative period, intercostal blockage is used for pain control and compressive garments are avoided. No drains are used. Patients are discharged home after 24 h of hospital stay with oral analgesia and antibiotic prophylaxis. No preoperative or postoperative imaging is used regularly unless a clinical thoracic complication is observed. Postoperative outcomes are shown (Figs. 3, 4).

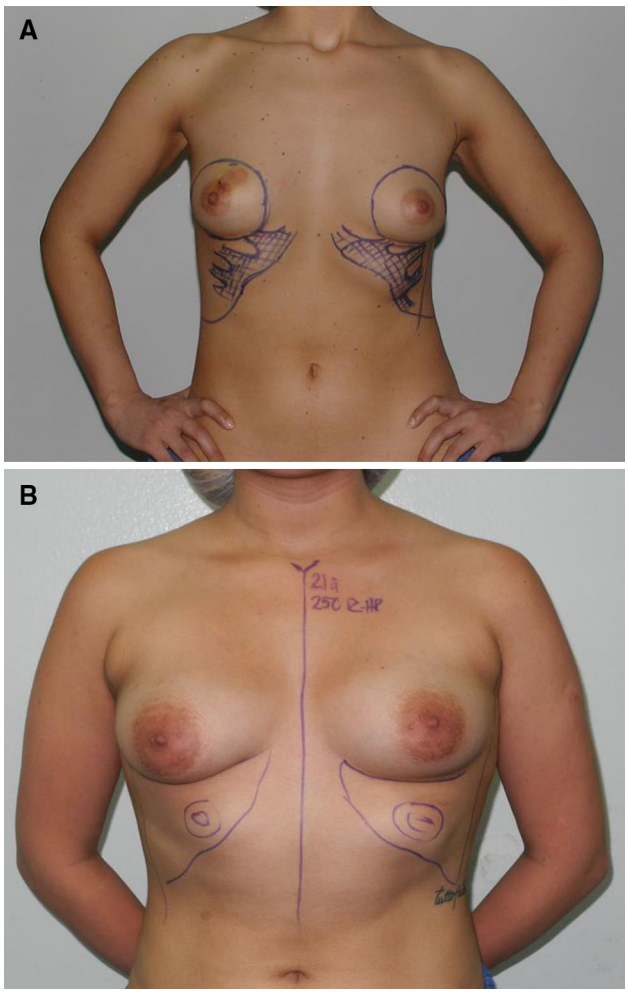

Fig. 1 Case 1 (**a**) and 2 (**b**) presurgical markings in standing position. Areas to be marked are the most prominent point on the chest wall. Standard preoperative markings are made in the standing position

Results

This technique was applied to six patients with satisfactory results. There were no intraoperative complications such as pneumothorax, hematoma or chest wall deformity during 1-month and 6-month follow-ups. All patients were satisfied with the surgery results.

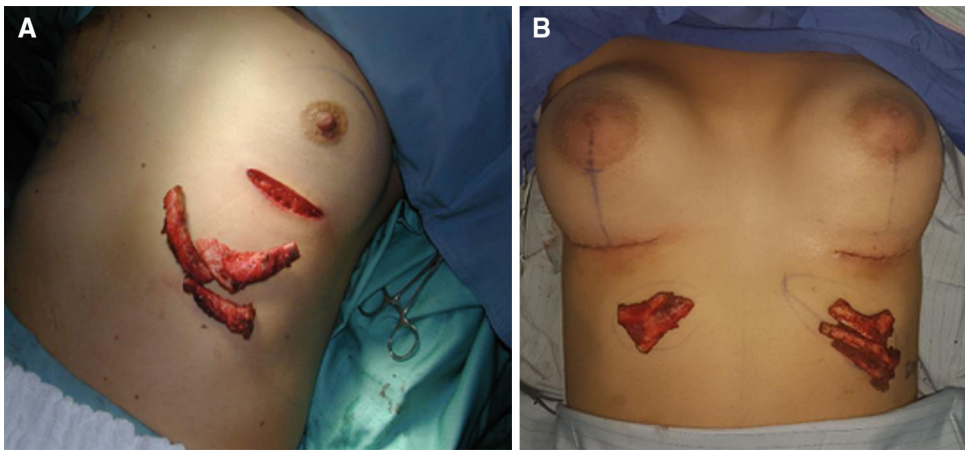

Fig. 2 Case 1 (**a**) and 2 (**b**) costal cartilages resected during surgery

Discussion

CWDs are a large spectrum of anomalies with etiologies and genetic implications still largely unknown [11]. Precise identification of the single malformation, its classification and an accurate diagnostic assessment are the first fundamental steps in the modern approach [10]. Winged ribs seem to be a rare malformation; Acastello et al. [5], in 22 years of experience, determined that lower rib dysmorphia accounted for only 0.3% of patients with CWDs. But these statistics are largely underestimated because they are based on patient consultations and not on population studies. A systematic and careful assessment of chest contours in asymptomatic patients will definitively reveal a higher incidence of this problem.

Achieving satisfactory outcomes in augmentation mammaplasty depends on many factors that surgeons must consider including implant choice, surgical technique, patient expectative and CWD. These deformities are not uncommon and therefore, chest wall contour assessment must be a major concern in patients looking for breast surgery [10]. An unrecognized CWD may lead to suboptimal outcomes and unsatisfied patients after surgery. Most of the time patients are only aware of major CWDs and usually do not notice minor problems [10]. The plastic surgeon must perform a thorough chest wall evaluation and if there is any CWDs, this must be shown and discussed with the patient in detail. If the patient is undergoing breast augmentation and presents with winged ribs, the surgeon must explain that the deformity will not disappear after surgery and may jeopardize outcomes by creating implant over projection or malposition. In other cases, the deformity might become more noticeable after surgery.

There are different types of thoracic deformities, and according to severity, they can compromise in different ways the outcome in breast augmentation surgery. CWDs with major thoracic cage contour alterations are treated with combined approaches. Thoracic surgery appears to be mandatory in severe cases, especially if it is accompanied by a cardiovascular anomaly. Camouflage techniques have been described for mild or moderate cases of pectum excavatum [12–14]. Subtle deformities may present as breast asymmetry (e.g., winged ribs and scoliosis) and are considered major complicating factors in augmentation mammaplasty because even if the volume asymmetry is compensated, it is difficult to reduce the asymmetric illusion caused by rib protrusion or vertebral scoliosis [14].

A single-stage approach to correct CWDs and mammary hypoplasia has been previously described in marked deformities. Ma et al. [12] reported a safe concurrent repair of chest wall contours in 13 patients who underwent concomitant placement of breast implants and support bars without increased risk of complications. Moscona et al. [13] described the use of wide silicone implants in moderate and severe pectum excavatum patients with the aim to camouflage the deformity. Eleven cases underwent breast augmentation surgery through an inframammary fold incision. Implants were placed under the pectoralis major muscle. Our approach corrects mild chest wall deformity during breast augmentation surgery.

Winged ribs are a costal cartilage deformity of the lower thoracic cage, characterized by localized hypertrophies or fusion of costal cartilages. According to the severity of deformity, Winged Ribs are visible and palpable as unilateral or bilateral bulges under the inframammary fold, with a vaulted appearance at a specific point and without sternal deformation [11]. They are divided into true or false, depending on whether the costal cartilages corresponding to the true or false ribs are involved [5]. The most frequent cause of consultation is thoracic asymmetry at the expense of the lower sector of one or both hemithorax. It can present asymptomatically or with localized pain, usually produced by cartilaginous hypergrowth [11]. It is estimated that 30% of the patients with winged ribs present normal asymptomatic alterations such as inclined sternum, anterior convex ribs or prominent costal cartilages [15].

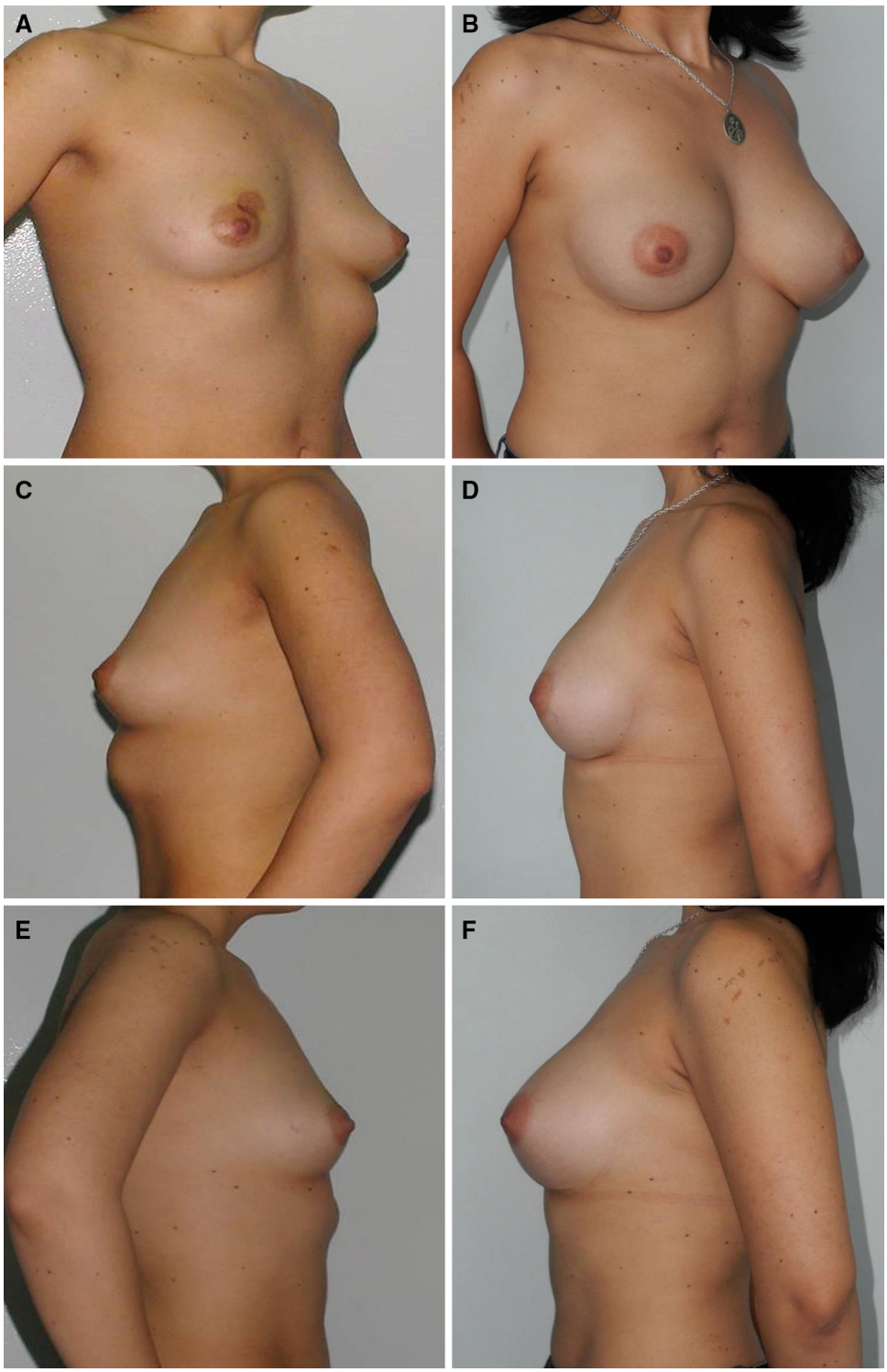

Fig. 3 Seven-year follow-up result of a patient undergoing breast augmentation and resection of prominent costal cartilages. Right three-quarter profile, left lateral profile view and right lateral profile view, pre (**a**, **c**, **e**) and postoperatively (**b**, **d**, **f**)

We describe a simple surgical technique to treat winged ribs during breast augmentation. Using the same surgical incision, prominent costal cartilages are resected and breast implants are placed. To prevent bottoming out, the inframammary fold is opened in the central portion and through a small incision. To reinforce the inframammary fold, the wound was closed in three layers: 3-0 Vicryl sutures to close the deep fascia, 4-0 Vicryl subdermal sutures and a 4-0 Monocryl running intradermal suture. No patient experienced bottoming out or double bubble deformities.

Cartilage resection is a standard technique commonly used by plastic surgeons for cartilage grafting and does not

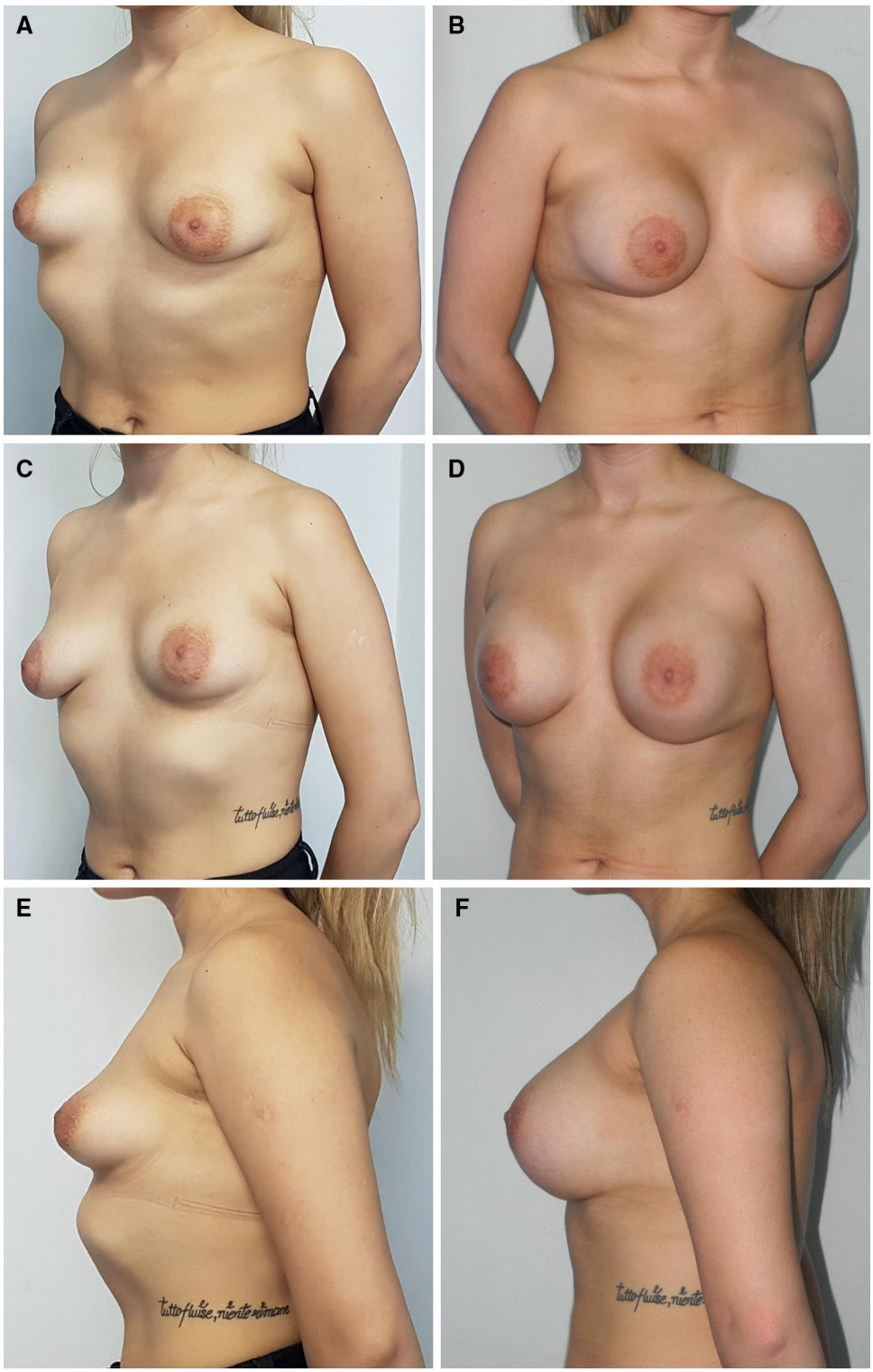

Fig. 4 One-year follow-up result of a patient undergoing breast augmentation and resection of prominent costal cartilages. Right three-quarter profile, left lateral profile view and right lateral profile view, pre (**a**, **c**, **e**) and postoperatively (**b**, **d**, **f**)

require any complex procedure or learning curve. The procedure adds no significant additional pain and responds to common analgesics and intercostal blockage. This technique is a non-complex surgical procedure with minimal morbidity and has an application in women with rib prominence amenable to resection and who are also seeking breast augmentation.

We have performed this technique in six patients with no postoperative complications, good postoperative aesthetic results and high patient satisfaction.

Conclusion

The presented surgical techniques offer to treat winged ribs during breast augmentation with successful outcomes. We highly recommend our colleagues to encourage patients to treat this deformity if they will undergo breast augmentation in order to improve postoperative outcomes.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflicts of interest to disclose.

Human and Animal Rights All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent For this type of study, informed consent is required; all the participants gave their informed consent in writing for the study.

References

1. Plastic Surgery Statistics (2018) American Society of Plastic Surgeons. Agost. https://www.plasticsurgery.org/documents/News/Statistics/2018/plastic-surgery-statistics-report-2018.pdf. Accessed Aug 2018
2. Lista F, Ahmad J (2013) Evidence-based medicine: augmentation mammaplasty. Plast Reconstr Surg 132(6):1684–1696
3. Ors S (2017) Incidence and classification of chest wall deformities in breast augmentation patients. Aesthetic Plast Surg 41(6):1280–1290
4. Hidalgo DA, Spector JA (2014) Breast augmentation. Plast Reconstr Surg 133(4):567e–583e
5. Acastello E, Garrido P (2009) Congenital chest wall malformations: 22 years experience in a childrens center. Rev Med Clin Condes 20(6):758–767
6. Acastello E, Maljuf F, Garrido P, Barbosa LM, Peredo A (2003) Sternal Clef: a surgical opportunity. J Pediatr Surg 38(2):178–183
7. Acastello E(2006) Patologías de la pared torácica en pediatría. Editorial El Ateneo, Buenos Aires
8. Eduardo Acastello PG (2011) Congenital malformations of the torácica wall. buenos aires
9. Donnelly LF, Frush DP, Foss JN, O'Hara SM, Bisset GS (1999) Anterior chest wall: frequency of anatomic variations in children. Radiology 212(3):837–840
10. Wolter TP, Lorenz S, Neuhann-Lorenz C (2010) Aesthetic breast augmentation and thoracic deformities. Aesthet Plast Surg 34(5):612–616
11. Torre M, Rapuzzi G, Jasonni V, Varela P (2012) Chest wall deformities: an overview on classification and surgical options. Topics in Thorac Surg. https://doi.org/10.5772/25950
12. Ma IT, Rebecca AM, Notrica DM, McMahon LE, Jaroszewski DE (2015) Pectus excavatum in adult women: repair and the impact of prior or concurrent breast augmentation. Plast Reconstr Surg 135(2):303e–312e
13. Moscona RA, Fodor L (2011) How to perform breast augmentation safely for a pectus excavatum patient. Aesth Plast Surg. 35(2):198–202
14. Bayram Y, Zor F, Karagoz H, Kulahci Y, Afifi AM, Ozturk S (2015) Challenging breast augmentations: The influence of preoperative anatomical features on the final result. Aesthetic surgery journal. 36(3):313–320. https://doi.org/10.1093/asj/sjv181
15. Obermeyer RJ, Goretsky MJ (2012) Chest wall deformities in pediatric surgery. Surg Clin North Am 92(3):669–684