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Correlation between Capsular Contracture Rates and Access Incision Location in Vertical Augmentation Mastopexy

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Background: Plastic surgeons commonly use one of three access incisions to place breast implants during vertical augmentation mastopexy, including inframammary, vertical, and periareolar. It is not known whether there is a correlation between capsular contracture and access incision location. The purpose of this study was to investigate in a single-surgeon series the incidence of capsular contracture associated with access incision locations in silicone vertical augmentation mastopexy.
Methods: Patients undergoing a vertical augmentation mastopexy between 2013 and 2017 were studied retrospectively. All patients underwent a standardized, dual-plane breast augmentation with smooth surface silicone gel implants. Patients were evaluated 1 year postoperatively by the Baker scale.
Results: A total of 322 patients met study criteria. Eighty-four had periareolar access, 86 had vertical access, and 152 had inframammary access. There were no differences in patient age or mean implant size between the groups. The capsular contracture rate of the periareolar group was 5.36 percent; in the vertical access group, 3.48 percent; and in the inframammary access group, 1.64 percent. Capsular contracture rates correlated inversely to the distance to the nipple-areola complex, with the periareolar access rates the highest, the vertical access rates intermediate, and the inframammary access rates the lowest. Inframammary incisions were associated with lower capsular contracture rates than periareolar incisions when performed in conjunction with vertical augmentation mastopexy ($p = 0.043$). Vertical access capsular contracture rates were intermediate between periareolar and inframammary groups.
Conclusion: Surgeons should take into consideration the capsular contracture rates associated with access incision location when planning or performing vertical augmentation mastopexy. (*Plast. Reconstr. Surg.* 150: 1029, 2022.)
CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, III.

One-stage breast augmentation with vertical mastopexy is one of the most common aesthetic breast procedures performed, allowing simultaneous augmentation and lift. Capsular contracture, associated with the augmentation portion of the procedure, continues to be a common complication affecting its outcome.[1,2] Surgeons commonly use one of three different access incisions for the placement of breast implants with vertical mastopexy: periareolar, vertical, or inframammary incisions.[3,4] The rates of capsular contracture with vertical augmentation mastopexy procedures have been published in isolated series, with typically one access incision used and various implant types placed, including saline and silicone implants.[5–7] No standardized comparison study has been performed in a single-surgeon

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series with silicone breast implants evaluating the various access incision types and the capsular contracture rates associated with them. The purpose of this study was to determine capsular contracture rates for each access incision type for vertical silicone augmentation mastopexy in a single-surgeon series and to evaluate whether differences in capsular contracture rates exist between access incision locations.

PATIENTS AND METHODS

The author performed a retrospective review of all consecutive patients undergoing primary vertical augmentation mastopexy with smooth silicone implants between 2013 and 2017. All patients included in the study were between the ages of 22 and 60 years and underwent smooth silicone breast augmentation with Mentor Memory Gel silicone implants (Mentor Worldwide, Irvine, Calif.) and the off-label use of triple-antibiotic irrigation containing povidone-iodine (Betadine; Purdue Frederick Co., Norwalk, Conn.). Patients underwent a dual plane silicone breast augmentation through periareolar, vertical, or inframammary incisions. All patients received preoperative intravenous antibiotics, either a 1-g dose of cephazolin or 600 mg of clindamycin, selected based on allergy profiles. Before insertion of implants, triple-antibiotic irrigation [50,000 U of bacitracin, 1 g of Ancef (GlaxoSmithKline, Middlesex, U.K.), and 80 mg of gentamicin] with the addition of 50 ml of povidone-iodine in 500 ml of normal saline was used.

Access incision location was selected based on surgeon and patient preference. The advantages and disadvantages of each access incision option were discussed, with patients agreeing to the access incision after discussing the benefits and risks of each option. For patients with limited lower pole breast tissue for implant coverage, periareolar incision was considered, taking into account the potential benefits of avoiding a scar outside of the mastopexy pattern. For patients in whom simultaneous tissue reduction was planned, use of the vertical access incision was considered as an approach, allowing simultaneous reduction of lower pole tissue and access to place breast implants. Patients open to the placement of an inframammary incision for the independent placement of the breast implants without involvement of the vertical mastopexy pattern were considered for this approach.

Tegaderm dressings (3M, Maplewood, Minn.) were used as nipple shields and skin barriers for implant insertion. The breast augmentation portion of the procedure was performed before mastopexy for all access incisions with breast tissue closed over the breast implants prior to mastopexy dissection. No implant insertion devices were used in the study.

All patients were evaluated at frequent follow-up appointments by both the author and a plastic surgery nurse specialist, including early postoperative visits and at 1 month, 3 months, 6 months, and 1 year postoperatively. Capsular contracture was evaluated by the Baker scale. Patients with grade III or IV capsular contractures at the 1-year postoperative visit were considered as having clinical capsular contracture. Rates of capsular contracture at 1 year postoperatively were evaluated. Chi-square analysis was used to compare the incision locations on their respective rates of capsular contracture when all four cells of the 2 × 2 table had more than five observations. When any cell of the 2 × 2 table had fewer than five observations, the Fisher exact test was used to compare the incision locations of categorical outcomes. Statistical significance was assumed at an alpha value of 0.05 and the inferential statistical analyses were performed using SPSS version 26 (IBM Corp., Armonk, N.Y.).

RESULTS

A total of 322 patients met the inclusion criteria and were included. Table 1 shows the number of patients, mean patient age, and mean implant size for patients undergoing vertical augmentation mastopexy with different access incisions. The mean age of patients in the series was 37.4 years and the mean implant size was 324.9 cc. There were no differences in age or implant size for the patients undergoing breast augmentation with different access incisions. Data for patients were described by the number of breasts evaluated, because each breast in each patient could demonstrate capsular contracture independently. Table 2 shows the number of breasts evaluated, number of capsular contractures present, and the rate of capsular contracture for the patients studied. Patients undergoing inframammary access for the placement of silicone breast implants demonstrated the lowest capsular contracture rate (1.64 percent), with a rate statistically lower than in those with periareolar access (5.36 percent) ($p = 0.043$). Patients undergoing vertical access demonstrated intermediate capsular contracture rates (3.48 percent) that were higher than inframammary cases but lower than periareolar cases. There were no

Table 1. Number of Patients, Patient Age, and Mean Implant Size for Patients Undergoing Vertical Augmentation Mastopexy with Different Access Incisions

Access Incision	No. of Patients	Mean Age, yrs	Mean Breast Implant Size, cc
Periareolar	84	35.8 ± 6.9	330.5 ± 67.1
Vertical	86	37.1 ± 8.1	328.6 ± 63.7
Inframammary	152	38.4 ± 7.4	320.7 ± 58.5

Table 2. Number of Breasts by Incision Type, Capsular Contractures, and Capsular Contracture Rates with Associated *p* Values

Access Incision	No. of Breasts	No. of Capsular Contractures (%)	*p*
Periareolar	168	9 (5.36)	Referent
Vertical	172	4 (3.48)	0.17
Inframammary	304	5 (1.64)	0.04*

*Statistically significant difference between periareolar and inframammary capsular contracture rates ($p < 0.05$).

statistically significant differences between the vertical access group and the other groups ($p = 0.167$ comparing periareolar and vertical; $p = 0.728$ comparing vertical and inframammary).

DISCUSSION

This study demonstrates that with vertical augmentation mastopexy procedures using smooth surface silicone implants, inframammary access incisions are associated with the lowest capsular contracture rates when comparing inframammary, periareolar, and vertical access incisions. Statistically significant differences were noted when comparing inframammary and periareolar incision locations. Although not previously known for vertical augmentation mastopexy procedures, these findings are consistent with studies of primary breast augmentation procedures in which inframammary incision access demonstrated lower rates compared with periareolar access incisions.[8–14] This finding may support the benefits for placing an inframammary incision for the purpose of silicone implant placement rather than using an incision within the mastopexy incision pattern for placing the breast implant.

One of the most interesting findings of this study was the vertical access rate of capsular contracture, which demonstrated intermediate rates compared with periareolar (higher) and inframammary (lower). In other words, the capsular contracture rate increased as the distance from the access incision to the nipple-areola complex decreased. This makes sense anatomically, as it is known that the number of mammary ducts decreases with increased distance from the nipple-areola complex.[15,16] Previous studies have suggested that the higher rates of capsular contracture associated with periareolar incisions is likely related to the higher number of mammary ducts adjacent to the nipple-areola complex and a greater propensity to develop a biofilm with this incision.[8,9] A plausible explanation for the findings of this study is that the vertical access incision is geographically between the nipple-areola complex and inframammary crease and may expose the implant to an intermediate level of biofilm risk because there are fewer ducts than with periareolar access and more ducts than with inframammary access incision.

Surgeon preference plays a major role in determining the optimal access incision for vertical augmentation mastopexy. In our practice, we have often considered periareolar access preferable for patients with limited soft tissue coverage in the lower pole of the breast or patients with uneven inframammary crease locations. Maintaining parenchymal structure in the lower pole may offer advantages in healing for patients with atrophic breast tissue. Vertical access has been useful in our practice treating patients with heavy lower pole soft tissue, allowing simultaneous breast tissue reduction through the same incision. The advantages of either the periareolar or vertical access incision include combining the access incision within the mastopexy incision pattern, preventing additional scarring. However, the results of this study suggest that the capsular contracture rates with both periareolar and vertical access incisions were higher than in inframammary cases, with the periareolar rate statistically higher than in inframammary cases. It will be important to balance capsular contracture risk with the potential benefits of each access incision considered and to counsel patients appropriately.

In our practice, we have had much success achieving low capsular contracture rates with inframammary access incisions for primary silicone breast augmentation. This finding encouraged us to offer this option to patients, and it

has become our most popular access incision for vertical augmentation mastopexy. This incision works very well in patients with well-developed inframammary creases who are likely to form good inframammary scars and who do not require substantial lower pole breast tissue reduction. Additional advantages include the option of a small inframammary skin excision, which can be performed without lengthening the inframammary access incision, and good muscle access for various dual plane approaches. Disadvantages include a slightly longer operative time and the possibility of unfavorable scarring associated with this additional incision. Some patients may wish to avoid inframammary incisions if they have a history of hypertrophic or keloid scarring or have a personal preference regarding minimizing the number of scars. For these and other reasons, we find it important to consider more than one access incision to place the implant in the vertical augmentation mastopexy procedure.

Although the periareolar incision was found to have the highest capsular contracture rates in this study, some surgeons prefer this approach, and techniques are available to reduce capsular contracture risk with periareolar implant placement. Periareolar scarring is often favorable compared with other sites and may offer cosmetic benefit because the breast implant can be placed within the mastopexy pattern and not require a separate incision. This reduces the risk of unfavorable inframammary scarring, especially in breasts with little ptosis after surgery where an inframammary scar may be visualized. The periareolar approach may also be preferable for subfascial dissection for surgeons preferring this approach. Finally, steps can be taken to reduce contamination through a periareolar or vertical access incision with the use of insertion funnels,[17] nipple shields, antibiotic pocket irrigation, and dissection carried through the breast septum avoiding the disruption of glandular tissue.

Implant insertion devices, such as funnels, were not evaluated in this study. Although several studies suggest that they may play a role in reducing capsular contracture risk,[17,18] this remains controversial. Many surgeons utilize these devices, but some do not. Some surgeons may use them as single-use devices whereas other surgeons may use one insertion device per case, reusing the device for the second breast. For example, in hospitals where the cost of an insertion device may be covered by insurance for breast reconstruction, a surgeon may elect to use a new insertion device with the placement of each breast implant prior to breast lifting. However, in private practice, it is unusual that a plastic surgeon will purchase two of these devices for a single case. There is also the possibility that funnels can be used many times with resterilization by some surgeons, such that one funnel is used for many cases. For these reasons, and to reduce the variability that implant insertion devices may contribute, patients in whom insertion devices were utilized were not included in this study.

Previous studies have reported capsular contracture rates for vertical augmentation mastopexy,[5,7,19–22] but there are no comparative studies looking at access incision location with silicone breast implants. Calobrace et al.[5] reported 105 vertical mastopexy cases in patients undergoing augmentation with both silicone and saline implants with a vertical access incision and a capsular contracture rate of 3.8 percent. Swanson[19] reported experience with 146 cases of vertical augmentation mastopexy using inframammary incisions and saline implants 95 percent of the time and a high capsular contracture rate of 6.2 percent. Hubbard[7] reported a capsular contracture rate of 3 percent using a vertical access incision and saline breast implants in 105 patients. These series illustrate the wide variation of techniques used with vertical augmentation mastopexy and the difficulty in determining the effect of access incision on capsular contracture rates. Our capsular contracture rate for the vertical access incision of 3.48 percent is consistent with these previous series and our periareolar and inframammary access incision capsular contracture rates are consistent with those reported for silicone breast augmentation.[9,10] However, this is the first study demonstrating that with vertical mastopexy and silicone breast implants, there is a clear and consistent trend in capsular contracture rates that correlates with the location of implant access incision.

Vertical augmentation mastopexy is associated with different capsular contracture rates depending on the access incision selected, with inframammary access having the lowest capsular contracture rate, vertical access an intermediate rate, and periareolar access the highest capsular contracture rate. Capsular contracture rates increase the closer the access incision is to the nipple-areola complex in these three incision locations. With the findings of this study in mind, surgeons should consider the risk of capsular contracture based on incision location when conducting preoperative planning and patient counseling for vertical augmentation mastopexy.

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