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Research Article

Our Experiences with Bi-Planar Mastopexy-Augmentation

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Abstract

Aims: By observing some restrictions with the widely performed mastopexy-augmentation operation solely involving the subglandular plane, we modified the method into a two-plane intervention in a number of selected cases. In this retrospective clinical study, we aimed to share our experiences with single stage bi-planar mastopexy-augmentation.

Methods: We performed a vertical mammoplasty and dissected both the subglandular plane, to fix the glandular tissue to a higher pectoral fascial level, and the submuscular plane to insert the implant. Additionally, we utilized either the superior-median dermofat or the dermoglandular flap to cover the implants completely or incompletely, aiming for a more stabilized vertical closure. The results were assessed retrospectively and statistically.

Results: Thirty-six cases (72 breasts) were included in the study. The average age was 42 years and the average follow-up period was 13 months. The mean sizes of the implants were 211.81±67.48cc for the right breasts and 213.19±66.41cc for the left breasts. Twenty-eight cases (77.78%) were classified as primary and the remaining eight (22.22%) as secondary. Revision operations were demanded in five (13.89%) cases, three (10.71%) in the primary and two (25%) in the secondary group. Postoperative complications were observed in 50% of the study population and also 50% of each group. However, whereas all complications were identified as major in the secondary group, only three cases (10.71%) of major complications were reported in the primary group. There was a significant statistical relationship between the grade of ptosis and minor complications (for which the grade 3 ptosis group was responsible). Problems due to previous breast operations of the secondary group were significantly correlated with the major problems in our study population. However, the grade of ptosis, implant volume, and previous mastopexy-augmentation operation were not related with the revision operations and postoperative complications.

Conclusion: We believe that, in select cases, it is feasible to perform bi-planar mastopexy-augmentation to overcome the limitations of the widely performed one-plane method. However, potential postoperative complications should be taken into consideration and more caution in secondary cases is needed due to higher complication rates.

Keywords: Bi-planar mastopexy-augmentation; Complications of mastopexy-augmentation; Single stage mastopexy-augmentation

Introduction

The safety of breast augmentation and mastopexy performed as a single procedure has often been debated [1-5]. As stated by Khavanin et al, [3] the literature regarding this procedure is relatively sparse; however, several cases using vertical or inverted T mastopexy with insertion of either a single or dual plane implant have been reported recently [4,6-8]. We are among those who perform the mastopexy-augmentation operation in a single stage. Faced with some restrictions with the widely performed sole submammarial plane procedure in some cases, we modified the method by creating two pockets: The first as a subglandular plane to obtain stable and effective lifting of the breast tissue (with Lejour fixing suture); and the latter as a submuscular plane to insert the implant (Figure1). In this retrospective clinical study, we aimed to share our experiences with single stage bi-planar mastopexy-augmentation.

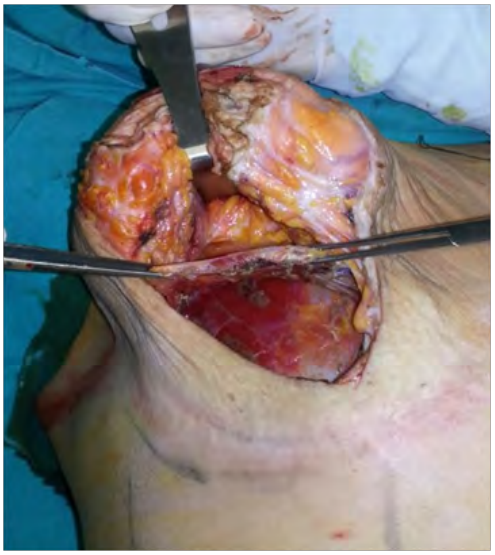

Figure 1: Submuscular and subglandular pockets during superior pedicle vertical mastopexy-augmentation. The pectoralis muscle is grasped and elevated, and the glandular tissue is retracted.

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Materials and Methods

Within each case, several parameters were investigated, these included: Patient age, preoperative diagnosis with grade of ptosis, history of previous breast augmentation operations (to classify the cases as primary or secondary), follow-up period, revisions, implant types and volumes, and postoperative complications (recurrent ptosis, capsule contracture, wound opening, implant exposure, hematoma, asymmetries, scar etc.). Licensed fourth generation, smooth or textured, high or moderate profile, cohesive gel implants were used in all cases. All patients were fully informed about the operation, including the possible complications and results, prior to giving signed consent. The sizes of the implants were based on both the patients' preference and physical examination (which assessed the laxity of the breast, degree of ptosis, preoperative volume of the breast, and the general physical properties of the patients) as well as an intraoperative evaluation using implant sizers.

Double pocket mastopexy-augmentation was employed in cases where the classical single plane method was not possible; the restriction of the subglandular space following Lejour's fixing suture [9,10] and existence of severe capsular contraction in secondary cases were the two main factors. We used a vertical mammaplasty technique and fixed the breast tissue at the areola-nipple level to the uppermost part of the pectoral fascia as described by Lejour; [9,10] the rationale behind the use of this technique was to improve the stability of the results and gain increased fullness in the upper portion of the breasts. The implants were placed in the subpectoral pockets after the medial-inferior origins of the pectoralis muscles were detached. Evaluation of the tightness of the vertical suture line and the decision on the necessity of additional skin removal was made by testing different volumes of implant sizers and temporary staplers. Limited elevation of the skin edges on the lateral pillars was carried out if required in order to reduce the tension on the suture lines. Placing the implant in the desired position enabled the superomedian dermoglandular or dermofat flap to cover the implant completely or incompletely (Figure 2); this reduced the risk of implant injury during wound closure of the wound or, with regards to postoperative wound healing, the risk of implant exposure.

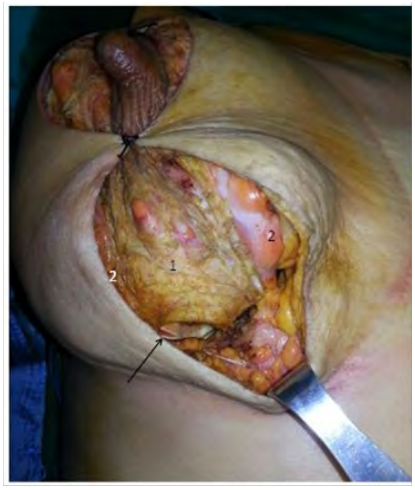

Figure 2: The superomedian flap and the lateral pillars are indicated as 1 and 2, respectively. The implant (arrow) is covered with the superomedian flap.

This method was also used for secondary cases in order to treat complications such as recurrent ptosis with or without capsular contracture. In all cases we detected older generation implants (ruptured or not) that were placed in the subglandular plane; these implants were removed and the pockets were copiously irrigated to remove the free silicone, if present. A limited or partial capsulectomy was carried out, unless there was evidence of calcification or any other severe complication associated with the subglandular capsule. We frequently use the capsule as a strong and stable tissue to lift and fix the breast tissue to the pectoralis fascia, and also for steadier wound closure. Problems generated by subglandular capsular contracture were simply solved by changing the plane for the new implants to the submuscular pocket.

Statistical Analysis

The mean and standard deviation values are given for continuous variables indicated by measurement; frequency and percentage values are given for qualitative variables. In group comparisons, in the case of parametric test conditions for continuous variables indicated by measurement, an independent sample t-test was used to analyze the difference between the two means. A Chi-squared test and Fisher's exact test were used for group comparisons of qualitative variables. The significance of p value was set at 0,05.

Results

We performed biplanar mastopexy-augmentation in 36 cases (72 breasts) (Figures 3-6). The average age of the patients was 42 years old and the average follow-up period was 9 months. Additional procedures such as liposuction, abdominoplasty, or extremity lifting were carried out in 13 cases (36.11%). Twenty-eight cases (77.78%) were classified as primary and the remaining 8 (22.22%) as secondary (Tables 1 and 2). Six out of the eight secondary cases (75%) were admitted to our clinic with severe capsular contracture and/or malposition of the implant. Eight cases (22.22%) were diagnosed with Regnault level 1 ptosis, eleven (30.56%) with level 2, eight (22.22%) with level 3, and nine (25%) with pseudoptosis. Implants between 100 and 400cc were used for these cases, with mean values of 211.81±67.48cc for the right breasts and 213.19±66.41cc for the left breasts. The implant volumes of the secondary cases were significantly greater than those of the primary cases (Table 3). Revision operations were demanded in five (13.89%) cases (Table 4); this included three cases (10.71%) in the primary group and two cases (25%) in the secondary group. Revisions were carried out in three cases (8.33%) for asymmetry, in one case (2.78%) for capsule contracture and asymmetry, and in one case (2.78%) for the presence of a widened scar.

Postoperative complications were observed in half of the study population (Table 4). Implant exposure, a major complication, was observed in two (5.56%) cases. Other major complications were seen in one (2.78%) case at a time and included asymmetry, severe capsular contracture with resultant asymmetry, hematoma, and wound opening that was managed by surgery, and wound opening with secondary healing. Minor complications were also noted and included mild asymmetry (n=4, 11.11%), mild sagging (n=5, 13.89%), widened scar (n=1, 2.78%), and wound healing issues with secondary epithelization (n=1, 2.78%). Postoperative complications were observed in 50% of the 28 primary cases; of these, eleven (30.56%) were defined as minor complications and three (10.71%) as major complications. Postoperative complications were also observed in half of the

secondary group; however, all of these were defined as major complications. In the cases with implant exposure, implants were removed and new implants were reinserted after a delayed period. In the cases with grade 3 capsule contraction, implants were replaced in parallel to performing a capsulectomy.

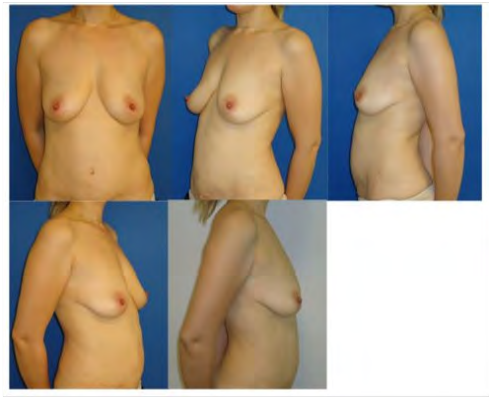

Figure 3: Preoperative images of case 28.

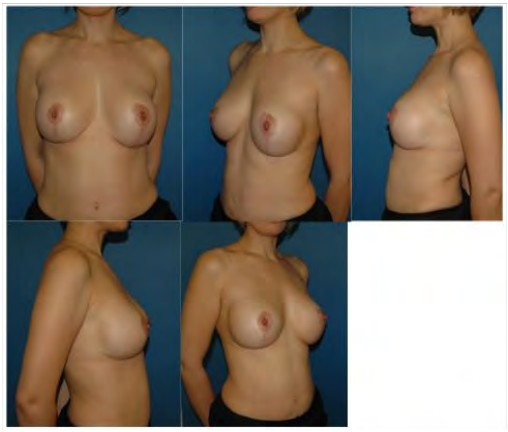

Figure 4: Postoperative images of case 28 after 12 months (250cc smooth high-profile implants).

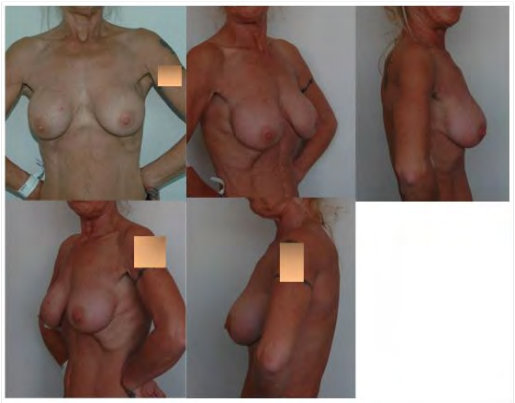

Figure 5: Preoperative images of case 29, who was admitted with deformities due to capsule contraction after an augmentation procedure. Implants were removed with their surrounding capsules (small image, bottom right).

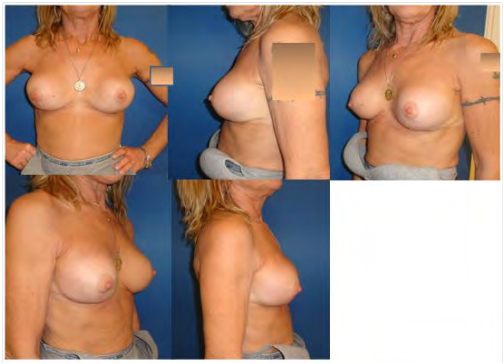

Figure 6: Postoperative images of case 29 after 22 months (smooth high profile 2x250cc new implants).

Case #	Diagnosis and Grade of ptosis	Primary (P) or Secondary (S)	Implant cc (right)	Implant cc (left)
1	3	P	100	100
2	1	P	125	125
3	1	P	125	125
4	2	P	125	125
5	Pseudoptosis	P	125	125
6	1	P	150	175
7	1	P	150	175
8	1	S	150	150
9	3	P	150	150
10	pseudoptosis and gr 3 contracture	S	150	150
11	2	P	175	175
12	3	P	175	200
13	3	P	175	150
14	3	P	175	175
15	pseudoptosis	P	175	175
16	2	P	200	200
17	2	P	200	200
18	3	P	200	200
19	1	P	225	225
20	2	P	225	250
21	2	P	225	225
22	Pseudoptosis	P	225	225
23	2	P	250	250
24	2	P	250	250
25	2	P	250	250
26	2	P	250	250
27	3	P	250	250
28	3	P	250	250
29	capsule contracture, malposition	S	250	250
30	capsule contracture	S	250	250
31	2	P	275	250
32	pseudoptosis and gr 3 contracture	S	275	275
33	1, malposition	S	300	300
34	1	P	300	300
35	pseudoptosis and gr 3 contracture	S	350	350
36	Pseudoptosis	S	400	400

Table 1: Diagnosis, grade of ptosis, groups of cases, and implant volumes.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Implant cc R	36	100	400	211,81	67,476
Implant cc L	36	100	400	213,19	66,409
Valid N (listwise)	36				

Primary (P) and Secondary (S) Groups		Implant cc R	Implant cc L
Primary group	N	28	28
	Mean	196,43	198,21
	Std. Deviation	53,017	51,787
Secondary group	N	8	8
	Mean	265,63	265,63
	Std. Deviation	87,564	87,564
Total	N	36	36
	Mean	211,81	213,19
	Std. Deviation	67,476	66,409

Table 2: Descriptive statistics regarding breast implant sizes (R: right, L: left).

Group Statistics					
	Primary (P) or Secondary (S)	N	Mean	Std. Deviation	Std. Error of Mean
Implant cc L	Primary	28	196,43	53,017	10,019
	Secondary	8	265,63	87,564	30,958
	Primary	28	198,21	51,787	9,787
	Secondary	8	265,63	87,564	30,958

Table 3: Implant volumes are significantly increased in the secondary group compared to the primary group ($p<0.05$).

Case #	Revision performed for	Major postoperative complications	Minor postoperative complications
1	Widened scar		Widened scar
5	Asymmetry		Mild Asymmetry
7			Mild Asymmetry
9			Mild Asymmetry
10		Wound opening managed by operation + asymmetry	
11			Mild sagging
13			Mild sagging
14			Mild sagging
16		Implant exposure	
17	Asymmetry	Asymmetry	
23		Hematoma	
25			Mild sagging
26			Mild Asymmetry
27			Wound problem with secondary healing
28			Mild sagging
32		Implant exposure	
33	Capsule contracture gr 3 + asymmetry	Capsule contracture grade 3 + asymmetry	
35	Asymmetry	Wound problem with secondary healing + asymmetry	

Table 4: Revisions performed and complications observed in all cases.

We investigated whether the number of revision operations and postoperative complications (minor, major, or total) were significantly correlated with the ptosis level, implant volume, and previous mastopexy-augmentation operation (Tables 5-16). Results demonstrated a significant relationship between the grade of ptosis and the minor complications (for which the grade 3 ptosis group was responsible). Major complications were seen significantly more frequent in the secondary group. All other correlations were insignificant.

Crosstab					
			Revision performed		Total
			No	Yes	
Grade of ptosis	Grade 1	Count	7	1	8
		% within Grade of ptosis	87,5%	12,5%	100,0%
		% of Total	19,4%	2,8%	22,2%
	Grade 2	Count	10	1	11
		% within Grade of ptosis	90,9%	9,1%	100,0%
		% of Total	27,8%	2,8%	30,6%
	Grade 3	Count	7	1	8
		% within Grade of ptosis	87,5%	12,5%	100,0%
		% of Total	19,4%	2,8%	22,2%
	Pseudoptosis	Count	7	2	9
		% within Grade of ptosis	77,8%	22,2%	100,0%
		% of Total	19,4%	5,6%	25,0%
Total		Count	31	5	36
		% within Grade of ptosis	86,1%	13,9%	100,0%
		% of Total	86,1%	13,9%	100,0%

Table 5: The statistical relationship between the grade of ptosis and revisionsis insignificant ($p>0,05$).

Crosstab					
			Major postoperative complications		Total
			No	Yes	
Grade of ptosis	Grade 1	Count	7	1	8
		% within Grade of ptosis	87,5%	12,5%	100,0%
		% of Total	19,4%	2,8%	22,2%
	Grade 2	Count	8	3	11
		% within Grade of ptosis	72,7%	27,3%	100,0%
		% of Total	22,2%	8,3%	30,6%
	Grade 3	Count	8	0	8
		% within Grade of ptosis	100,0%	0,0%	100,0%
		% of Total	22,2%	0,0%	22,2%
	Pseudoptosis	Count	6	3	9
		% within Grade of ptosis	66,7%	33,3%	100,0%
		% of Total	16,7%	8,3%	25,0%
Total		Count	29	7	36
		% within Grade of ptosis	80,6%	19,4%	100,0%
		% of Total	80,6%	19,4%	100,0%

Table 6: Statistical relationship between grade of ptosis and major postoperativecomplications is insignificant ($p>0,05$).

Crosstab					
			Minor postoperative complications		Total
			No	Yes	
Grade of ptosis	Grade 1	Count	7	1	8
		% within Grade of ptosis	87,5%	12,5%	100,0%
		% of Total	19,4%	2,8%	22,2%
	Grade 2	Count	8	3	11
		% within Grade of ptosis	72,7%	27,3%	100,0%
		% of Total	22,2%	8,3%	30,6%
	Grade 3	Count	2	6	8
		% within Grade of ptosis	25,0%	75,0%	100,0%
		% of Total	5,6%	16,7%	22,2%
	Pseudoptosis	Count	8	1	9
		% within Grade of ptosis	88,9%	11,1%	100,0%
		% of Total	22,2%	2,8%	25,0%
Total		Count	25	11	36
		% within Grade of ptosis	69,4%	30,6%	100,0%
		% of Total	69,4%	30,6%	100,0%

Table 7: The statistical relationship between the grade of ptosis and minor postoperative complicationsis significant (p<0, 05) (caused bythe grade 3 group).

Crosstab					
			Total postoperative complications		Total
			No	Yes	
Grade of ptosis	Grade 1	Count	6	2	8
		% within Grade of ptosis	75,0%	25,0%	100,0%
		% of Total	16,7%	5,6%	22,2%
	Grade 2	Count	5	6	11
		% within Grade of ptosis	45,5%	54,5%	100,0%
		% of Total	13,9%	16,7%	30,6%
	Grade 3	Count	2	6	8
		% within Grade of ptosis	25,0%	75,0%	100,0%
		% of Total	5,6%	16,7%	22,2%
	Pseudoptosis	Count	5	4	9
		% within Grade of ptosis	55,6%	44,4%	100,0%
		% of Total	13,9%	11,1%	25,0%
Total		Count	18	18	36
		% within Grade of ptosis	50,0%	50,0%	100,0%
		% of Total	50,0%	50,0%	100,0%

Table 8: The statistical relationship between the grade of ptosis and postoperative complications (major and minor) is insignificant (p>0,05).

Group Statistics					
	Revision performed for	N	Mean	Std. Deviation	Std. Error Mean
Implant cc R	No	31	211,29	61,182	10,989
	Yes	5	215,00	108,397	48,477
Implant cc L	No	31	212,90	59,816	10,743
	Yes	5	215,00	108,397	48,477

Table 9: The statistical relationship between the implant volume and revision operations is insignificant (p>0,05).

Group Statistics					
	Major postoperative complications	N	Mean	Std. Deviation	Std. Error Mean
Implant cc R	No	29	203,45	65,712	12,202
	Yes	7	246,43	68,357	25,836
Implant cc L	No	29	205,17	64,566	11,990
	Yes	7	246,43	68,357	25,836

Table 10: The statistical relationship between the implant volume and major postoperative complications is insignificant (p>0,05).

Group Statistics					
	Minor postoperative complications	N	Mean	Std. Deviation	Std. Error Mean
Implant cc R	No	25	223,00	70,312	14,062
	Yes	11	186,36	55,186	16,639
Implant cc L	No	25	225,00	68,465	13,693
	Yes	11	186,36	55,186	16,639

Table 11: The statistical relationship between the implant volume and minor postoperative complications is insignificant (p>0,05).

Group Statistics					
	Total postoperative complications	N	Mean	Std. Deviation	Std. Error Mean
Implant cc R	No	18	213,89	70,826	16,694
	Yes	18	209,72	65,943	15,543
Implant cc L	No	18	216,67	68,599	16,169
	Yes	18	209,72	65,943	15,543

Table 12: The statistical relationship between the implant volume and total postoperative complications (both major and minor) is insignificant (p>0,05).

Crosstab					
			Revision performed for		Total
			No	Yes	
Primary (P) or Secondary (S)	Primary	Count	25	3	28
		% within Primary (P) Secondary (S)	89,3%	10,7%	100,0%
		% of Total	69,4%	8,3%	77,8%
	Secondary	Count	6	2	8
		% within Primary (P) Secondary (S)	75,0%	25,0%	100,0%
		% of Total	16,7%	5,6%	22,2%
Total		Count	31	5	36
		% within Primary (P) Secondary (S)	86,1%	13,9%	100,0%
		% of Total	86,1%	13,9%	100,0%

Table 13: The statistical relationship between groups (primary or secondary) and revision operations is insignificant (p>0,05).

Crosstab					
			Major postoperative complications		Total
			No	Yes	
Primary (P) or Secondary (S)	Primary	Count	25	3	28
		% within Primary (P) Secondary (S)	89,3%	10,7%	100,0%
		% of Total	69,4%	8,3%	77,8%
	Secondary	Count	4	4	8
		% within Primary (P) Secondary (S)	50,0%	50,0%	100,0%
		% of Total	11,1%	11,1%	22,2%
Total		Count	29	7	36
		% within Primary (P) Secondary (S)	80,6%	19,4%	100,0%
		% of Total	80,6%	19,4%	100,0%

Table 14: The statistical relationship between groups (primaryor secondary) and major postoperative complications is significant (p<0,05).

Crosstab					
			Minor postoperative complications		Total
			No	Yes	
Primary (P) or Secondary (S)	Primary	Count	17	11	28
		% within Primary (P) Secondary (S)	60,7%	39,3%	100,0%
		% of Total	47,2%	30,6%	77,8%
	Secondary	Count	8	0	8
		% within Primary (P) Secondary (S)	100,0%	0,0%	100,0%
		% of Total	22,2%	0,0%	22,2%
Total		Count	25	11	36
		% within Primary (P) Secondary (S)	69,4%	30,6%	100,0%
		% of Total	69,4%	30,6%	100,0%

Table 15: The statistical relationship between groups (primary or secondary) and minor postoperative complications is insignificant (p>0,05).

Crosstab					
			Minor postoperative complications		Total
			No	Yes	
Primary (P) or Secondary (S)	Primary	Count	14	14	28
		% within Primary (P) Secondary (S)	50,0%	50,0%	100,0%
		% of Total	38,9%	38,9%	77,8%
	Secondary	Count	4	4	8
		% within Primary (P) Secondary (S)	50,0%	50,0%	100,0%
		% of Total	11,1%	11,1%	22,2%
Total		Count	18	18	36
		% within Primary (P) Secondary (S)	50,0%	50,0%	100,0%
		% of Total	50,0%	50,0%	100,0%

Table 16: The statistical relationship between groups (primary or secondary) and total postoperative complications (both major and minor) is insignificant (p>0,05).

Discussion

Surgeons prefer to insert breast implants under the muscle in many of their augmentation cases. This option is also valid when additional mastopexy is considered. Thus, bi-planar mastopexy-augmentation may be indicated in selected cases. As an example, we have observed that the maneuver to fix the breast tissue to the pectoral fascia during vertical mammaplasty, not only increases the tightness of the breast tissue and the tension on the suture line, but also restricts the volume of the submammarial pocket for the implant. As a result, the implant is pushed downward and outward, making the suture line tighter, especially on the lower breast pole; this observation is especially important in the context of larger implants. Consequently, in selected cases we inserted the implants into the submuscular plane after fixing the glandular tissue to a higher level on the subglandular plane (hence bi-planar mastopexy-augmentation). The increased tension on the suture line due to the Lejour fixing suture and implantation should be taken into consideration when planning the preoperative markings; especially in cases involving firmer breasts. Other example is the formation of capsular contracture in the subglandular plane after the primary operation and desire to avoid the same plane.

In two-plane mastopexy-augmentation, positioning the implant on a desired higher level may enable the surgeon to cover the implant with muscle superiorly and superomedian dermoglandular or dermofat flap inferiorly, decreasing the risk of implant exposure during wound healing. We also believe that the submuscular plane enables the surgeon to use smooth surface implants, which can slide inside and adapt to postoperative changes in the breast shape.

Beale et al., [11] investigated Rohrich's 83 mastopexy-augmentation cases retrospectively and determined a number of important safety criteria, these included precise preoperative marking, the use of 8cm vertical limbs with broad pedicle base, limited undermining of thick skin flaps, small subpectoral implants (<200ml), and the movement of nipple no more than 4cm. They stated that the use of smaller subpectoral implants results in minimal skin flap and nipple loss. They also advocated minimal capsule removal in secondary cases so as not to compromise the vascular network of the flaps. We agree with these points and additionally, we would like to contribute that the capsule is an ideal tissue to fix the lifted breast to; this results in a safer wound closure, especially in cases that involve closing the skin just above the implant surface. In cases where there is severe capsule contraction in the subglandular plane, a second plane (the submuscular plane) would be an ideal place to insert the implant. Furthermore, the capsule itself would be a very effective tissue on which to hold the lifting sutures. Therefore, the two-plane method may be a suitable option to manage secondary cases with severe capsule contractions.

In our study, the rates of revision operations and postoperative major complications were 13.89% and 19.44%, respectively. Khavanin et al., [3] performed a meta-analysis of single stage mastopexy-augmentation by reviewing 23 studies. They found the approximate reoperation rate to be 10.7% (6.7%-15.4%) and the complication rate to be 13.1% (6.7%-21.3%). Our results are comparable with these findings. However, we believe that the patients should be informed profoundly about all potential problems after one stage mastopexy-augmentation operations.

We observed that asymmetries and bad scar formation were the most frequently reported complications. Most asymmetries were due to tissue laxity and sagging, especially on the inferior pole of the breast. This has the potential to create a dilemma in that the tightness of the lateral pillars may result in wound healing issues, even as severe as implant exposure; on the other hand, the laxity of the lateral pillars may cause sagging. Excision of the sagged area as a secondary procedure is usually sufficient to obtain the desired shape.

We found that major complications were significantly more frequent in the secondary group; this could be due to the larger implant volumes in the secondary group. However, there was no statistical correlation between the implant volumes and the major complications. Nevertheless, it should be taken into consideration that the main limitation of this study was the lower number of cases in the secondary group. On the other hand, Beale et al., [11] recommended smaller implants to avoid the aforementioned complications. In spite of small study population of the second group, we recommend caution for the secondary mastopexy-augmentation cases.

Conclusion

We believe that bi-planar mastopexy-augmentation, and coverage of the implants with median dermofat or dermoglandular tissue, could be performed in selected cases. However, potential postoperative problems should be taken into considerations and more caution is needed for secondary cases.

Conflicts of Interest and Source of Funding:

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

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