

Ideas & Innovation

The expanded inframammary fold triangle: Improved results in large volume breast reductions

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ABSTRACT

Context: The inferior pedicle, Wise-pattern reduction mammoplasty is the most popular technique for breast reduction because of its reproducible results and reliability. However, complication rates in super obese patients or patients receiving large volume reductions are high, ranging from 35 to 78%. These complications include delayed healing, infection, seroma, nipple-areolar complex necrosis, fat necrosis and development of hypertrophic scars. **Aims:** This study aimed to determine whether a modification to the standard Wise-pattern reduction technique, an expanded inframammary fold skin triangle, produces improved outcomes in high-risk large volume breast reduction patients. We report that this modification leads to improved outcomes by decreasing wound complications and improving aesthetic appearance. **Settings and Design:** Twenty-two patients received the inferior pedicle Wise-pattern reduction mammoplasty, which was modified to include an 8 cm wide inferior pedicle. This pedicle was de-epithelialized and an 8 × 3 cm² triangle of skin was preserved at the inferior base to reduce tension at the triple point, inverted T-closure. **Materials and Methods:** A retrospective review was performed on all patients who underwent reduction mammoplasty with the expanded inframammary fold (eIMF) technique as well as all patients who received the standard wise pattern technique. **Statistical Analysis Used:** A student *t*-test was performed for both reduction populations using SPSS software package. Statistical significance was defined as *P* < 0.05. **Results:** The average patient age was 32.25 years old (range 18-59), average BMI was 35.0, and average tissue mass removed per breast was 1378.39 g. The modified technique was found to produce a statistically significant (*P* < 0.05) increase in the amount of breast tissue removed (693.96 g increase in the left and 571.21 g in the right) as well as a statistically significant (*P* < 0.05) reduction in dehiscence (75% reduction) and post-operative infection (44.10%). **Conclusions:** This method is an easily reproducible and reliable technique that produces a favourable cosmetic outcome with acceptable, sustainable results in high-risk reductions in obese patients.

KEY WORDS

Inverted T-closure; breast reduction; Wise pattern mammoplasty

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INTRODUCTION

Breast reduction mammoplasty has become one of the most common plastic surgery procedures done in today's society.^[1,2] With the rising global obesity epidemic, an increasing number of patients are opting for surgical intervention for relief of symptoms that may

be secondary to their large and ptotic breasts. These symptoms include neck pain, back-pain, shoulder pain, poor posture, interference with ability to exercise, and problems with self-image.^[1,3-6] Breast reduction has been found to improve patient quality of life, mitigating back, neck, and shoulder pain associated with macromastia.^[3] Patients report not only resolution of physical symptoms, but also improvement in mental health as well.^[4] Moreover, breast reduction has also been found to decrease the risk of breast cancer by up to 30-50%, a difference is most pronounced when larger amounts of tissue are removed.^[2]

Breast reduction mammoplasty techniques have a well documented history in plastic surgery literature and are constantly being challenged and modified to maximize functional and aesthetic outcomes. Since its inception in 1949, the inferior pedicle, Wise-pattern (IPWP) reduction mammoplasty technique has risen to become one of the most commonly used techniques for breast reduction due to its predictability and reliability.^[2,5] IPWP is the mainstay of not only breast reduction in the general population, but also has been found to be effective in bariatric patients, obese patients and those with severe ptosis.^[1,6,7] Alternative reduction methods such as the vertical technique gained popularity due to reduced scarring and lower wound complication rates compared to the Wise pattern. Although this vertical technique improves patient satisfaction and scar formation, studies show the IPWP technique is easier for surgeons to master, has a lower overall revision rate, and allows for increased reduction of breast mass,^[8,9] making it the preferred technique for moderate-to-large size reductions and cases of extreme ptosis^[10] without significantly sacrificing aesthetic outcome.^[9]

However, the IPWP mammoplasty technique is not without its flaws. It is associated with complication rates as high as 78% and problems with aesthetic appearance such as a “bottomed out” breast shape.^[2,8,9,11,12] Complication rates in obese patients or patients receiving large volume reductions can be even higher; ranging from 35 to 78%.^[11,12] These complications include delayed healing, infection, hematoma, seroma, nipple necrosis, fat necrosis and hypertrophic scars.^[11,13] Most major complications occurred at the area of the inverted T junction, due to the increased tension in this area.^[14,15]

Studies show that obese patients are predisposed to surgical complications such as delayed healing, cellulitis, hypertrophic scarring, hematoma, seroma, fat necrosis,

and asymmetry requiring revision.^[4] Although breast reduction was found to be safe in the obese patient population, some data also suggest that there is a significant increase in complication rate with increasing reduction amount and increasing BMI of patients.^[4]

While a reliable and proven technique, the traditional inferior pedicle, wise pattern reduction mammoplasty has an increased risk of complications for large reductions in an obese population. We report a simple modification — the expanded inframammary fold (eIMF) triangle — which in our experience leads to improved outcomes by decreasing complications and improving aesthetic appearance, even in large reductions.

MATERIALS AND METHODS

The authors conducted an IRB approved retrospective review of 22 consecutive patients who underwent reduction mammoplasty using the modified Wise pattern expanded inframammary fold (eIMF) technique and 16 consecutive control population patients that underwent reduction mammoplasty using the typical wise pattern inferior based pedicle technique. The following data points were recorded: Patient demographics, pre-operative surgical measurements, operative specimen weight, and complications including wound dehiscence, skin necrosis, nipple-areolar complex necrosis, erythema/infection, hematoma and seroma.

The modified Wise technique was performed on a total of 43 breasts by one experienced attending surgeon at a large academic hospital. All patients received an inferior pedicle Wise-pattern reduction mammoplasty which was modified to include an 8 cm wide inferior pedicle [Figure 1]. The pedicle was then de-epithelialized and an 8 cm (base) by 3 cm (height) triangle of skin was preserved at the inferior base [Figure 2]. This expanded inframammary fold was preserved in order to reduce tension at the inverted T-closure [Figure 3] that concluded each procedure. The control population included a total of 32 breasts, and all patients received a normal Wise pattern, inferior pedicle based reduction mammoplasty from another experienced attending surgeon at the same academic hospital.

RESULTS

The average patient age for the control population was 31.44 years old (range 18-54), and for the modified



Figure 1: Pre Operative Markings for Expanded IMF technique



Figure 2: De-epithelialized pedicle with 8 cm (base) by 3 cm (height) triangle of skin preserved at the inferior base. This expanded inframammary fold was preserved in order to reduce tension at the inverted T-closure

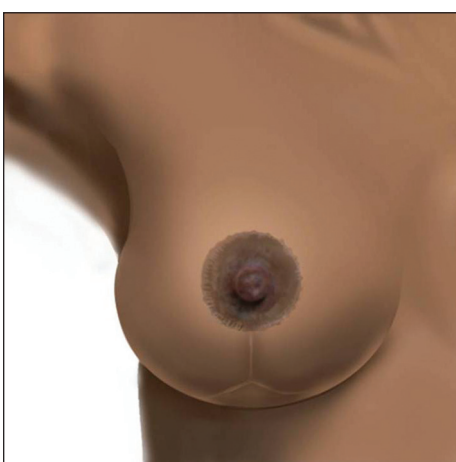


Figure 3: Expanded IMF technique modified inverted T-closure scar

wise pattern inframammary fold (eIMF) was 32.25 (range 18-59). Average tissue removed per breast was 744.24 g for the control group and 1378.39 g for the eIMF

group. Preoperatively in the control population, 88.89% of reporting patients were obese with an average BMI of 35.28, and 0% were smokers. For the eIMF population, 84.21% of reporting patients were obese, average BMI was 35.000, and 27.27% were known smokers. Pre-operative bra size (40.54 cm in control, 42.12 cm in eIMF), pre-operative sternal notch to nipple measurements (35.6 cm in control, 39.0 cm in eIMF), and average follow up time (4.71 weeks in control, 5.73 weeks in eIMF), were also recorded. All demographic, measurement, outcome and complication data are summarized and presented in Table 1.

Overall rate of minor dehiscence in the control group was 100% of those reporting, and 25% in the eIMF group. All minor dehiscence that occurred in the eIMF group were in smokers. Wound infection/erythema was noted in 50% of the control population cases and 4.9% of eIMF group cases. One patient receiving the modified Wise technique requested surgical revision for small dog-ears. Neither group reported any other serious complications such as seroma, hematoma, or nipple-areolar complex necrosis.

Statistical analysis was performed using an SPSS software package. A student *t*-test was performed for both reduction technique populations. Measures that were determined to have a statistically significant ($P < 0.05$) difference were the amount of breast tissue removed, with the eIMF technique resulting in an average increased amount of 693.96 g removed in the left breast and 571.21g removed in the right breast, supporting the efficacy of this technique. Further, two of the most cited flaws of the typical wise pattern reduction technique in obese populations were found to have a statistically significant ($P < 0.05$) reduction in incidence using the eIMF technique, with a 75% reduction in dehiscence and a 44.10% reduction in infection post-operatively in the eIMF population.

All other outcome measures were determined to be not significantly different between populations ($P > 0.05$), lending support to the similar nature of the two patient populations studied and subsequently the statistical power of this study's comparison. Age, Height, BMI, bra size, sternal notch to both left and right nipple measurements, and follow-up time frame were all amongst these measures.

DISCUSSION

We recognize that a large number of plastic surgery

Table 1: Summary of control and expanded inframammary fold breast reduction populations

Demographic	Control			Expanded Inframammary Fold (eIMF)			Combined	
	Number reported	Mean (± 1 stdev)	%	Number Reported	Mean (± 1 stdev)	%	Difference P-value (eIMF- ctrl)	Significance (P <0.05)
Patients								
Race	10		18					
African American	8		80%	17		94.4%		
Caucasian	2		20%	1		5.6%		
Smokers	6	0	20	6				
Age (yrs)	16	31.44 \pm 10.93	20	32.25 \pm 11.14		0.81	0.975	n/s
Height (inches)	6	64.50 \pm 2.66	19	63.95 \pm 2.57		-0.55	0.653	n/s
Weight (lbs)	14	225.29 \pm 72.05	19	203.32 \pm 39.83	-21.97	0.024		Yes
BMI (kg/m ²)	9	35.28 \pm 9.12	19	35.00 \pm 6.41		-0.28	0.578	n/s
Bra Size (cm)	13	40.54 \pm 3.84	16	42.12 \pm 4.41		1.587	0.363	n/s
SN-LN (cm)	12	35.58 \pm 5.18	13	39.77 \pm 9.41		4.19	0.057	n/s
SN-RN (cm)	12	35.62 \pm 5.60	13	38.23 \pm 10.30	2.61	0.071		n/s
L Removed (gm)	15	734.87 \pm 322.20	17	1428.82 \pm 788.52	693.96	0.002		Yes
R Removed (gm)	15	753.60 \pm 292.25	16	1324.81 \pm 686.39	571.21	0.003		Yes
Follow Up (weeks)	12	4.71 \pm 5.43	15	5.73 \pm 3.60	1.03	0.45		n/s
Dehiscence	10	10	100%	20	5	25.0%	-75%	0.0001 yes
Erythema/Infection	10	5	50%	17	1	4.9%	-44.10%	0.008 yes
Seroma	10	0	0%	21	0	0%	0%	n/s
Hematoma	10	0	0%	21	0	0%	0%	n/s
NAC Necrosis	10	0	0%	21	0	0%	0%	n/s

SN-LN: Sternal Notch to Left Nipple distance (cm), SN-RN: Sternal notch to right nipple (cm), L Removed: Left Breast Tissue Removed (gm), R Removed: Right Breast Tissue Removed (gm), NAC Necrosis: Nipple-Areolar Complex Necrosis.

residents are taught to use a similar inframammary fold triangle which is often small in size (a few millimeters). In our experience, this small skin triangle was insufficient to off-load enough tension at the time of closure to prevent wound complications in today's patient population, which tends to be obese and with multiple medical co-morbidities. In our experience, expanding the height and width of this skin triangle, as described above, provides a significant advantage in these challenging breast reduction cases. This modified technique resulted in complication rates significantly lower than the historical mean (as high as 78%,^[2,8,9,11,12]) a statistically significant larger mean volume reductions (1378.39 g) in a predominantly morbidly obese patient group (BMI 35.00). This method is an easily reproducible and reliable technique that produces a favourable cosmetic outcome with acceptable, sustainable results in high-risk reductions in morbidly obese patients, even for less experienced surgeons [Figures 4 and 5].

Limitations

Despite finding statistically significant decreased complications and higher volume reductions, the authors recognize that limitations to this study exist. Ideally, this study could have been performed in a randomized and



Figure 4a: Pre operative view of patient undergoing expanded IMF breast reduction

prospective manner with only one surgeon performing both procedures to study this modified technique more rigorously, and the authors plan to collect more data using this technique in the future. Further, while we acknowledge the difference in resection weight between the two techniques as an advantage to the eIMF technique, it does also differentiate the control and eIMF populations further. However, the study's focus on the patient population demographics in terms of weight and BMI lead us to believe that these findings are still



Figure 4b: Post operative view of patient who underwent expanded IMF breast reduction



Figure 5: Actual 1 year post operative scar using the modified expanded inframammary fold wise pattern technique at follow up visit

of interest and significance. Both surgeons performing breast reductions were experienced in breast reduction and practice at a large academic centre, decreasing the chance that experience in reduction led to lower complications over time during the course of these cases.

CONCLUSION

The expanded inframammary fold triangle technique for WISE-pattern reduction mammoplasty is an easily reproducible and reliable technique that produces a favourable cosmetic outcome with acceptable,

sustainable results in high-risk reductions in morbidly obese patients.

REFERENCES

1. Radosa JC, Raadosa MP, Baum S, Mavrova R, Camara O. Reduction Mammoplasty for symptomatic macromastia: Which factors influence the post-operative outcome. *Arch Gynecol Obstet* 2013;287:715-22.
2. Hunter-Smith DJ, Smoll NR, Maarne B, Maung H, Findlay MW. Comparing Breast-Reduction Techniques: Time-to-Event Analysis and Recommendations. *Aesthetic Plast Surg* 2012;36:600-6.
3. James A, Verheyden C. A retrospective study comparing patient outcomes of wise pattern-inferior pedicle and vertical pattern-Medial pedicle reduction mammoplasty. *Ann Plast Surg* 2011;67:481-3.
4. Roehl K, Craig ES, Gomez V, Phillips LG. Breast Reduction: Safe in the Morbidly Obese? *Plast Reconstr Surg* 2008;122:370-8.
5. Champaneria MC, Wong W, Hill ME, Gupta SC. The Evolution of Breast Reconstruction: A Historical Perspective. *World J Surg* 2012;36:730-42.
6. Gentileschi S, Bracaglia R, Garganese G, Gallucci V, Corrado G, Pacelli F, *et al.* Immediate Definitive Prosthetic Reconstruction in Patients with Ptotic Breasts. *Ann Plast Surg* 2013;70:144-8.
7. Akyurek M. Short scar reduction mammoplasty in the Bariatric Patient. *Ann Plast Surg* 2011;66:602-6.
8. Cruz-Korchin N, Korchin L. Vertical versus wise pattern breast reduction: Patient satisfaction, revision rates, and complications. *Plast Reconstr Surg* 2003;112:1573-8.
9. Kreithen J, Caffee H, Rosenberg J, Chin G, Clayman M, Lawson M, *et al.* A Comparison of the LeJour and Wise Pattern Methods of Breast Reduction. *Ann Plast Surg* 2005;54:236-42.
10. Wolf O, Westreich M, Shalom A. Trends in breast reduction technique. *Isr Med Assoc J* 2012;14:304-6.
11. Cunningham BL, Gear AJ, Kerrigan CL, Collins ED. Analysis of breast reduction complications derived from the BRAVO study. *Plast Reconstr Surg* 2005;115:1597-604.
12. Henry SL, Crawford JL, Puckett CL. Risk factors and complications in reduction mammoplasty: Novel associations and preoperative assessment. *Plast Reconstr Surg* 2009;124:1040-6.
13. Lin IC, Bergey M, Sonnad SS, Serletti JM, Wu LC. Management of the ptotic or hypertrophic breast in immediate autologous breast reconstruction: A comparison between the wise and vertical reduction patterns for mastectomy. *Ann Plast Surg* 2013;70:264-70.
14. Di Candia M, Lie KH, Forouhi P, Malata CM. Experience with the wise mammoplasty skin resection pattern in skin-sparing mastectomy and immediate breast reconstruction for large breast volumes. *Intl J Surg* 2011;9:41-5.
15. Hunter JE, Malata CM. Refinements of the LeJour vertical mammoplasty skin pattern for skin-sparing mastectomy and immediate breast reconstruction. *J Plast Reconstr Aesthet Surg* 2007;60:471-81.

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