

Periareolar Closure Techniques: A
Review and Recent Advances

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Abstract

All breast reduction and mastopexy procedures employ a periareolar closure. No matter the surgical technique, whether it is a periareolar mastopexy, short scar technique or wise pattern reduction, the periareolar closure is ever present and forms a vital component of the procedure. The periareolar closure component is often described as the most complex part of the operative closure [1,2]. There is evidence that periareolar closures completed with an absorbable suture may be prone to significant widening, hypertrophy and/or areolar distortion, and in an effort to avoid this some surgeons use a non-absorbable/permanent suture material. This in turn opens the door to other potential risks including suture infection and extrusion. A review of current techniques used in periareolar closure and recent advances has been undertaken. At this time there is no significantly superior technique and this area warrants further study.

Method

In order to review current techniques and advances in periareolar closure a search of several databases including Medline, CINAHL, Pro Quest and SCOPUS was conducted. Search terms used utilized include: (Periareolar) and (suture or closure) and (MH "Periareolar") or (MH "Areolar") and (complication). The search was limited to articles published between January 2006 and March 2016. Papers that met the following criteria were deemed eligible for inclusion: full text only, peer reviewed, scholarly journals, published in English and randomized control trials and clinical trials.

This literature search method yielded 207 articles. Duplicates of 68 articles were removed leaving 139 articles to be screened for inclusion in the review. Articles focusing solely on incision techniques were excluded. The remaining 31 full text articles were screened for inclusion in this review. A further 19 articles were excluded for the following reasons: The study aims and research designs were not consistent with the inclusion criteria, studies focused on surgery other than mastopexy and breast reduction procedures, studies concentrated on surgical technique of breast surgery procedures not the periareolar closure, and studies discussed closure of the periareolar but did not discuss outcomes.

Results

A selection of retrospective cohort studies, prospective observational studies and comparative studies were reviewed. Over the reviewed eight retrospective cohort studies the patient group was 3059 areolae in 1565 patients. The prospective observational studies included 128 areolae in 66 patients, and the comparative studies 644 areolae in 322 patients. All studies included review of patient charts and photos postoperative. Data was also collected through patient surveys, computer software, and patient data collection log books [2-7].

The key themes that emerged from the reviewed articles were the method of periareolar closure and the material used to perform the closure. Four studies focused on a combination of both absorbable and non-absorbable sutures for a periareolar closure [5,6,8,9]. Four of the reviewed articles focused on using a non-absorbable suture for the closure [4,10-12]. Articles presented by Goes et al (2010), Lee et al (2013) and Komenaka et al (2011), preferred the use of an absorbable suture for closure. Articles with focus on using an absorbable closure were consistent with using a cutaneous running suture to close the nipple areolar complex [3,13,14].

Bogdanov-Berezovsky et al (2013) and Nicoletti et al (2009) suggested completing this method of closure with an additional cutaneous absorbable suture for improved tensile strength in the initial healing stages. The studies that focused on periareolar closure with non-absorbable sutures employed a range of closure techniques [4,10-12]. Franco et al, 2014, discussed the use of the purse string closure, while Saleem & John (2013), reported on closure on two levels, sub cutaneous and cutaneous. A key point for consideration across all surgeons using a non-absorbable GORE-TEX suture was that the knot on occasion was palpable, had tendencies for extrusion and also caused wound breakdown [4,10-12]. Despite reports of such complications, the incidence of scar hypertrophy was reported as significantly lower long term in comparison to those who used an

absorbable suture. All evidence suggests that the method and material of closure can be significantly affected by the patient [4,10-12]. Patient age, skin elasticity, smoking status and other predeceasing factors play a huge impact in relation to patient healing [3,4,10-12].

Some of the most significant evidence was presented by Rosen, 2015, who did a comparative study on his results using a GORE-TEX purse string closure compared to that of an absorbable barbed suture. Data was collected on his patients between 2000 and 2007. This patient group had combinations of closures and techniques, which included both absorbable and non-absorbable closures. Between 2007 and 2014 he performed an interlocking cutaneous closure with an absorbable barbed suture on 644 areolae in 322 patients. The patients were seen at two weeks, three months, six months, 12 months and 24 months post operatively. The outcomes presented eight haematomas (1.2%), three instances of partial skin necrosis (0.5%), and eight patients (1.2%) with various healing complications associated with the wound, including suture extrusion, delayed healing, and dehiscence. Comparably it could be concluded that there are significant advantages and disadvantages to each method of closure. While the patient variables are undeterminable the desired aesthetic outcome remains the same [5].

Chapman & Ingram, 2016, discuss a GORE-TEX closure technique with a modified tie off technique. In a means to eliminate the palpable knot created by the GORE-TEX knot as describe by Hammond, 2007, they employ a ligature technique to complete the closure. The modified closure method had no reports of patients developing suture extrusions, skin fistulas or granulomas [2]. Improved scar quality was also recorded in all patients [2].

A significant element to the content of the data reviewed surrounds the levels of evidence presented. None of the papers included in the literature review presented any quantitative data on the periareolar closure. Quantitative data could be found on breast surgery but not specifically on the periareolar closure. A further significant result is that only Chapman & Ingram, 2016 made any mention of using adhesives to complement or aid in the closure of the periareolar incision.

Discussion

Despite the fact that breast surgery in various forms has been carried out and reported upon since the early 1800's there has been very little objective analysis specifically of the periareolar closure. This step in the closure of every breast reduction and mastopexy procedure is described by many as the most complex component of the surgery [2]. In reporting complications it is frequently the periareolar closure that is singled out in relation to complications such as adverse scars, areolar enlargement and distortion, suture extrusion, granulomas and wound breakdown. The suturing methods and materials used in the periareolar closure are surgeon preference. The choices can affect wound healing, wound integrity, wound strength, postoperative care and aesthetic outcome. The literature currently presents quantitative data on breast surgery procedures and only qualitative data on the periareolar closure.

The two primary themes throughout the literature are the use of absorbable and non-absorbable suture materials. The suture material used influences the tensile strength across the wound as the healing progresses [3,4,11,12]. The use of absorbable sutures seems to result

in fewer problems relating to suture extrusion, infected knots, and granulomas [3,13,14]. However these studies reported scar widening and enlargement of the areolar [3,13,14]. This could be due to the fact the absorbable sutures lose their tensile strength over time.

Surgeons who used non-absorbable sutures in closure reported complications associated with knots being palpable, granulomas, suture extrusions, impaired wound healing and on occasion scar hypertrophy [4,10,11,12]. No issues around scar widening or areolar enlargement were reported.

The modified closure technique paper presented by Chapman & Ingram, 2016, affords the use of the non-absorbable suture however eliminates the palpable knot and minimizes the risk of suture extrusion by ligating the ends of the GORE-TEX with a fine monofilament suture. The result is the strength of the GORE-TEX now with a small permanent knot buried to complete the closure.

Several methods of closure are discussed throughout the studies. Some authors draw little attention to their suturing method [3,8,14], whilst others provide an in depth description and rationale for their closure method [4,10,12,13,15]. The three main methods of closure discussed across the literature are the round block method, the purse string closure and a combination of interrupted and running cutaneous sutures [4,5,8,10,12,13,15]. No method presented with a 'better' closure than the other. The tensile strength distribution across the different methods however could play an impact on the long-term postoperative outcomes [5].

Conclusion

Periareolar closures are considered one of the more complex components of breast surgery. The closure technique and suture material in conjunction with patient variables have a huge impact on the postoperative outcome, making it difficult to achieve consistent outcomes. The research presented above highlights these facts and suggests that each method of closure has its benefits and drawbacks. There is a general lack of evidence with statistical significance in this area and it is not possible at this time to define exactly what the best technique is? however there are some recent advances in closure techniques that may offer improved outcomes and warrant further study.

References

1. Hammond DC, Khuthaila DK, Kim J. The interlocking Gore-Tex suture for control of areolar diameter and shape. *Plastic and Reconstructive Surgery*. 2007; 119: 804-809.
2. Chapman J, Ingram S. The Gore-Tex Suture in Periareolar Closure: A Modified Closure Technique. *Aesthetic Plastic Surgery*. 2016; 40: 885-886
3. Komenaka IK, Maffi TR, Davis KM, Klemens AE, Bouton ME, Pennington RJ. An alternative technique for immediate breast reconstruction. *The American Surgeon*. 2011; 77: 756-760.
4. Loustau HD, Mayer HF, Sarabayrouse M. The owl technique combined with the inferior pedicle in mastopexy. *Aesthetic Plastic Surgery*. 2008; 32: 11-15.
5. Rosen AD. 2016. Periareolar Closure with Barbed Sutures. *Aesthetic Surgery Journal*. 36: 372-375
6. Saleem L, John J. Unfavourable results following reduction mammoplasty. *Indian Journal of Plastic Surgery*. 2013; 46: 401-407.
7. Salgarello M, Visconti G, Barone-Adesi L. Interlocking circumareolar suture with undyed polyamide thread: a personal experience. *Aesthetic Plastic Surgery*. 2013; 37: 1061-1062.

8. Bogdanov-Berezovsky A, Pagkalos VA, Krieger Y, Shoham Y, Silberstein E. Burying the knot in periareolar mastopexy. *Aesthetic Plastic Surgery*. 2013; 37: 851-853.
9. Nicoletti G, Scevola S, Faga A. Breast sculpturing: Overcoming the limits of traditional approaches in breast reduction. *Aesthetic Plastic Surgery*. 2009; 33: 204-212.
10. Bozola AR. Periareolar breast reduction. *Aesthetic Plastic Surgery*. 2009; 33: 228-234.
11. Fu S, Luan J, Xin M, Liu C, Mu D, Mu L. An innovative method for intraoperative shaping and positioning of the nipple-areola complex in reduction mammoplasty and mastopexy. *Aesthetic Plastic Surgery*. 2012; 36: 908-913.
12. Franco J, Kelly E, Kelly M. Periareolar augmentation mastopexy with interlocking gore-tex suture, retrospective review of 50 consecutive patients. *Archives of Plastic Surgery*. 2014; 41: 728-733.
13. Goes JC, Sampaio, Bates D. Periareolar mastopexy with FortaPerm. *Aesthetic Plastic Surgery*. 2010; 34: 350-358.
14. Lee J, Lee S, Bae Y. Trans-nipple double Z-plasty for benign periareolar disease with inverted nipple. *Aesthetic Plastic Surgery*. 2013; 37: 327-331.
15. Righi B, Robotti E. Successfully exploiting two opposing forces: a rational explanation for the "interlocking suture". *Aesthetic Plastic Surgery*. 2011; 35: 177-183.