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ORIGINAL ARTICLE BREAST

The Use of Dermabrasion to Achieve Natural-Looking Areolas Following Breast Reduction or Mastopexy: A Study of 23 Patients

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Abstract

Background Although obtaining symmetrical breasts with good projection and a correctly positioned nipple–areola complex are the main objectives after breast reduction (BR) or mastopexy (MP), the importance of areola esthetics should not be underestimated. In this study, the authors discuss the use of dermabrasion for another purpose, which is to achieve a more natural areola with a smooth, natural border and depigmentation.

Methods Twenty-three patients who had undergone BR surgery (18) or MP (5) between 2012 and 2014 were included in the study. The mean age of the participants was 25.5 (range 19–43). Dermabrasion of the areola was performed using a diamond-type fraise to obtain a smooth transition from the border of the areola to the depigmented areola zones.

Results The patients were followed up for 15 months on average (range 12–18 months). In a survey administered 1 year after surgery, the patients were asked to score their new areola on a scale of 0–10. The mean score was 8.6 (range 4–10). Three patients were re-operated due to the persistence of the sharp border due to insufficient dermabrasion. One patient had a hypertrophic scar and another had hyperpigmentation.

Conclusions Satisfactory and a more natural areola can be obtained using dermabrasion with few complications in BR or MP patients. Therefore, this technique may be considered a complementary procedure for motivated and voluntary patients ready to accept the disadvantages of a secondary procedure.

Level of Evidence IV This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

Keywords Areola · Dermabrasion · Breast reduction · Mastopexy

Introduction

Breast reduction (BR) and mastopexy (MP) are commonly performed operations in plastic surgery. The main objective of these operations is to create an ideal and long-lasting breast shape with minimal scarring while maintaining the blood supply to the nipple–areola complex (NAC) [1, 2]. Accurate and symmetrical localization of the NAC is one major concern in BR, MP, and reconstruction surgery. In particular, the focus is typically on the transfer of the NAC via the appropriate pedicle and on maintaining the blood flow and sensation [3, 4]. However, ensuring an esthetically satisfactory NAC is also important. A literature review reveals that this issue has not been addressed by many surgeons.

Breasts which have not been operated on typically have smooth transitions between the areola border and the breast skin (Fig. 1, right). In contrast, following BR and MP surgery, there is often a sharp border between the NAC and

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Fig. 1 A typical areola following a breast reduction (*left*). The sharp areola–skin border lacking hypopigmentation. This view can be accepted as 'stigmata' of a breast reduction or mastopexy surgery. A non-operated breast areola (*right*). The smooth areola–skin border with hypopigmented regions on the areola periphery

the surrounding tissue (Fig. 1, left). This sharp border, which occurs as a result of the incision around the areola, impairs the natural appearance of the areola. We believe that these are stigmata of BR and MP surgery (Fig. 1).

In this study, we used dermabrasion to attempt to soften the sharp border between the NAC and the surrounding normal skin tissue following BR or MP surgery. We aimed to achieve a more natural transition and depigmented areolas in 23 patients who had previously undergone BR or MP surgery.

Materials and Methods

Twenty-three female patients (45 breasts) who had undergone BR or MP surgery between 2012 and 2014 at our clinic were included in the study. The patients had undergone primary surgery an average of 13 months (range 12–37 months) before the dermabrasion procedure; 18 patients had undergone BR and 5 patients had undergone MP. Only one of these patients had a unilateral BR. The mean age of the patients was 25.5 (range 19–43 years old). Based on the Fitzpatrick skin classification system, patients who were type 1, 2, or 3 were enrolled in the study. The patients were asked whether they had recently had a herpes simplex virus infection and about the use of blood thinners or isotretinoin. None of the patients had an unfavorable anamnesis. The patients were prepared for the procedure after they had given informed consent (Table 1).

Surgical Technique

The patients were operated on under sedation (1 mg IV midazolam) and local anesthesia (2 ml solution containing 40 mg lidocaine HCl and 0.025 mg adrenaline) in an operating room. Dermabrasion was performed using a diamond-type fraise at 30,000 RPM. An assistant stretched the areola and the surrounding skin. Moving the fraise back and forth at a constant pressure and rate, dermabrasion was performed on the areola border and the surrounding region at an approximate width of 0.5 cm (Fig. 2, left above). The epidermis was passed and the procedure continued until punctate hemorrhages were observed in all areas. In the second stage, depigmented areola zones were created by moving the fraise toward the inside of the areola to obtain the indentations and protrusions that are naturally present on a non-operated areola (Fig. 2, right below). This was done only to eliminate the areola pigment, and care was taken to avoid bleeding. In the final stage, especially in cases where there was a deepening risk, a scalpel was used to create perpendicular incisions along the areola border to break up the dermis (Fig. 2, right above and left below). Care was taken to prevent these incisions from reaching the subcutaneous tissue. Immediately after the procedure, the surgical area was temporarily covered with gauze wetted with 1/50.000 (0.002 %) diluted adrenaline to achieve hemostasis. Following hemostasis, a Xeroform gauze dressing was applied for 48 h to ensure a moist environment to accelerate wound healing. This was followed by the routine application of dressings with antibiotic ointment. The patients were discharged approximately 4 h after the procedure.

Results

The mean duration of the procedure was 18 min for both breasts (range 13–27 min). The mean duration of follow-up was 15 months (range 12–18 months). In all patients, re-epithelization was observed in the early post-operative period 14 days after the procedure. The patients were instructed not to expose the dermabrasion areas to the sun for a year following the procedure and were invited to the clinic for a follow-up visit at 1, 3, and 6 months and 1 year after the procedure. The patients were then administered a survey after 1 year to determine patient satisfaction. The patients were asked to score their new areolae on a scale of 0–10, in comparison to the areola after the initial surgery. The mean score was 8.6 (range 4–10) (Table 2). Any complications were documented. None of the patients had bleeding or infection at the site of the wound. Three patients had to undergo the procedure again due to inadequate dermabrasion. The late post-operative follow-ups revealed hypertrophic scar formation in one patient with a Fitzpatrick skin classification of type 3 (score: 4). The patient did not request an additional procedure and was prescribed silicon sheets and creams as a conservative measure. Another patient with relatively darker skin had hyperpigmentation. The results obtained are shown in Figs. 3, 4, 5, 6, and 7.

Table 1 Patient characteristics and results

$n = 23$ (number of patients)	Mean	Range
Age	25.5	19–43
Follow-up (months)	15	12–18
Primary surgery time prior to dermabrasion (months) (18-breast reduction, 5-mastopexy)	13	12–45
Mean surgery time for both breasts (min)	18	13–27
Score of the new areola on a scale of 0–10	8.6	4–10

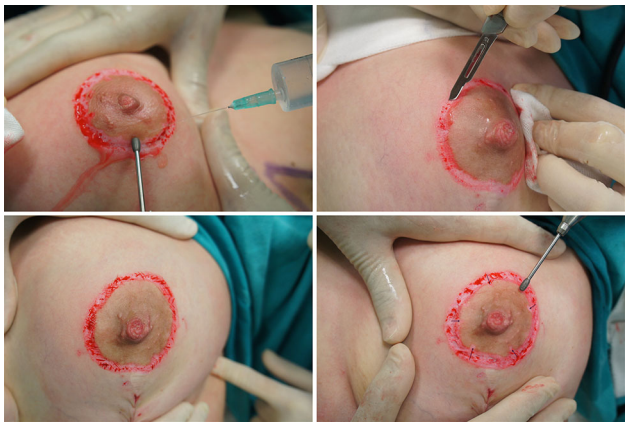

Fig. 2 Dermabrasion is being performed to break the sharp border between the areola and the surrounding skin border (*above*, *left*). In patients with thin skin due to risk of excessive deepening, the dermis can be scored with a scalpel as demonstrated (*above*, *right*). Appearance of the areola after first two steps (*below*, *left*). Finally, creation of depigmentation areas is achieved after very gentle application of the fraise on various sites on the areola periphery (*below*, *right*). *Arrows* indicate the depigmented regions

Table 2 Complications

Complications	*n* (%)
Infection	0 (0)
Prolonged bleeding	0 (0)
Re-operation due to insufficient dermabrasion	3 (13)
Hypertrophic scar	1 (4)
Hyperpigmentation	1 (4)
Hypopigmentation	0 (0)
Nipple necrosis	0 (0)

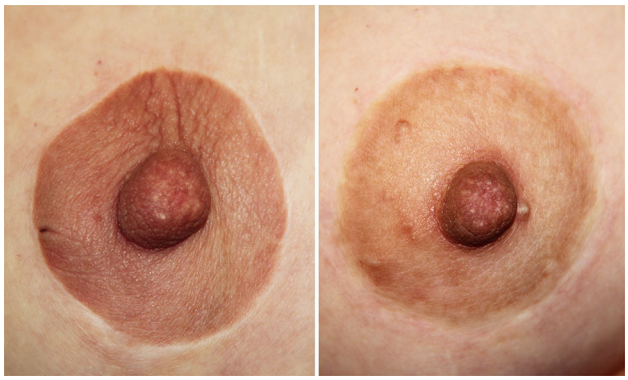

Fig. 3 The view at month 13 following a dermabrasion. The more natural areola with irregular and smooth borders together with small depigmented areas

Fig. 4 Preoperative view following a previous breast reduction (*left*). The circular hypopigmented zone around the areola. The view at month 14 following a dermabrasion (*right*). Now the areola looks more natural with total disappearance of the hypopigmented zones

Discussion

The transfer of the NAC to the required site is the main component of a successful BR or MP surgery [3, 4]. To date, surgeons have proposed various options regarding which pedicle should be used for localizing the NAC in BR and MP surgery [5–7]. The issue that is less often addressed is NAC esthetics. The studies performed to achieve an ideal NAC are mostly related to the reconstruction of the NAC complex following mastectomy.

NAC reconstruction and labial grafts were introduced by Adams in the 1940s [8, 9]. This was followed by Millard's nipple-sharing concept, where contralateral nipple tissue

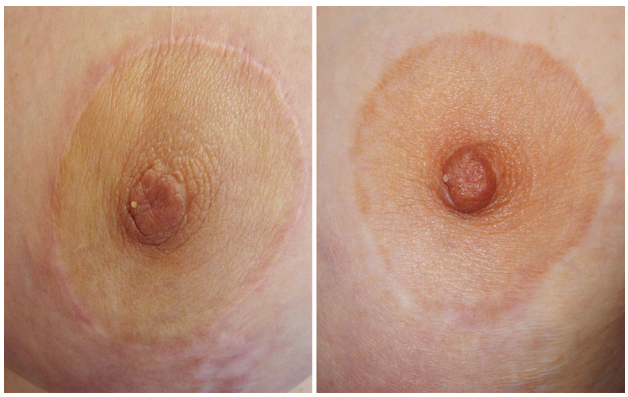

Fig. 5 The results obtained in a patient with a light skin (*left*). The breaking of the sharp areola–skin border most prominent superiorly (*right*)

was used as a composite graft [10]. Thumb pulp grafts, auricular cartilage grafts, and mucous membrane grafts were subsequently used for NAC reconstruction [11, 12]. In the 1980s and 1990s, NAC reconstruction procedures involving the use of skate, star, cervical visor, bell, and S flaps alone or in combination with skin grafts were common [13–16]. Becker used the tattoo method in NAC reconstruction for the first time in 1986, a method which was later popularized by Spear et al. [17]. Medical tattoos and skin grafts are now the most common techniques in areola reconstruction.

In contrast to the above-mentioned reconstructive methods, only few studies have been undertaken to achieve a more natural-looking areola following esthetic breast surgery. For example, Gryskiewicz et al. attempted to achieve a more natural-looking areola border using a zigzag wavy-line peri-areolar incision [18]. A custom-made peri-areolar wavy-line marker was used to help achieve a natural peri-areolar incision [19]. Teplica has stated that the human body does not have any geometric-shaped lines and that W-plasty and Z-plasty necessarily involve irregularity; thus, irregular incisions have been used in the peri-areolar region [20]. Unfortunately, all the above-mentioned studies were case reports in which the surgeons aimed to obtain a more natural areola border. However, they did not focus on creating the hypopigmented areas that are naturally present on the areola.

Dermabrasion has been used as a skin-resurfacing technique since the 1930s [21]. Krometer used this technique for the first time after performing a process involving freezing with carbon dioxide and ether spray, carrying out a treatment using a rotating burr and rasp [22]. Iverson removed superficial debris with sandpaper. The use of dermabrasion extended from cases of trauma to tattoo removal [23]. In the last 50 years, dermabrasion has been commonly used in wrinkle treatment, and the treatment of pre-cancerous lesions [21]. In the literature, the use of dermabrasion on breast skin was previously reported in only one publication. This was a report by Cohen, who used the dermabrasion technique on a black patient to re-form the NAC [24].

We are highly aware of the importance of projection, symmetry, and ideal NAC localization in achieving an ideal breast. However, we believe that ideal NAC localization alone is not enough. We believe that the sharp, unnatural border between the areola and the surrounding tissue is an important issue, as it impairs breast esthetics. On a non-operated, natural breast, this border is less marked and is smooth and natural. This transition is always present in women who have or have not given birth, even if the extent of pigmentation differs [25–27]. Therefore, we used the dermabrasion procedure, which is commonly used as a scar revision technique, not for the purpose of scar revision but for the purpose of breaking the areola–breast skin border and creating hypopigmented areas on the areola periphery.

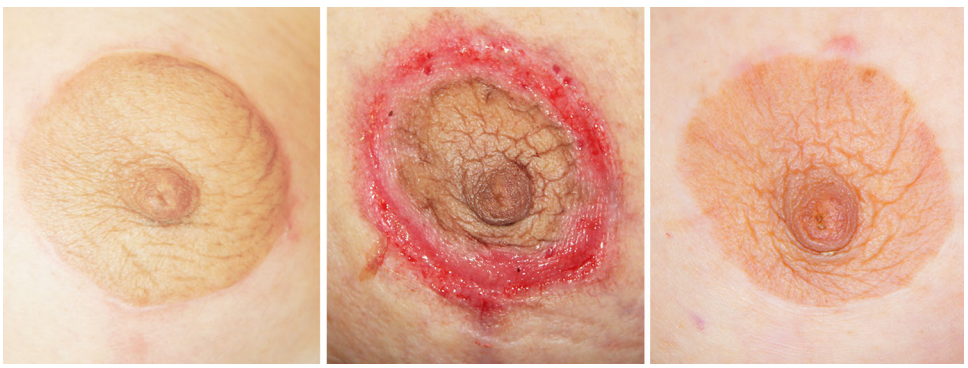

Fig. 6 Initial areola appearance after a breast reduction (*left*). Post-operative one-week view (*middle*). The view at month 12 after the initial surgery (*right*). The wavy and smooth borders enabled the areola to be more natural

Fig. 7 Various post-operative patient examples. In all cases, the sharp areola–skin border has been smoothened successfully

In the literature, there are many conservative and invasive options that can be used for scar revision. The conservative techniques include appropriate wound care, silicone sheet therapy, and pressure garment use. Intralesional steroid administration, excision and repair, staged excisions, and Z- or W-plasty are among the main invasive options [28, 29]. Apart from these, many laser options with types of CO_2, erbium YAG, pulsed dye, and fractionated types are used for scar revision [30, 31]. Although we think that each of the above-mentioned techniques is beneficial to some degree in scar revision, we specifically use dermabrasion for some reasons. The important point is that we should evaluate our technique as an areola reconstruction, not as a scar revision solely. Instead, our objective was to soften the sharp border between the areola and skin and to create depigmented areas in the areola periphery. The surgical techniques such as re-excision and Z- or W-plasty do not serve this purpose. The advantages of dermabrasion are many actually. It is simple and cost efficient, can be performed conveniently as an office-based procedure, does not require sophisticated equipments such as laser devices, and allows correction of areola asymmetries when needed. Apart from these, it can be performed simultaneously with already-required surgical procedures such as dog-ear excisions or scar revisions in patients with BR or MP.

There are certain crucial points to consider regarding our technique. First, as is well known, the most common complications of dermabrasion that should be avoided are injury to the adnexal structures and scar formation [32]. Therefore, extra care was taken to prevent these incisions from reaching the subcutaneous tissue. Secondly, having a good anamnesis before the procedure is necessary, particularly for patients with a history of hypertrophic scarring or keloids and who receive contraindicated medications (immunosuppressants, etc.). These cases should be carefully analyzed. For example, we observed hypertrophic scar formation in a patient with a type 3 Fitzpatrick skin classification. This indicates that the Fitzpatrick skin classification should also be considered in addition to the medical anamnesis before the procedure is performed. Patients with type 2 and type 3 Fitzpatrick skin classifications are ideal candidates for this procedure, while patients with thick, dark skin and a predisposition for hypertrophic scarring and keloids, and who are at risk of wound healing issues are definitely not candidates for this procedure. Another important point to note is the necessary time period between the primary esthetic surgery and the procedure. We operated on our patients 13 months after the primary BR or MP surgery (range 12–45 months). However, this period may be shorter for some patients, particularly if they require a revision such as a dog-ear excision, in which case both procedures can be done at the same time.

The main disadvantage of dermabrasion and areola revision techniques is the necessity of a secondary operation. The additional financial burden and surgical risks are also disadvantages. In addition, the fact that the patient theoretically lives with an open wound during the wait for epithelization may be an issue for the working patient population. Thus, this procedure can be recommended for a motivated patient group who desires optimal results following primary surgery.

Conclusion

In conclusion, the creation of a stable breast shape, maintenance of blood flow to the NAC, sensation, and a less-visible scar have been the main objectives of BR and MP surgery to date. Still, areola esthetics is the most common concern of operated patients, and this concern should thus be given more importance. Areola revision by dermabrasion, with which we obtained more natural and satisfactory results, may be considered an effective final step for appropriate candidates without risk factors.

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