

The Transareolar Incision for Breast Augmentation Revisited

Peter Kompatscher, M.D.,¹ Christine Schuler, M.D.,¹ and Gertrude M. Beer, M.D.²

¹Feldkirch, Austria

²Zürich, Switzerland

Abstract. Of the various possible incisions for breast augmentation, the transareolar access has gained only limited popularity. The potential side effects of this incision are said to be altered nipple sensation, impaired lactation, an increased rate of infections with capsular fibrosis, well visible scar formation with hypopigmentation, and the need for an additional access in case a breast ptosis correction should prove necessary at a later date. The purpose of this retrospective study was to judge advantages and limitations of transareolar breast augmentation, and to verify whether the reluctant attitude toward this surgical approach is justified.

A sample of 18 patients with a transareolar, retropectoral breast augmentation was selected for a retrospective evaluation. The suitability of the technique in general was examined together with early postoperative complications, sensory changes, and late complications on the basis of an evaluation system for cosmetic surgical results.

The study showed that only women with an areolar diameter of 3.5 cm or more without pronounced breast ptosis were suitable for the transareolar access. No early infections were noted. The rate of capsular fibrosis was 11%. Two years after breast augmentation, 16 women (89%) judged their breast sensation to be normal, but objective assessment showed that mean pressure and vibration sensation were moderately compromised in all parts of the breast. The scars were of good quality, with very little hypopigmentation.

With appropriate patient selection, respecting the advantages and limitations, the transareolar incision has its definite place among the different incisions for breast augmentation.

Key words: Breast augmentation—Breast sensation—Scars—Transareolar approach

Breast augmentation can be performed by various surgical approaches. The most popular are the inframammary, axillary, and periareolar approaches [2,8,12,16,23]. Among the remaining approaches [11], the transareolar incision has not gained widespread popularity although it was published already three decades ago by Pitanguy [13–15]. It is feared that this incision could lead to impaired lactation, an increased rate of infections with capsular fibrosis, well visible scar formation with hypopigmentation, and the need for an additional access in case a breast ptosis correction should prove necessary at a later date.

One main reason for rejection of the transareolar incision is concern of the women that nipple sensation will be compromised. Women feel that the nipple is the most sensitive part of the breast [24], and that this kind of incision could lead to greater impairment of nipple–areola complex (NAC) sensation than other surgical approaches.

Although there is general agreement that the breast receives its innervation medially and laterally in a converging way from branches of the upper (first to sixth or seventh) intercostal nerves [18], there is an ongoing controversy about which nerves supply the NAC as well as their course and distribution. Craig and Sykes [3], for instance, found that the anterior branch of the fourth lateral intercostal nerve is the unique nerve to the nipple passing deeply through the breast tissue. In contrast, Cooper [4], in one of the oldest descriptions on breast sensation, noted in 1840 that nerves travel on the surface of the gland, several of them reaching the areola and nipple from both the lateral and medial directions.

In most of the newer studies on breast specimens from cadavers [18], these observations are confirmed. The nipple and areola receive their nerve supply from the two branches of the fourth intercostal nerve in all cases, with additional branches from the third and fifth lateral and medial intercostal branches passing

Correspondence to Gertrude M. Beer M.D., Division for Plastic, Hand, and Reconstructive Surgery, Department of Surgery, University Hospital (Academic Medical Center), Zürich, Switzerland; *email*: gertrude.beer@chi.usz.ch

under the areola in a subdermal plane to reach the nipple. Given this superficial and converging course of the nerve branches from the entire periphery of the breast to the NAC, the transareolar incision, with a strictly vertical course toward the pectoralis major muscle, would theoretically be of great benefit in sparing many of the tiny nerve branches.

This retrospective review was undertaken to judge advantages, disadvantages, and limitations of transareolar breast augmentation, and to verify whether the reluctant attitude toward this surgical approach is justified. The assessment of complications included a subjective and quantitative evaluation of NAC sensory perception.

Patients and Methods

This study enrolled 18 patients who had undergone a primary bilateral transareolar, retropectoral breast augmentation with textured implants. The study excluded patients with previous diseases or surgery of the breast who had impaired sensation and women who had breast ptosis [17].

Routine physical workup was performed. Comorbidities, previous pregnancies and lactation, and the diameter of the areola were recorded. The volume of the breast was estimated by cup size. Preoperatively, a single-shot intravenous dose of antimicrobiologic prophylaxis (cephazoline 2 g) was administered [7]. Intraoperatively, the volume of the breast implants and postoperative early infections [7] were recorded.

Two years later, women were asked about their subjective feelings of breast sensation, new pregnancies, and lactation. Additionally, the sensory modalities of the breast were measured by testing the pressure threshold of slowly adapting nerve fibers [19] using the complete set of Semmes–Weinstein “Rol-yan” filaments (Smith & Nephew, Menomane Falls, WI, USA) in a descending way. The measurements were indicated in terms of $\log_{10} F$ because these values are more familiar to all surgeons than g/mm^2 . The vibratory threshold of rapidly adapting nerve fibers [24] was tested with a biotesiometer (Vibrometer^R; Somedic Sales AB, Farsta, Sweden) using slowly increasing amplitude. Temperature perception was measured qualitatively with cold–warm discrimination according to Terzis et al. [24]. Nipple erectibility also was assessed qualitatively to evaluate the intactness of the autonomic nervous system.

The tests were conducted in a room with a controlled temperature of 22°C. The patients were tested in a semisitting position. All the tests were performed by one observer. The nine coordinates of the breast according to Courtiss and Goldwyn [5] were tested: point 1 (the nipple) and points 2 through 5 (the midareolar area at 12, 3, 6, and 9 o'clock). Coordinates 6 to 9 represented the four quadrants of the breast.

Table 1. The quality of scars and pigmental changes 2 years after transareolar breast augmentation ($n = 18$)^a

	Noticeable	Obvious	Deforming
Scars	3	1	—
Pigment changes	4	—	—

^a The ranging is derived from a system for the evaluation of cosmetic surgical results [21].

The resulting scars and pigmental changes were classified according to a system for evaluating cosmetic surgical results [21] with the subdivisions “noticeable,” “obvious,” and “deforming.” All the findings were recorded according to a standard clinical protocol.

The results were analyzed using SPSS 11.0 (SPSS, Chicago, IL, USA). Continuous variables were summarized as mean \pm standard deviation. Comparison of our patient group with the two groups that had “normal” breasts without surgery was performed by the unpaired *t* test. A *p* value of 0.05 or less was considered significant.

Results

The age of the 18 patients ranged from 20 to 39 years (mean, 29 years). Preoperatively, all 18 were healthy (American Society of Anesthesiologists [ASA] score, 1) and had either a brassiere cup A or B. The diameter of the areola ranged from 3.5 to 4.9 cm (mean, 3.9 ± 0.8 cm), 3.5 cm being the smallest diameter possible for the transareolar augmentation. Previous pregnancies had been encountered in four patients: three women had experienced one previous pregnancy, and one woman had experienced two pregnancies. Three of the four women had breastfed their children from 1 to 4 1/2 months. Postoperatively, none of the women had delivered an additional child. The implants used ranged from 115 to 325 cm^3 .

No early infections were encountered. At the end of the first postoperative year, two patients experienced a mild to moderate capsular contracture (11%). No reoperations had been required. Scars and pigmentation were rated satisfactorily for all but one woman. Ratings of the scars and the pigmental changes are presented in Table 1 and Figure 1.

Two years after augmentation, erectibility of the nipple was present in all the women, and 16 (79%) women felt (subjectively) that sensation had returned to normal after a short period (1 to 3 months) of hyposensitivity or hypersensitivity with or without pain in the NAC region. In contrast, sensation measurements for pressure and vibration showed significant impairment. The different sensation thresholds compared with normal values in the literature are presented in Table 2.

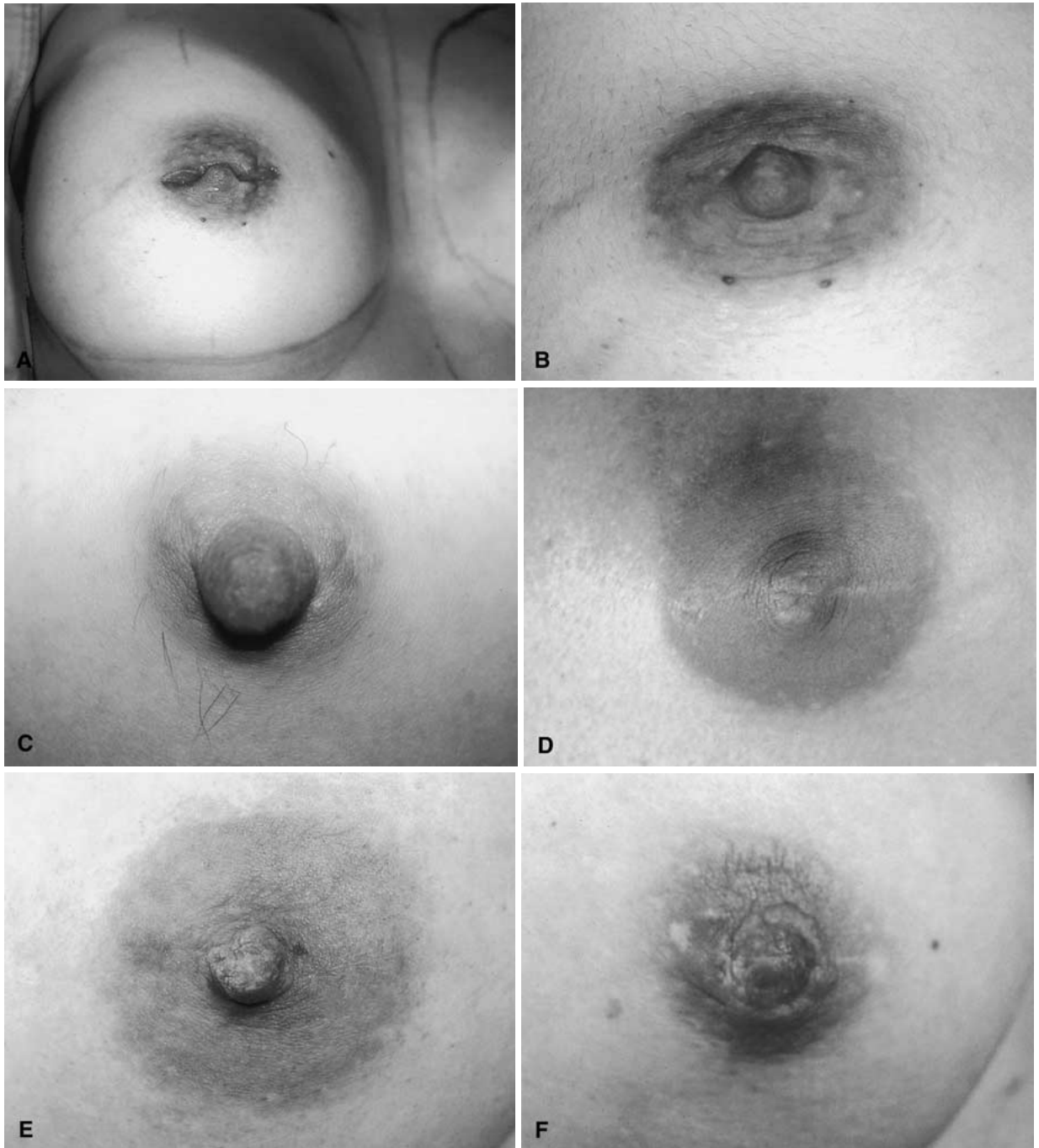


Fig. 1. Scars after a transareolar incision for breast augmentation. In general, the scar is interrupted in its horizontal course and therefore principally not well visible. (a) Intraoperative situs with transareolar incision. (b) Same right nipple-areola complex of a in detail: excellent scar and pigmentation. (c) A further example of a perfect scar. (d) Example of a “noticeable” scar. (e) Example of a “noticeable” distortion of the nipple. In this case, the incision could have been made at the lower base of the nipple. (f) Example of the only “obvious” rated scar with pigment changes that could be easily tattooed.

Discussion

There is a striking discrepancy between the fact that most of the women felt normal sensation 2 years after breast augmentation and the increase in measured mean thresholds for pressure or vibration.

This shows that the final recovery and judgment of breast sensibility depends not only the regeneration of severed nerves or the cross-innervation from remaining unharmed intercostal nerve branches [10], but also on other physiologic and psychological elements.

Table 2. The mean values, standard deviations, and ranges for pressure and vibration thresholds and temperature in 36 breasts^a

Area		Mean \pm SD (n = 36)	Range	Reference 22 (n = 50)	Reference 20 (n = 11)	
Pressure (log ₁₀ F)	Nipple	3.57 \pm 0.56	2.44–3.87	2.85 \pm 0.44	28.5 \pm 7.4	log ₁₀ F 4.08
	Areola	3.75 \pm 0.40	1.65–4.56	2.69 \pm 0.44	31.6 \pm 4.0	4.17
	Body	3.31 \pm 1.09	1.65–4.56	2.36 \pm 0.45	23.1 \pm 13.0	3.84
						Macromastia (cup D) (n = 13)
Vibration (μ m)	Nipple	4.3 \pm 5.9	0.3–14.2	—	0.3 \pm 0.2	7.6 \pm 6.8
	Areola	0.2 \pm 1.6	0.1–0.3	—	0.1 \pm 0.6	8.1 \pm 7.1
	Body	1.3 \pm 1.1	0.1–3.7	—	0.4 \pm 0.3	8.4 \pm 1.1
Temperature ($^{\circ}$ C)	Nipple (%)		Body (%)	Reference 24		
	44	100	74	94	(100/75/91)	
	0	100	79	96	(100/84/97)	

SD, Standard deviation

^a The four measure points on the areola and the four coordinates of the breast body were averaged. For comparison, the mean values of normal-breasted women (References) are given, including the vibratory threshold values of women with macromastia but no surgery (cup D). In Reference 20, the normal pressure thresholds were indicated in g/mm². Note that the mean values for the pressure threshold of the patients in this study were significantly higher (all $p < 0.001$) than those in reference 22, but lower (better) than those in reference 20. The values for vibratory threshold after augmentation equaled or were better than the values of women with macromastia but no surgery in reference 20.

Among the greatest psychological benefits of breast augmentation seems to be the increased self-esteem occasioned by the improved breast contour, which leads to heightened sensuality, despite the quantitative amount of impaired sensation [6]. Regarding the physiologic peculiarities, there are only very rare reports on breast sensation after breast augmentation. In 1976, Courtiss and Goldwyn [5] provided the first significant clinical study evaluating changes of sensation after augmentations. Using crude assessment by finger touch, pain perception (Vitapulp), and light pressure to test sensibility, they found marked differences in sensory perception between the skin of the breast, the areola, and the nipple (the areola was the most sensitive part of the breast and the nipple the least). Two years postoperatively, 15% of their patients had a persistently decreased sensation in the NAC, and larger implants were associated with greater sensory loss. They found no difference based on insertion of the implant through an inframammary, transareolar, or periareolar incision at either location. Pitanguy [13] stated that areolar sensibility and muscle mobility were not altered in his cases of augmentation.

In a recent study [1] that measured sensitivity 6 months after retropectoral breast augmentation, 20% of the women felt that they had decreased sensation. Yet, the authors concluded that these feelings are of little scientific value and therefore negligible because they found no significant changes in measurements of pressure and vibration thresholds. If the authors had used the appropriate set of 20 monofilaments for pressure measurement instead of only 6 monofilaments, they probably would also have detected the decrease in pressure sensation that we found. Other studies on breast augmentation have

found no change, have reported an improvement of sensation postoperatively, or, as in most cases, have not commented on this issue.

Therefore, the main knowledge of breast sensation and its sequelae after surgery derives from studies of breast reduction and “normal-breasted” women versus those with macromastia [20,22,24]. From these reports, it is known that there is a wide range of sensation thresholds even in normal breasts without surgery, and that not all sensational modalities in one breast are distributed homogeneously.

In our study, special attention was given to sensation of the nipple because no other incision for augmentation traverses the nipple itself. Whereas the nipple is thought by some authors to have a poor sensation and a paucity of nerves supplying it [5, 18], others, including women, consider the nipple to be very sensitive [4]. In contrast to these assumptions, we sought to quantify the severity of sensory impairment after augmentation. In our women, the mean values of the pressure threshold were increased by 1 to 2 Semmes–Weinstein filaments. This is considered a mild to moderate loss of sensation. The mean vibratory threshold also was increased (to approximate the values among women with macromastia who have had no surgery [20]) (Table 2). As a result, 11% of our women were aware of impaired sensation and judged it to be decreased.

The parameter that correlated best with the subjective outcome was temperature sensation. It had returned to normal [24]. Whether other incisions or implants could lead to a smaller objective sensory compromise remains undetermined.

Scars proved to be barely visible in most of the cases, and areas of hypopigmentation were rare. Yet,

the transareolar incision certainly is limited to breasts without ptosis because nearly every incisional pattern of mastopexy requires a periareolar approach. The question of compromised lactational function cannot be answered conclusively from this small study nor from literature [9,25].

In conclusion, the transareolar approach for breast augmentation showed no increased rate of complications, including capsular contraction. The scars were of good quality, without major pigmental changes. Perceived sensation was normal 2 years after augmentation in 89% of the women, but objective mean pressure and vibration sensation were moderately compromised in all parts of the breast. This discrepancy shows once more that when clinicians are in doubt, the subjective feelings of their patients are more important than objective "reproducible" measurements.

If patients are appropriately selected with respect to the limitations of the technique (i.e., limited implant size in relation to the diameter of the areola and augmentation of only breasts without ptosis), the transareolar access has its definite place among the different incisions used in breast augmentation.

References

- Banbury J, Yetman R, Lucas A, Papay F, Graves K, Zins JE: Prospective analysis of the outcome of subpectoral breast augmentation: sensory changes, muscle function, and body image. *Plast Reconstr Surg* **113**:701–707, 2004
- Broadbent TR, Woolf RM: Augmentation mammoplasty. *Plast Reconstr Surg* **40**:517–523, 1967
- Craig RDP, Sykes PA: Nipple sensivity following reduction mammoplasty. *Br J Plast Surg* **23**:165–172, 1970
- Cooper AP: *On the anatomy of the breast*. Longmann, Orme, Green, Brown and Longmanns, London, 1840
- Courtiss EH, Goldwyn RM: Breast sensation before and after plastic surgery. *Plast Reconstr Surg* **58**:1–13, 1976
- Courtiss EH, Webster RC, White MF: Selection of alternatives in augmentation mammoplasty. *Plast Reconstr Surg* **54**:552–557, 1974
- Garner JS: CDC guideline for prevention of surgical wound infections, 1985: supercedes guideline for prevention of surgical wound infection published in 1982. *Infect Control* **7**:193–200, 1986
- Griffiths CO Jr: The submuscular implantation in augmentation mammoplasty *Trans Fourth Internat Congr Plast and Reconstr Surg*. Medica Excerpta, Amsterdam, 1964
- Hurst NM: Lactation after augmentation mammoplasty. *Obstet Gynecol* **87**:30–34, 1996
- Jaspers JJP, Posma AN, van Immerseel AAH, Gittenberger-de-Groot AC: The cutaneous innervation of the female breast and nipple–areola complex: implications for surgery. *Br J Plast Surg* **50**:249–259, 1997
- Johnson GW, Christ JE: The endoscopic breast augmentation: the transumbilical insertion of saline-filled breast implants. *Plast Reconstr Surg* **92**:801–808, 1993
- Jones FR, Taurus AP: A periareolar incision for augmentation mammoplasty. *Plast Reconstr Surg* **1**:641–644, 1973
- Pitanguy I: Transareolar incision for breast augmentation. *Aesth Plast Surg* **2**:363–372, 1978
- Pitanguy I: Transareolar incision for gynecomastia. *Plast Reconstr Surg* **38**:414–419, 1996
- Pitanguy I, Carreirao SE, Garcia LC: Transareolar incision for augmentation mammoplasty. *Rev Brasil Chir* **63**:301–306, 1973
- Price CI, Eaves FF, Nahai F, Jones G, Bostwick J: Endoscopic transaxillary subpectoral breast augmentation. *Plast Reconstr Surg* **94**:612–619, 1994
- Regnault P: Breast ptosis definition and treatment. *Clin Plast Surg* **3**:193–203, 1996
- Sarhadi NS, Dunn JS, Soutar DS: An anatomical study of the nerve supply of the breast, including the nipple and areola. *Br J Plast Surg* **49**:156–164, 1996
- Semmes-Weinstein J, Ghent L, Teuber LH: *Frequency of response to a series of pressure stimuli according to log force in somatosensory changes after penetrating brain wounds in man* Harvard University Press, Cambridge, pp 60–62, 1960
- Slezak S, Dellon LA: Quantitation of sensibility in gigantomastia and alteration following reduction mammoplasty. *Plast Reconstr Surg* **91**:1265–1269, 1993
- Strasser E: An objective grading system for the evaluation of cosmetic surgical results. *Plast Reconstr Surg* **104**:2282–2285, 1999
- Tayrich GV, Kuzbari R, Rigel S, Todoroff BP, Schneider B, Deutinger M: Normal cutaneous sensibility of the breast. *Plast Reconstr Surg* **102**:701–704, 1998
- Tebbetts JB: A surgical perspective from two decades of breast augmentation: toward state of the art in 2001. *Clin Plast Surg* **28**:425–434, 2001
- Terzis JK, Vincent MP, Wilkins LM, Rutledge K, Deane LM: Breast sensibility: a neurophysiological appraisal in the normal breast. *Ann Plast Surg* **19**:318–322, 1987
- Widdice L: Commentaries: the effects of breast reduction and breast augmentation surgery on lactation: an annotated bibliography. *J Hum Lact* **9**:161–167, 1993