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Patient satisfaction following nipple-areolar complex reconstruction and tattooing

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KEYWORDS

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Summary *Background:* Nipple-areolar complex (NAC) reconstruction and tattooing complete and compliment reconstruction of the breast mound. Patient satisfaction with NAC reconstruction and tattoo, independent from breast mound reconstruction is evaluated in this study.

Methods: Patients who underwent nipple tattooing between January 2001 and June 2008 were sent a postal questionnaire retrospectively. Questions included those regarding reconstruction type, patient satisfaction with NAC reconstruction and tattoo outcome, and complications.

Results: 110 patients with completed questionnaires were included from the 172 patients who were invited. Median follow up time was 38.5 months (1–86). Eighty eight percent reported overall satisfaction with their NAC reconstruction. Seventy percent of patients were satisfied with their nipple tattoos. All procedures were done in a day case setting and eighty-nine patients reported no postoperative complications. The commonest causes for disappointment were lack of projection of the NAC reconstruction and fading of tattoos. Ninety-six percent of women stated that NAC reconstruction and tattooing were important to them, and 93% of the patients would undergo the procedures again.

Conclusion: We believe that NAC reconstruction is an important and integral part of breast reconstruction. This study should inform surgeons and patients regarding outcome, possible complications and the potential need and timing of further tattooing.

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Nipple-areolar complex (NAC) reconstruction is an integral part of breast reconstruction. It compliments and completes breast mound reconstruction. Studies demonstrate that breast reconstruction is not complete without

a NAC.^{1,2} Techniques for NAC reconstruction have evolved over the past three decades and various techniques and advances have been reviewed.^{3,4} Only a handful of studies however examine patient satisfaction following NAC

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reconstruction^{5–7} with only one of these including responses from just over 100 patients.⁶ There have also been two small studies^{8,9} from a United Kingdom health-care setting but again numbers have been small with 14 and 40 patients studied. The aim of this study was to determine patient satisfaction with their NAC reconstruction and tattooing, independent of their breast mound reconstruction, in a large single series, from a single institution.

Methods

Records of all patients who underwent areolar tattooing at the Mountbatten Department of Plastic and Reconstructive Surgery, and Breast Surgical Unit at the Royal Hospital Haslar between January 2001 and June 2008 were identified from the theatre operative logbook. Following review, only patients who underwent breast reconstruction following breast cancer surgery were included. Patients identified were each sent a postal satisfaction questionnaire (Appendix 1). The questionnaire was divided into two main parts: part one relates to nipple-areolar reconstruction and part two nipple tattooing.

Questions related to the type of breast mound reconstruction and adjuvant radiotherapy. On NAC reconstruction, questions regarding satisfaction, position, projection, size of the reconstruction, and whether there were any complications, were included. Patients were also asked about the timing of areolar tattooing and the outcome. Patients were then given the option of free text comments and the overall satisfaction was assessed using a visual analogue scale between 1 and 5 (1 = poor, 2 = disappointing, 3 = satisfactory, 4 = good, 5 = excellent).

Results

Cohort identification, questionnaire distribution and completion

A total of 250 tattooed 'nipples' were identified. Twenty-four were excluded for the following reasons: nine patients were deceased, ten had incomplete records and five tattoos were unrelated to NAC reconstruction. The remaining 226 'tattooed' nipples were from 172 individual patients. All these 172 patients were each sent a satisfaction questionnaire. We received 112 replies from the 172 patients (65%). Two patients were excluded due to incomplete completion of questionnaires. A total of 110 patients (64%) were therefore included in the study. One hundred and one of these patients had undergone NAC reconstruction with areolar tattoo, and nine patients had areolar tattoos without NAC reconstruction. The median age of the population was 52 years (30–71), and the median follow up was 38.5 months (1–86).

Breast mound reconstruction

There were a total of 110 breast mound reconstructions. Fifty six patients had a latissimus dorsi flap with or without an implant, 21 had an expander implant only, six patients each had a fixed volume implant, ten had DIEP flaps, 11 had a TRAM

flap and six patients had other alternate types of reconstructions. Thirty-one patients had previously received radiation therapy to the reconstructed area (28%). Seventy-nine patients did not receive adjuvant radiotherapy.

NAC reconstruction

One hundred and one patients underwent NAC reconstruction. Thirty five patients had a modified Star-type flap, 21 had Skate-type flaps, 16 had S-flaps and full thickness skin graft, ten with nipple share technique, one with nipple salvage, one patient had a cylindrical flap, and 17 with a non-specific 'local' flap. All the NAC reconstructions were performed either under local anaesthesia or with no anaesthesia at all: eight with no anaesthesia, 124 with topical 4% tetracaine gel (Ametop), 36 with injection 2% xylocaine with adrenaline, two with injection 2% lidocaine, and two with injection 0.5% bupivacaine.

Nipple tattoo

The majority of the tattooing was done by our specialist nurse tattooist in an outpatient setting using semi sterile technique. We used a six-point tattoo needle and the pigments were from the DTS Ready-Mixed Pigment range, by the DTS Tattoo Supplies Limited. The pigments for tattoos were non sterile.

A total of 160 individual nipple tattoo episodes were identified in these 110 patients. For those who had a tattoo with NAC reconstruction, 19 patients (19%) underwent tattooing before NAC reconstruction, and 82 patients (81%) had tattoos after the NACs were reconstructed. Nine patients underwent tattooing without NAC reconstruction. Ninety nipple tattoos were primary unilateral procedures and 42 nipple tattoos were from 21 patients requiring primary bilateral tattooing. Twenty were for repeat unilateral nipple tattoos, and four were repeat bilateral nipple tattoos for two individual patients. There were four second repeat (third session) nipple tattoos.

The first repeat tattoo was performed around 16.4 months (2–41.6) from the initial tattoo. For those who required a second repeat (third) tattoo, the timing was at 14.4 months (3.9–25.6) from the second tattoo.

Complications

Eighty-nine patients (81%) reported no complication. Eight patients reported minor dressing reaction or local erythema which was not thought to represent a significant complication. Eight patients suffered minor ooze or bleeding which required no surgical intervention. One patient extruded the absorbable sutures but was very happy with the outcome of her NAC reconstruction. Four patients suffered local infection requiring systemic antibiotics. There were no reported cases of NAC necrosis or nipple loss.

Patient satisfaction

The majority of patients (88%) reported overall satisfaction with their NAC reconstruction (Figure 1). Sixty-nine patients (68%) rated the NAC reconstruction as 'good/

excellent'. Nine patients (9%) rated the NAC reconstruction as 'disappointing' whereas 3 patients (3%) felt that their NAC reconstructions were 'poor'. The techniques used for NAC reconstruction in those patients who rated the result as 'disappointing/poor' were: four with a modified Star-type flap, three had non-specific 'local' flaps, three with nipple share technique, one with a S-flap and full thickness skin graft, and one patient had a Skate-type flap.

Ninety-six patients felt that the position of their reconstructed nipple was 'about right', three felt that they were 'too low', and two patients felt that the position was 'too high' (Table 1). Eighty-seven patients felt that the dimension of their reconstructed nipple was 'about right', 11 patients 'too small' and three patients felt that the size of their NAC reconstructions was 'too large'. Regarding projection of the NAC reconstruction, 58 patients rated the height as 'about right'. Forty-two patients (42%) felt that the projection was 'too small' and one patient felt that the neo-nipple projection was 'too large'.

One hundred patients rated the dimension of their neo-areola as 'about right'. Six patients felt that the neo-areolar dimension was 'too small' and four patients felt that their neo-areola was 'too large'. Sixty-one patients rated the neo-areolar colour match as 'about right', 48 patients (44%) felt that they were 'too pale' and one patient felt that her neo-areola was 'too dark' (Table 2). Eighty-five out of the 110 patients (77%) reported fading of their areola tattoos.

The majority of patients (70%) were also satisfied with their nipple tattoos (Figure 2). Fifty-one patients (46%) rated the tattoos as 'good/excellent'. Twenty patients (18%) felt that their nipple tattoos were 'disappointing' and 13 patients (12%) rated the nipple tattoos as 'poor'. For those patients who rated their tattoos as 'disappointing/poor', six out of 33 felt that their nipple tattoos were 'too pale' and all 33 of them reported fading of the tattoos.

31 of our patients (28%) received adjuvant radiotherapy. Of these, 10/31 reported dissatisfaction with the final outcome of the NAC reconstruction/tattooing. 6/31 reported complication following surgery.

When asked about the significance of NAC reconstruction and tattooing, 106 patients (96%) replied that both NAC reconstruction and tattooing were important to them. One hundred and three patients (93%) also said that with hindsight, they would undergo the procedures again.

Discussion

Without a NAC, breast mound reconstruction may not appear visually complete. NAC reconstruction is usually the final step in reconstructive breast surgery and is of

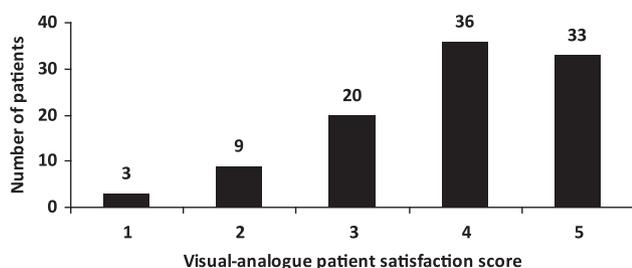


Figure 1 Overall satisfaction with NAC reconstruction.

Table 1 Patient satisfaction with NAC reconstruction

Position of NAC	Dimension of neo-nipple	Projection of NAC
96 'about right'	87 'about right'	58 'about right'
3 'too low'	11 'too small'	42 'too small'
2 'too high'	3 'too large'	1 'too large'

psychological and aesthetical significance to the patients. Whilst this study is retrospective, with a relatively small sample size of 110 completed evaluable responses, this appears greater than in any of the few published series.⁵⁻⁷ This study, is therefore as far as we can tell, the largest single institution series to date. The questionnaire was constructed by consensus between plastic and breast surgeons. Whilst the questionnaire has not been formally validated, it is based on work previously published.⁵ The questions were made as simple as possible and this included using visual analogue scales. The questions were however based on our interpretation as what was a satisfactory outcome on the visual analogue scale, and may not truly reflect on how patients feel about their individual NAC reconstruction and tattoos. A free text comments section was therefore included in the questionnaire.

The median age of our study population at the time of their NAC reconstruction or tattooing was 52 years old. This was similar to the study by Jabor et al.⁵ However, our questionnaire was sent based on the record of patients who have had NAC tattooing. We therefore do not know the number of patients who were offered NAC reconstruction but declined NAC tattooing, and their levels of satisfaction. Jabor et al.⁵ however found that 90% of their patients underwent NAC reconstruction.

The median follow up duration 38.5 months (1-86) was comparable with other studies on patient satisfaction regarding NAC reconstruction.^{6,7} Only 31 of our study patients (28%) received adjuvant radiotherapy. Ten out of these 31 patients reported dissatisfaction with the final outcome of the NAC reconstruction/tattooing. Six of the 31 patients who received radiotherapy reported complication following surgery. Therefore adjuvant radiotherapy did not appear to affect the surgical outcome or satisfaction of patients in the majority of patients who received them. This again is consistent with other results.⁵

Most our surgeons favoured tattooing after NAC reconstruction. Previous work demonstrates that one stage NAC reconstruction and immediate tattoo carried no extra complication.⁷ We did not determine the interval between NAC reconstruction and tattooing in this study. Jabor et al.⁵ however found that patients who have had a longer time interval between breast mound and NAC reconstruction reported an overall poorer level of satisfaction. In our unit, the tattooing is usually performed between three to six months following NAC

Table 2 Patient satisfaction with nipple-areolar tattooing

Dimension of neo-areola	Colour of neo-areola
100 'about right'	61 'about right'
6 'too small'	48 'too pale'
4 'too big'	1 'too dark'

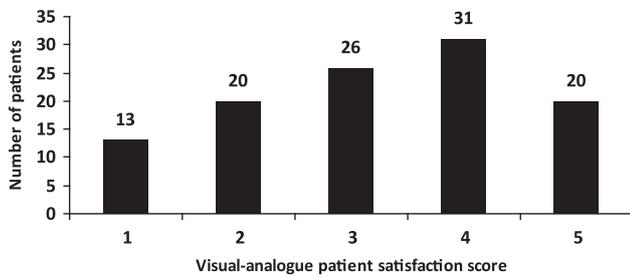


Figure 2 Overall satisfaction with nipple tattooing.

reconstruction. Batty and Berry found that the mean interval between NAC reconstruction and areolar tattooing in their study to be three months.¹⁰ All our patients tolerated topical or local anaesthesia very well. In some cases no anaesthetic was used, as most breast mounds were insensate. All the operations were done in a day case setting.

The NAC reconstructions were performed by one of the five plastic surgeons according to their preferred technique in each individual patient. This was depicted by the wide range of techniques used. Patient satisfaction in our study was not influenced by the type of flap used. Most of the complications were expected superficial skin reaction from tattooing. We did not come across any loss of NAC reconstruction as a result of necrosis or infection. We do not routinely use prophylactic antibiotics.

Eighty-five out of the 110 patients (77%) reported fading of their areola tattoos. Spear and Arias have reported that 60% of their tattoos became lighter than normal.⁶ Of the 132 originally tattooed areola, 24 required a second tattoo (18%). Four out of these 24 re-tattooed areola required another repeat (third) tattoo (17%). Published studies have reported reapplication of tattoo rate of 10%.^{6,7} In our experience patients required re-tattooing at median time 16.4 months (2–41.6) from first tattoo. For those who required a third tattoo, the timing was 14.4 months (3.9–25.6) from the second tattoo.

In summary, we have shown that patients regard the NAC reconstruction and tattooing as an important and integral step in their treatment journey. Patients are overall satisfied with the procedures and their outcome. We have also shown that these procedures can be performed under local anaesthesia or with no anaesthesia at all, in a day case setting, and with minimal complications. The information we contributed should also inform surgeons and patients regarding the likelihood of fading and timing of re-tattooing.

Conflict of interest

None.

Ethics statement

The United Kingdom National Research Ethics Service indicated that this work constituted service evaluation and so did not require a formal research ethics committee application.

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Appendix Supplementary data

Supplementary data associated with this article can be found in the online version, at [doi:10.1016/j.bjps.2010.05.010](https://doi.org/10.1016/j.bjps.2010.05.010).

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