

Indications for medical tattooing in breast-reconstructed patients

Abstract

Background: Scars, skin pigmentation mismatch, contour deformities are often negatively affecting good reconstructive outcomes in reconstructed patients. In cases when surgery is reaching its limits, it is important to provide another treatment option like using medical tattooing. This may help to improve the postoperative outcome and patient's satisfaction. We analyzed the beneficial effects of medical tattooing, an advanced form of cosmetic tattooing, in reconstructed patients.

Methods: We analyzed the outcome of surgical NAC (nipple-areola complex) reconstructions in comparison with tattooed NACs in breast-reconstructed patients (after skin-sparing mastectomy and implant reconstruction). 20 patients underwent post-reconstruction medical tattooing by a tattoo-artist to improve colour mismatch and contour deformities using colors like carbon black, titanium dioxide, glycerine, isopropyl alcohol. All colors were applied using an electric tattoo machine; 20 patients underwent nipple-reconstruction using different type of local flaps and skin-grafting (groin-skin). GAIS?

Results: Compared to reconstructive NAC procedures, medical tattooing showed more improved aesthetic outcome. Patient satisfaction was significantly higher in the post-tattooed patients. Further, no adverse events were noticed in the medical tattoo group. In the reconstructed group the aesthetic outcome was not as perfect because of colour mismatch and contour-irregularities. 1 loss of implant following skin penetration and infection after flap-elevation for nipple reconstruction was noted.

Conclusion: A cross-over combination of reconstructive surgery and medical tattooing is a promising and much safer approach to provide high patient satisfaction in reconstructive surgery.

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Introduction

Skin grafting and different kinds of local flaps represent the standard technique for NAC reconstruction. We find this technique to be the ideal choice for patients that were reconstructed with autologous tissue, using the contralateral areola-skin performing an areola-sharing technique. Colour match and circumferential areola border can be achieved extremely similar to the contralateral side. After skin-sparing mastectomy, the remaining skin often is too thin to perform local flaps or even skin grafting. The risk of penetrating the skin and a following extrusion of the mamma-prosthesis is high. In these cases medical tattooing can offer a variety of benefits for example as an enhancement of contour symmetry and to restore colour mismatch (3) We aimed to analyze the beneficial effects of medical tattooing at our breast-cancer unit.¹

Methods

We analyzed patient satisfaction and scar quality of 20 patients who underwent medical tattooing after subcutaneous mastectomy and implant reconstruction in comparison to 20 patients after a surgical NAC reconstruction. All patients underwent uni- or bilateral subcutaneous mastectomy. Indications for NAC tattooing were critical-reduced postoperative skin thickness and patient's desire. All tattoos were performed by a tattoo-artist (Figure 1) who is skilled in 3D tattoos to receive a 3D effect of the nipple. Colors like carbon black, titanium dioxide, glycerine, and isopropyl alcohol were applied using an electric tattoo machine. The primary outcome was patient satisfaction, which was assessed, if the patients would undergo the

medical tattooing procedure again or not. Scar quality and quality of the contour and colour match were rated by reconstructive surgeons.²

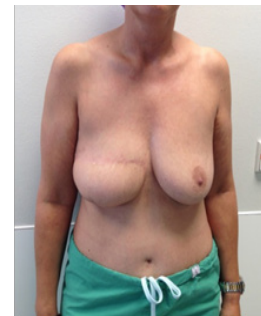


Figure 1 All tattoos were performed by a tattoo-artist who is skilled

Results

All tattooed patients showed overall improvement of the appearance of the reconstructed breast (Figure 2). Patient satisfaction was 100% as all patients would undergo the medical tattooing procedure again. Hence, all patients scheduled a second medical tattooing appointment to fine tune the colour and add more pigment to any areas that may have healed unevenly. No adverse events of medical tattooing were noticed. The aesthetic outcome of the reconstructed NAC group was lower compared to the tattoo group. By tattooing NACs can look more similar to original NACs in terms of fading the colour at the edges and simulating a more natural look than a skin graft. Tattooing the nipple in a 3D way provides the visual illusion of real nipple (Figure 3).

In the reconstructed NAC group one implant had to be removed and afterwards replaced by a free flap. Trying to elevate the flaps for nipple reconstruction (Figure 4), a skin perforation happened, followed by infection and skin retraction (Figure 5), which made it impossible to close the skin over another implant. Therefore a free flap had to be performed in order to replace the implant.³

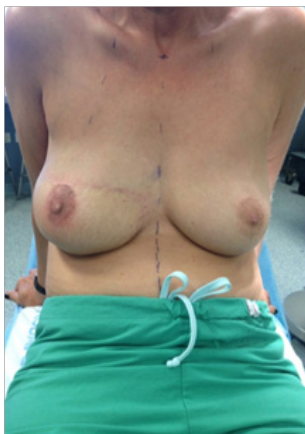


Figure 2 All tattooed patients showed overall improvement of the appearance of the reconstructed breast.



Figure 3 Tattooing the nipple in a 3D way provides the visual illusion of real nipple.

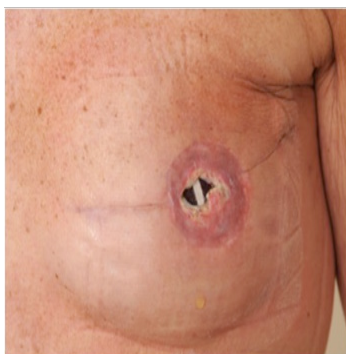


Figure 4 Trying to elevate the flaps for nipple reconstruction.



Figure 5 Skin perforations happened, followed by infection and skin retraction.

Discussion

Our case series showed that a combination of reconstructive surgery and medical tattooing is a promising collaboration to improve aesthetic outcome and patient satisfaction in reconstructive surgery. Colour temperature must be taken into consideration when choosing the right colour-mixture. The medical tattooing process, performed under aseptic/sterile conditions inserts pigment into the dermis, which requires the use of an electric tattoo machine, which inserts ink using disposable single- or a group of needles, which are soldered on a bar-attached on an oscillating unit. The needles are driven in and out of the skin 80 to 150 times per second. Needle speed and frequencies is crucial when performing medical tattooing treatments to suit the different structure and tolerance of the skin. Furthermore, needle selection is a critical consideration for any treatment. Smaller needles can penetrate the skin better if there is obvious scar tissue.⁴

Different inks are composed of different ingredients, like inorganic materials (titanium dioxide, iron oxide, carbon black, azo dyes, acridine, quinolone, phthalocyanine, naphthol), and organic materials- dyes made from ash and other mixtures. Modern tattooing inks are carbon-based pigments. The pigments used in the field of medical tattooing must be produced under extremely tight guidelines to ensure they are of the highest industry standard and quality.⁵

Through the intradermal injection, pigment is dispersed throughout a homogenized layer through the epidermis and upper dermis. The immune system activates phagocytes as a reaction on foreign material. The pigment stays stable over the several years, with a potential migration into the deeper dermis after decades. The procedure has an immediate effect. It has to be taken in account that the colour becomes lighter after a few weeks and that tattoos may fade out with time.² Therefore revision could be done using the same technique. Generally, a review is not needed for another 12-18 months following a cover-up.⁶

Conclusion

Traditional coloring techniques for nipple-areola tattooing ignore the artistic principles of light and shadow to create depth on a two-dimensional surface.⁵ Medical tattooing can serve to improve the appearance and symmetry, which in turn helps diminish the visual

effects and promotes an improved feeling of self-esteem. Medical tattooing of the NAC has proven to be a safe and predictable technique with maximizes patient's satisfaction and improves the postoperative outcome especially in patients after subcutaneous mastectomy and implant reconstruction. The application of three-dimensional techniques or "realism" in tattoo artistry has significant potential to improve the aesthetic outcomes of reconstructive surgery.

Acknowledgements

None.

Conflict of interest

Authors declare that there is no conflict of interest.

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