



# Nipple reconstruction in Asian females using banked cartilage graft and modified top hat flap

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## KEYWORDS

Nipple reconstruction;  
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**Summary** Nipple reconstruction is usually the final stage of breast reconstruction and there are over 50 articles that describe different techniques. The majority of methods use local soft tissue as local flaps but they face the disadvantage of reduction in nipple projection after the initial two months. This is particularly troublesome in Asian females who may have wider nipples with prominent projection but small areola surface area. We developed a method to correct this problem using cartilage graft harvested during the initial breast reconstruction operation and banked beneath the skin flap. Using the modified 'top hat' flap, we found that no excess soft tissue is required to compensate for the reduction. We have used this method in 25 cases of nipple reconstruction and have obtained satisfactory result in projection.

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One of the features of nipple reconstruction in Asian females is the inherent large and projecting nipple with relatively small areola. In general, tattooing the areola area covers the scar produced from elevating the local flap for nipple reconstruction. With a small areola surface area, flaps that produce an excessive long scar are therefore less favourable. Nipple projection has always been a problematic area and over the years, there have been no less than 50 articles describing different techniques for nipple reconstruction by different authors.<sup>1-3</sup> These procedures have usually relied on dermal fatty tissue for projection, with the skate flap and its modified versions<sup>4</sup> being the most commonly used. The alternatives are tissues grafted from the opposite nipple (nipple sharing

technique) or imported from distant regions such as ear lobe or hallux pulp.<sup>5</sup>

With most of these soft tissue flap reconstruction, the major problem is the lost of nipple height after the initial reconstruction. Nearly all the reduction in nipple height is noted within the first 2 months after the initial operation and reductions in height around 59%<sup>6</sup> or more<sup>7</sup> have been reported. No further significant reduction was noted after the initial 2 months.<sup>6</sup> Using composite tissue and synthetic material may prevent the reduction in height noted with soft tissue reconstruction but they are not without their disadvantages. The overall graft take of composite tissue transfer is not reliable and synthetic material has a higher risk of infection.

We feel that in order to maintain projection, soft tissue alone is insufficient and underlying support is required. Since we used internal mammary artery and vein as the recipient vessels for our autologous

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tissue breast reconstruction, the costal cartilage that is usually removed and discarded can be used to resolve the projection problem.

## Method

In our hospital, most breast reconstruction using autologous tissue is performed using the internal mammary artery and vein as recipient vessels. During the initial dissection, the third costal cartilage is removed to expose the underlying vessels. A segment of 1 cm in length of costal cartilage inclusive of perichondrium is stored in saline and prior to the end of the operation, the costal cartilage was banked between the flap and the mammary pocket and the position noted in the operation record. There had been no distortion of the breast or complaint of discomfort from any patient over the time.

At the 3 months follow-up, nipple reconstruction operation can be planned providing no major surgical operation to either breast is scheduled. The position of the new nipple is sited with the patient standing up and matching the position of the opposite nipple.

During the operation, the cartilage is first retrieved from the pocket through a small incision through the inset scar of the flap. Afterwards, the flap designed in the previously marked nipple position can then be incised (Fig. 1) with the two 'wings' raised on the dermal level and the central core area raised with subcutaneous fat. The width of the 'wings' determined the height of the nipple and the central circular region determining the circumference of the nipple which equals the

length of the two 'wings'. We do not think extra tissues needs to be harvested as the cartilage prevents excess soft tissue contraction that happens with pure cutaneous local flap reconstruction. The two edges of the 'wings' are incised obliquely to prevent a vertical scar contraction pulling the nipple downward. After trimming the cartilage to approximately 1 cm in length and 0.6 cm in diameter, it could then be placed underneath the central core as a strut and anchored with 3-0 PDS. The two 'wings' are used to wrap around the central portion and closed with 5-0 Ethilon. Dressing is kept to a minimum and an antibiotic ointment is applied.

In the 25 cases we have performed, none of the patients complained about hardness of the nipple as soft tissue coverage was sufficient. The height of nipple projection was maintained at above 1 cm in all cases which is appropriate to the initial design. We have not yet experienced excessive decrease in all our nipple projection at the follow-up clinic ranging from 3 months to 1 year (Figs. 2 and 3).

## Discussion

With all 25 cases, there were no complications post-operatively including infections and skin necrosis. We suspect that using autologous cartilage that has been embedded in the local tissue previously would probably have a lower risk of infection in comparison to prosthetic material or composite graft tissue.

Few et al. indicated that majority of the loss in nipple height happened in the first 2 months following surgery and is usually stable thereafter.<sup>6</sup> All our cases have been followed up from 3 months to a year and we have found no excessive loss in nipple height. There may be a concern with cartilage resorption but this does not seem to be the case when comparing the harvested cartilage graft was banked and when it was removed from the bed for nipple reconstruction. We feel that the



**Fig. 1** Pre-operative marking of nipple flap. The length of the two wings 'X' equalled the circumference (2πR) of the circular top. The circular marker at 11 o'clock showed the position of the banked costal cartilage.



**Fig. 2** Banked cartilage after retrieval.



**Fig. 3** Three months post-operative result after tattooing with nipple maintaining good projection.

important step is maintaining the perichondrium which would provide better revascularisation in comparison to cartilage that is devoid of perichondrium.

The method in raising the local flap for nipple reconstruction is similar to the 'modified star flap'<sup>5</sup> but is probably more of a modification of the 'top hat flap' that was recently described.<sup>8</sup> Because we do not think there will be any reduction in height, our flap design can match the height and width of the opposite nipple. We feel the underlying cartilage is the key issue in providing the strut to sustain the projection.

Nipple reconstruction in breast reconstruction is the final stage and it is important to produce a reconstructed nipple comparable to the opposite

nipple in both size and projection. In our hospital, we think one of the many reasons behind the lack of projection is due to the inherent lack of framework as the projection of the nipple relies on skin dermis and underlying subcutaneous tissue. We think using cartilage which would have been discarded provides a good underlying infrastructure support and in return, minimises the reduction in projection.

## References

1. Hartrampf CR, Culbertson JH. A dermal-fat flap for nipple reconstruction. *Plast Reconstr Surg* 1984;**73**:982–6.
2. Kroll SS. Nipple reconstruction with the double-opposing tab flap. *Plast Reconstr Surg* 1999;**104**:511–4.
3. Chang WH. Nipple reconstruction with a T flap. *Plast Reconstr Surg* 1984;**73**:140–3.
4. Staggers W, Vasconez L, Fix R, Terkonda S. Nipple reconstruction with the skate flap and modifications. In: Strauch B, Vasconez L, Hall-Findlay E, editors. *Grabb's encyclopedia of flaps*, 2nd ed. Philadelphia: Lippincott-Raven; 1998. p. 1363–9.
5. Eskenazi L. A one-stage nipple reconstruction with the 'modified star' flap and immediate Tattoo: a review of 100 cases. *Plast Reconstr Surg* 1993;**92**:671–7.
6. Few JW, Marcus JR, Casas LA, Aitken ME, Redding J. Long-term predictable nipple projection following reconstruction. *Plast Reconstr Surg* 1999;**104**:1321–4.
7. Kroll SS, Reece GP, Miller MJ, Evans GRD, Robb GL, Baldwin BJ, et al. Comparison of nipple projection with the modified double opposing tab and star flaps. *Plast Reconstr Surg* 1997;**99**:1602–5.
8. Hamori CA, LaRossa D. The top hat flap: for one stage reconstruction of a prominent nipple (top hat flap). *Aesthetic Plast Surg* 1998;**22**:142–4.