

# Results of Nipple Reconstruction Using the Modified Double Opposing Tab Flap Technique

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## ABSTRACT

**Objective:** Nipple-areola reconstruction represents the final stage of breast reconstruction. Many nipple reconstruction techniques are available using either local flaps or free composite grafts. Maintenance of nipple projection has always been the biggest problem with the various techniques. We report our results with nipple reconstruction using the modified double-opposing tab (MDOT) flap technique as described by Kroll that we have been using for the past three years.

**Methods:** Because nipple projection tends to decrease for several months after reconstruction with any technique, only patients with a follow-up of at least three months after nipple reconstruction were included in the analysis. Over the last three years 28 patients underwent 31 nipple reconstructions using the modified double-opposing tab flap technique (one bilateral and two revisions) at King Hussein Medical Centre and King Hussein Cancer Centre. All 28 patients had previous breast reconstructions by the authors at least three months prior to the nipple reconstruction; 12 patients had had immediate reconstruction and 16 patients had delayed reconstruction. The outline of the areola was defined with a round template in an appropriate location and the modified double-opposing tab flaps were raised within this circle. The axis of the flaps varied with the location of the breast scars. Donor sites were primarily closed and all resulting scars contained within the planned areola so as to be completely camouflaged by later intradermal tattoo to be performed four months postoperatively. All but five cases that required surgery on the other breast were done under local anesthesia.

**Results:** Age range was 28-55 years (mean 39.5 yrs). The duration of the procedure varied from 30-45 minutes. Three nipples in the series suffered partial necrosis from ischemia of which two needed revisions due to loss of projection. The third nipple healed spontaneously and maintained adequate projection. All three complications occurred in the first five patients and were due to inexperience with the technique. The average reduction of projection at three months was 48.3% of the original projection. All patients were satisfied with the final projection and symmetry.

**Conclusion:** The technique is simple and permits freedom in choosing the height of the nipple, even in the presence of scars. The dissection is straightforward and the technique is rapid with few complications after a short learning curve.

**Key words:** Nipple, Breast, Reconstruction, MDOT

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## Introduction

Although reconstruction of the nipple-areola complex is an optional procedure, it significantly improves patients' satisfaction with breast

reconstruction.<sup>(1,2)</sup> Nipple-areola reconstruction represents the final stage of breast reconstruction and is usually performed with a second operative procedure, although it can be deferred to a third procedure. In our centre it is typically done at least

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**Table I.** Demographic data (n=28)

Age (Years)	Range	28-55
	Median	39.6
Site	Left : Right : Bilateral	14:13:1
Anaesthesia	Local: General	23: 5
Contra lateral Nipple Projection (Millimeters)	Range	3-15
	Mean	7.1

**Table II.** Type of previous breast reconstruction (n=28)

Type of Reconstruction	Number	%
Immediate LDMCF* only	8	28.7
Immediate LDMCF* + implant	2	7
Immediate implant only	2	7
Delayed LDMCF* only	1	3.6
Delayed LDMCF* + implant	6	21.5
Delayed Free DIEAPF <sup>†</sup>	7	25
Delayed Free SGAPF <sup>*</sup>	1	3.6
Delayed Free SIEAF <sup>‡</sup>	1	3.6

\*: Latismus Dorsi myocutaneous flap. †: Deep Inferior Epigastric Artery Perforator Flap.

‡: Superior Gluteal Artery Perforator Flap. †: Superficial Inferior Epigastric Artery Flap.

three months after reconstruction of the breast mound. Nipple reconstruction can be done with a variety of techniques, including nipple sharing, in which a part of the nipple from the opposite breast is grafted to the reconstructed breast, and the use of local flaps.<sup>(3,4)</sup> Both can be done under local anesthesia as day case procedures. The areola is now commonly reconstructed with intradermal tattooing.

Maintenance of nipple projection has always been the biggest problem with the various techniques. In this study we review our results of nipple reconstruction using our favored method, the MDOT flap.

## Methods

During the period from May 2005 and June 2008 twenty eight female patients underwent 31 nipple reconstruction procedures using the MDOT flap technique at King Hussein Medical Centre (KHMC) and King Hussein Cancer Centre (KHCC). Because nipple projection tends to decrease for several months after reconstruction with any technique, only patients with a follow-up of at least three months after nipple reconstruction were included in the analysis.

The median age was 39.5 years (range 28-55 yrs). There were 14 right sided nipples, 13 left sided nipples and one patient with bilateral nipples. All but five cases that required surgery on the other breast were done under local anaesthesia. The existing (contra lateral) nipple projection was

measured preoperatively and recorded (Average 7.1mm, Range 3-15mm) (see Table I).

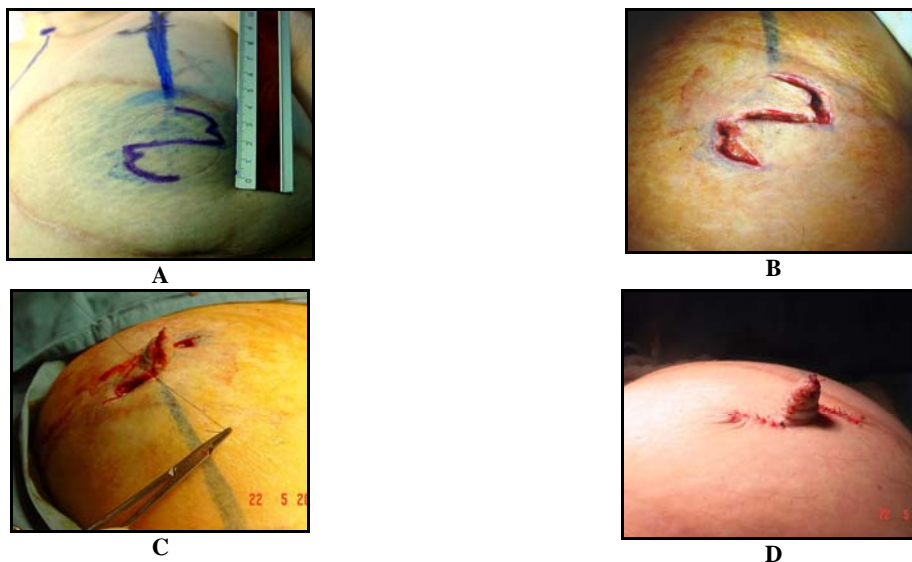
All 28 patients had previous breast reconstructions by the authors at least three months prior to the nipple reconstruction. Eight patients (28.7%) had immediate Latismus Dorsi myocutaneous flap (LDMCF) only, two patients (7%) had Immediate Latismus Dorsi myocutaneous flap with implant, two patients (7%) had immediate implant only reconstruction, one patient (3.6%) had delayed LDMCF only, six patients (21.5%) had delayed LDMCF with implant, and nine patients (32.2%) had late reconstruction using free tissue transfer (see Table II).

## Surgical technique

The MDOT flap technique was carried as originally described by Stephen Kroll in 1989 and its later modification in 1999.<sup>(5-8)</sup> The outline of the areola was defined with a round template in an appropriate location and the MDOT flaps were raised within this circle (Fig.1). The axis of the flaps varied with the location of the breast scars. The width of the flaps ranged from 18-22 mm and the thickness about 8mm to maximize blood supply. The lengths of the flaps at the short limb varied from 20-30mm depending on projection of contra lateral nipple. Donor sites were primarily closed and all resulting scars contained within the planned areola so as to be completely camouflaged by later intradermal tattoo to be performed four months postoperatively (Fig.2).

**Table III.** Results of the reconstructed nipple projection.

Projection created at surgery ( <i>Millimeters</i> )	Range	5-22
	Mean	11.5
Projection at surgery ( <i>Percentage of contra lateral nipple</i> )	Range	135%-250%
	Mean	179%
Projection of new nipple at three months ( <i>Millimeters</i> )	Range	0-12
	Mean	6.1
Percent reduction in nipple Projection at three months	Range	26.6%-76.9%
	Mean	45%



**Fig. 1.** Surgical Technique

**A:** The outline of the areola defined using a round template.

**B:** MDOT flaps were raised within the outlined circle.

**C:** Primary closure of the donor site.

**D:** Final intra operative appearance after closure.

All patients were operated upon by the same team of plastic and reconstructive surgeons at KHMC and KHCC 3-18 months after breast reconstruction depending on extraneous factors such as oncological aspects of the disease and patient's preference. Nipple projection was measured intra-operatively and at three months post operatively, the reduction in projection was recorded. Also patient and surgeon satisfaction was recorded at three months.

## Results

The duration of the procedure varied from 30-45 minutes. The average new nipple projection at time of surgery was 11.5mm (Range: 5-22mm). Nipple projection was made to be around 180% of the contra lateral nipple (Range: 135%-250%). At three months the average nipple projection was 6.1 mm (Range: 0-12mm), this reflects a 45% average reduction in the projection (Range: 26.6%-76.9%) (see Table III).

Three nipples in the series suffered partial necrosis from ischemia of which two needed revisions due to loss of projection (Fig. 3). The third nipple healed

spontaneously and maintained adequate projection. All patients were satisfied with the final projection and symmetry. Even those who underwent revision had satisfactory projection (Fig. 4). There were no cases of nipple retraction in this series.

## Discussion

Historically many techniques have evolved for nipple reconstruction. Basically, those can be classified in three main categories:

1. Those that utilize transferring tissues from distant areas such as the contra lateral nipple or the toes.<sup>(9)</sup>
2. Techniques that use local tissue flaps such as the skate flap, star flap, C-V flap, top hat flap, double opposing pennant and tab flap and others.<sup>(4,10-14)</sup>
3. Others that combine the above mentioned techniques.<sup>(15-17)</sup>

Reconstruction of the nipple areola complex (NAC) is an integral component of any type of breast reconstruction.



**Fig. 2.** All scars contained within the planned areola



**A**



**B**

**Fig. 3.** Surgical complications

**A:** Partial nipple necrosis that resolved spontaneously.

**B:** Complete nipple necrosis that needed later revision.



**A**



**B**

**Fig. 4.** Example of good projection

**A:** Projection immediately postoperatively.

**B:** Projection at three months postoperatively



**A**



**B**

**Fig. 5.** Example of final reconstruction result before tattoo.

**A:** Pre operatively.

**B:** After full reconstruction and contra lateral breast augmentation

It marks the end point of breast reconstruction and, for many women, a final stage of their emotional struggle with their body image (Fig. 5). Nonetheless many patients used to refuse this step because they did not want any further scarring in other areas that might further distort their body image.<sup>(2)</sup> This led to the evolution of several local flap techniques for NAC reconstruction.

The MDOT flap technique for nipple reconstruction offers several advantages over the other local flap techniques; firstly the flaps in this method are thicker and wider at their base and are tapered at their tip with preservation of the sub dermal plexus there which would influence the

viability of the flaps and hence the long term projection. Furthermore the M shape created at the distal end of each flap facilitates interdigitation of the two flaps when closed; this creates a natural looking round nipple rather than a pointed tip nipple. Also in this technique one can control the direction of the flaps according to the existing scars, since the direction of the flaps should be parallel to the scar.<sup>(5-7)</sup>

Timing of NAC reconstruction is a very important issue. In all of our cases the procedure was delayed till after the completion of breast mound reconstruction and contra lateral breast surgery when needed. This aided in achieving better

symmetry since the position of the new NAC is usually a compromise between the position of the contra lateral NAC and the position of the scars on the breast mound. Others use immediate nipple reconstruction at the time of breast reconstruction, but this has its drawbacks in achieving the required symmetry.<sup>(18-20)</sup>

Progressive loss of nipple projection and nipple retraction are the two major drawbacks of most nipple reconstruction techniques. In our series we had no cases of nipple retraction and the average reduction in nipple projection was 45%. Since the projection at time of surgery was originally made almost twice the contra lateral nipple then the final symmetry was acceptable in almost all cases.

In our group of patients that were followed up for more than one year (13 patients) we have noticed that there was no dramatic drop in the projection over that occurring after three months. This will need further follow up to study the long term maintenance of nipple projection in this technique. Shestak and colleagues<sup>(21)</sup> reported good projection at three months with the Skate flap and Modified Star techniques; nonetheless there was dramatic decrease in projection at one year almost double that at three months.

In his discussion on Kroll's technique, Little<sup>(22)</sup> brought up a point that the MDOT flap technique works perfectly for small or moderate-sized nipples, however when larger nipples needed to be produced there will be undue tension when closing the donor sites which will lead to gross loss of the projection. To overcome this Little<sup>(22)</sup> suggests that one should close the donor site with minimal tension and then cover the rest with a narrow skin graft taken from along the mastectomy scar.

## Conclusion

In our series we had three cases of nipple necrosis and this is a relatively high number, those three complications occurred in the first five patients and in the last 28 nipples we had no case of nipple necrosis. We assume that this was attributed to lack of experience with the technique at the beginning.

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