Technical Note

The “Nipple-Licus”: the Everted Umbilicus for Immediate Nipple Reconstruction in Mid-Abdominal Transverse Rectus Abdominis Myocutaneous Breast Reconstruction

Cindy Siaw-Lin Goh and Bien-Keem Tan

Department of Plastic, Reconstructive and Aesthetic Surgery, Singapore General Hospital, Singapore

Abstract
In this paper, we present a technique for immediate nipple reconstruction in two patients who underwent ipsilateral mid-abdominal transverse rectus abdominis myocutaneous breast reconstruction. The umbilical stalk and surrounding skin were included in the harvested flap. The flap was transferred and inset placing the umbilicus in the ideal nipple position. The umbilicus was then everted with traction, and its height was maintained with cerclage suturing, dermal grafts, and horizontal-to-vertical skin closure. This “nipple-licus” achieves immediate nipple reconstruction without a need for a second surgery or an additional donor site.

Keywords
breast reconstruction, nipple reconstruction, TRAM flap, micro-incision, cerclage suture

Introduction
In pedicled breast reconstruction, the ipsilateral transverse rectus abdominis myocutaneous (TRAM) flap has been determined to be a reliable option for its low complication rates and short operative time\(^1\). However, in patients with multiple previous lower abdominal surgeries, or an extended transverse abdominal incision such as the Maylard incision\(^2\), extensive scarring can make flap elevation challenging with increased risk of inadvertent entry into the abdomen or damage to the deep inferior epigastric pedicle.

In this case, the mid-abdominal TRAM flap is deemed more advantageous for several reasons. Firstly, the flap is designed in a more cephalad position away from the scarred zone, thus increasing safety and speed of flap harvest. Secondly, the flap has better vascularity as it is centered around the larger periumbilical perforators and located closer to the superior epigastric pedicle. Thirdly, there is reduced risk of future abdominal wall herniation as the rectus abdominis muscle can be divided above the arcuate line. For these reasons, the mid-abdominal TRAM flap has been advocated in morbidly obese patients who are generally considered poor candidates for breast reconstruction due to increased risks of flap necrosis, future abdominal wall herniation\(^3\), and implant-related complications.

Nipple-areolar complex reconstruction is the final step in the breast reconstructive process, leading to increased sexual well-being and satisfaction with the reconstructed breasts\(^4\). Common techniques performed include nipple-sharing and local flaps, but these often suffer from drawbacks such as the need for a second surgery, scarring, loss of projection over time, and impaired sensation of the contralateral nipple\(^5\). Thus, in this paper, we describe our technique of immediate nipple reconstruction using the everted umbilicus during mid-abdominal TRAM flap reconstruction. This avoids an additional donor site or a delayed reconstructive procedure.

Surgical Technique
The flap is marked with the skin paddle centered approximately around the umbilicus (Figure 1). An ipsilateral flap is then preferentially raised because this gives a longer functional pedicle length, allowing better positioning and shaping of the flap during inset\(^6\). During flap elevation, the umbilicus is transected at its base at the level of the rectus fascia. The deep inferior epigastric vessels are preserved for vascular augmentation. The rectus abdominis muscle is di-
A 55-year-old female with left breast cancer. She had a history of open appendicectomy and two previous cesarean sections. Preoperative markings for skin-sparing mastectomy and immediate reconstruction with an ipsilateral mid-abdominal pedicled TRAM flap and umbilical eversion are shown.

The flap is then tunneled to the breast pocket in the usual fashion. Venous drainage is augmented by anastomosing the deep inferior epigastric vein to the lateral thoracic vein or the thoracodorsal vein in the axilla. An intervening vein graft is used to ensure laxity of the vascular pedicle and freedom of flap inset. The flap is tagged with 2-0 Vicryl sutures to the chest wall, placing the umbilicus in the same horizontal plane as the contralateral nipple.

To evert the umbilicus, we use a modification of our previously described technique for correction of nipple inversion. A traction suture is first placed to evert the umbilicus (Figure 2). Three 2 mm stab incisions are made using a micro-knife (15 degree Micro-knife, Reda Instrumente) 120 degrees apart from each other, at the planned location of the nipple base. Through each incision, the micro-knife is carefully used to divide the internal fibrous attachments of the umbilicus until the skin is fully released to create a nipple mound. A circular 2-0 Vicryl stitch is placed in the Scarpa’s fascial layer deep to the umbilicus to gather the adipose tissue together to provide a stable base for the neo-nipple. A 3-0 Prolene suture is then passed between each incision in turn, catching the inner wall of the umbilicus with each bite. In patients with sizable nipples or in cases where adjuvant radiotherapy is anticipated, nipple projection is augmented with thin slivers of dermis harvested from the discarded portion of the flap. These are simply inserted through the stab incisions to obliterate the dead space until sufficient nipple projection is achieved. The 3-0 Prolene cerclage suture is then tied under moderate tension to hold the umbilicus in its everted position, thus creating the neo-nipple or “nipple-licus.” The construct is further stiffened by closing each incision in a horizontal-to-vertical fashion with a single interrupted 5-0 Ethilon stitch.

Postoperatively, antibiotic ointment is applied and the neo-nipple protected with stacked doughnut-shaped foam dressings (Allevyn Non-adhesive dressing, Smith & Nephew). Stitches are removed on day 14, and splinting continued for a minimum of 6 months. Tattooing of the nipple-areolar complex is performed beyond 6 months of surgery.

Case Reports

Case 1

A 55-year-old overweight female (BMI 28) was diagnosed with left breast cancer and planned for skin-sparing mastectomy. She had a history of an open appendicectomy and two cesarean sections. Reconstruction with a mid-abdominal pedicled TRAM flap was performed to minimize dissection in the scarred zone (Figure 1). Nipple reconstruction was achieved with umbilical eversion at the same setting. She then completed adjuvant chemoradiotherapy uneventfully. Figure 3 shows her results after 2 years, following weight gain. She declined umbilicoplasty.

Case 2

A 60-year-old obese female (BMI 32) with large ptotic breasts presented with multifocal invasive ductal carcinoma of the breast, and a skin-sparing mastectomy was planned. Due to a history of three previous cesarean sections, she opted for immediate reconstruction with a pedicled mid-abdominal TRAM flap with umbilical eversion for immediate nipple reconstruction. Following adjuvant radiotherapy, some settling of the nipple occurred, but projection remained acceptable, and the patient was satisfied.

Discussion

Abdominal-based flaps utilizing the infraumbilical pannus, such as the TRAM and deep inferior epigastric perforator flaps, are known to be workhorses of breast reconstruction. However, there are occasions when the pedicled mid-abdominal TRAM flap still has its merits, particularly in patients with multiple previous lower abdominal surgeries. The cephalad design of this flap permits faster and safer dissection away from the inferior zone of scarring, thus reducing the risk of complications such as inadvertent entry into the abdomen and bowel injury. Vascularity of the flap is also improved, as the skin paddle is located closer to the superior epigastric vessels and centered around the robust periumblical perforator network. An ipsilateral flap design is preferred, as this provides a longer functional pedicle length,
Figure 2. Operative technique. (A & B) The umbilicus is first everted with a traction suture. Three stab incisions are made using a micro-knife at the nipple base, 120 degrees apart, and the internal fibrous attachments are carefully divided until sufficient eversion is achieved. Adipose tissue at the base of the nipple is gathered with a 2-0 Vicryl suture to create a stable platform. A Prolene stitch is then passed through each stab incision, catching the inner walls of the umbilicus to cerclage it in eversion. Nipple projection may be further augmented by inserting thin slivers of dermis into the umbilical base. (C) The incisions are closed in horizontal-to-vertical fashion to reinforce the everted construct.

Figure 3. Postoperative photograph of the same patient following adjuvant radiotherapy and chemotherapy. These results are at 2-year follow-up following substantial weight gain.

allowing greater flexibility in flap shaping and inset\(^*\). This also allows the flap to be designed in a way that centers the umbilicus over the breast mound.

The use of the umbilicus for nipple reconstruction has been infrequently reported in the literature. De Cholnoky described the use of the everted navel for nipple reconstruction using abdominal tubed flaps in 1966\(^*\). Remnants of the umbilical vessels and urachus were dissected to form a connective tissue support internally to prevent retraction. Additional support was provided externally by tying a nylon suture placed through the base of the neo-nipple to an external splint. El Amm et al. later reported their case series of immediate nipple reconstruction using the everted umbilicus\(^*\). Specific details of their technique of umbilical eversion were not included in their report.

There are several benefits of using the everted umbilicus for nipple reconstruction. Scarring around the breast is minimal and no additional donor sites are required. The contralateral nipple is spared from a nipple-sharing procedure,
which impairs its sensation. Commitment to a delayed nipple reconstructive procedure is also avoided. We have found that tattooed umbilical skin retains intradermal pigmentation well even after irradiation. With judicious release of the umbilical stalk attachments using a micro-knife, we have not observed any cases of skin necrosis.

Long-term nipple projection using the everted umbilicus appears fairly good compared to some other local flap techniques. This may partly be due to the thicker and more glabrous nature of periumbilical skin compared to abdominal skin\(^5\). To maximize the height and longevity of nipple projection, we apply protective splinting postoperatively for an extended period of time. Although this technique requires umbilical sacrifice, umbilicoplasty can be performed in patients who desire umbilical preservation either at the time of breast reconstruction\(^7\) or in a delayed fashion.

Contraindications to this technique include umbilical constriction, active infection or dermatitis, and scarring of the umbilicus, which occurs after laparoscopic port insertion.

In conclusion, the everted umbilicus provides an “instant” nipple reconstruction without the need for additional donor sites. The ipsilateral pedicled TRAM design provides sufficient pedicle laxity to facilitate adjustments of the umbilical position on the breast mound to match the contralateral nipple position. Depending on patient preference, the missing umbilicus can be reconstructed using local flaps.

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Ethical Approval: This study was exempted from IRB application at our institution (Singapore General Hospital), as it falls under Category 7: Reporting of Individual Patients’ Clinical Results.

Consent to Participate: The patients provided their written informed consent for their data and photos to be included in this study.

Consent for Publication: The patients provided their written informed consent for their data and photos to be used for publication.

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