

The Oxygen Therapy Tube as a Tool for Breast Squeezing during Pedicle De-epithelialization in Reduction Mammoplasty

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Summary: During breast reduction, pedicle de-epithelialization, as meticulous as possible, is necessary to ensure satisfying breast sculpting and to avoid any epidermoid cyst. To perform an effective and rapid de-epithelialization, a good tension of the skin is mandatory. Several techniques to improve skin tension of the breast are described in the literature. We report a cheap, effective, and easily reproducible method, based on the use of an oxygen tube with nasal cannula. (*Plast Reconstr Surg Glob Open* 2024; 12:e5554; doi: [10.1097/GOX.0000000000005554](https://doi.org/10.1097/GOX.0000000000005554); Published online 29 January 2024.)

INTRODUCTION

Reduction mammoplasty is among the most commonly performed procedures in plastic surgery. One of the first steps of the procedure, before breast shaping, is pedicle de-epithelialization around the nipple-areola complex, which allows a migration of the complex itself to the required distance.

A meticulous de-epithelialization aims to remove any residual epidermis, to avoid epidermal inclusion cysts. To perform a suitable pedicle de-epithelialization, some degree of tension on the breast surface is necessary. Several methods are usually used to obtain optimal squeezing.¹ Among them, the use of lap pads^{2,3} or sterile gloves tight and fixed at the breast base,⁴ the usage of cable ties,⁵ surgical drapes,⁶ or the simple use of the hands have been reported.

Starting from this point, we propose a new method that could offer stable and long-lasting tension during the pedicle de-epithelialization procedure, reducing ischemic or pressure injuries caused by a tensioning tool.

A 45-year-old female patient was referred to our clinic with severe bilateral breast hyperplasia, undergoing breast reduction.

To achieve the adequate tension of the skin during pedicle de-epithelialization, a medical-grade polyvinyl chloride (PVC) sterile oxygen therapy tube including nasal cannula was used. This tool was placed around the base of the breast, and breast squeezing was obtained, thanks to the sliding of the tube through the fork. A cocker clamp was placed at the base of the fork to avoid any sliding of the tube (Figs. 1 and 2). During the procedure, we observed a stable and durable tension, which allowed for a comfortable pedicle de-epithelialization.

DISCUSSION

The pedicle de-epithelialization procedure is a key aspect in breast reduction and mastopexy. Although effective, the various techniques described for breast squeezing during de-epithelialization show some critical aspects (Table 1).

The role of healthcare textiles in the transmission of infections is well described in the literature.⁷ It has been shown that cotton fiber absorbs moisture to a greater extent than synthetic materials, which supports the enhanced survival of microorganisms on this fiber type.⁸

Lap pads^{2,3} are generally made of cotton: this fabric, unlike plastic and synthetic materials, is extremely absorbent and retains during surgical procedures lots of secretions and contaminants.

The breast harbors significant concentrations of endogenous bacteria, and they are most concentrated near the nipple.⁹ Even under sterile operating conditions, these bacteria can result in contamination of a foreign body placed around the breast, such as lap pads. Their tissue could represent an important reservoir of bacteria and also could facilitate the translation of contaminants into the surgical site.

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Fig. 1. Intraoperative picture showing the placement of the oxygen tube, breast squeezing, and tube clamping.



Fig. 2. Detail of the tube placement at the breast base.

Another important point is that the lap pad is clearly much more bulky than the oxygen therapy tube. In fact, if it is placed at the breast base, after it is rolled up, it may result in cluttering at the level of the mammary region to be de-epithelialized. On the other hand, the tube, having a significantly smaller diameter and footprint, is far away from the region to be de-epithelialized when placed around the breast base.

A final consideration concerns the composition of the lap pads: these are made of cotton fibers that have specific mechanical properties, making it less versatile than medical-grade PVC-P.¹⁰ Gloves⁴ could break easily, particularly if a clamp is used, and also can only be used in breasts with medium and small bases. The use of cable ties,⁵ described by a Turkish research group, could expose to pressure injury and ischemic events. Sterilization is generally not allowed in hospitals. Adhesive surgical drapes⁶ may cause diffusion of adhesive material onto the de-epithelialized area. Diffusion of drape fragments may occur after custom cutting for the

Takeaways

Question: We aimed to achieve good tension of the skin to perform an effective and rapid de-epithelialization during breast reduction.

Findings: The authors propose a cheap, effective, and easily reproducible method by using an oxygen tube with nasal cannula.

Meaning: An oxygen tube has proven to be useful in the breast squeezing maneuver and represents a valid alternative to conventional methods during reduction mammoplasty.

surgical area. They confer poor breast tension with loss of stability during surgery due to insufficient adhesive capacity.

The manual tensioning during breast de-epithelialization is operator-dependent: help from an assistant is required. This approach has several disadvantages. The presence of blood results in a significant loss of hand grip from the breast surface. The assistant must constantly adapt to the movements made by the operator who performs the de-epithelialization because of the encumbrance of the hands. Finally, we have observed episodes of manual fatigue during this procedure, especially in those cases of large breasts in which large skin areas should be de-epithelialized. All these factors can contribute to determining discontinuity in the de-epithelialization, with numerous interruptions, resulting in an increase in operating time.

The oxygen tube has been shown to be a reliable, safe, and stable instrument during the pedicle de-epithelialization procedure and does not seem to have these critical features. The tube has a sliding fork that adjusts the width of its loop in the terminal part. This feature is useful to easily modulate the loop width according to the breast base. The degree of tension exerted on the breast base is clearly variable by pulling the tube through the fork.

The tube, made of PVC, is soft and deformable.¹⁰ Silicone is another type of material used in the manufacture of the oxygen therapy tube, which is even more elastic, flexible, and soft, making it potentially safer than PVC. The tube is clearly cavitated to allow oxygen to pass through it. This internal space is useful during tension increase since its collapse increases its contact surface with the breast surface. Conversely, the cable tie is more rigid and less deformable. The softness and deformability of the tube, and the variability of the bearing surface, allow reduced risk of ischemic events or pressure injury (Fig. 3).

Finally, the material of the tube (PVC) is waterproof. This feature prevents the absorption of secretions or liquids that could theoretically promote contamination.

CONCLUSIONS

We describe a new, simple, and cheap method that facilitates the pedicle de-epithelialization procedure

Table 1. Comparative Analysis of the Various Techniques Described for Breast Squeezing

	Advantages	Disadvantages
Lap pad	<ul style="list-style-type: none"> • Low-cost material • Easily available in OR • Good stability during the procedure • Low risk of vascular injury or pressure injury • No assistant needed • Time saving 	<ul style="list-style-type: none"> • Absorption of potentially contaminating secretions • Bulky tool with overlap in the area of de-epithelialization • Low elasticity of cotton • Clamp needed for blockage
Sterile glove	<ul style="list-style-type: none"> • Low-cost material • Easily available in OR • Excellent flexibility and elasticity • Low risk of vascular injury or pressure injury • No assistant needed • Time saving 	<ul style="list-style-type: none"> • Easy to break (particularly if clamped) • Usable with small/medium sized breast bases only • Clamp needed for blockage
Cable tie	<ul style="list-style-type: none"> • Low-cost material • Good stability during the procedure • Nonabsorbent • Self-blocker • No assistant needed • Time saving 	<ul style="list-style-type: none"> • Very high risk of vascular injury or pressure injury (due to its rigidity and nonelasticity) • Sterilization needed
Surgical drape	<ul style="list-style-type: none"> • Low-cost materials • Nonabsorbent • Easily available in OR • Low risk of vascular injury or pressure injury 	<ul style="list-style-type: none"> • Potential diffusion of adhesive material on the de-epithelialized area • Potential diffusion of drapes fragments after custom cut for surgical area • Poor stability during the procedure
Manual tensioning	<ul style="list-style-type: none"> • No material costs • Low risk of vascular injury or pressure injury 	<ul style="list-style-type: none"> • Assistant needed • Dependent operator (loss of grip on the breast surface, repeated changes of position, and fatigue) • Poor stability during the procedure • Loss of time
Oxygen tube therapy	<ul style="list-style-type: none"> • Low-cost material • Nonabsorbent • Easily available in OR • Good flexibility and elasticity (especially silicone tubes) • Great stability during the procedure • Low risk of vascular injury or pressure injury • No assistant needed • Time saving 	<ul style="list-style-type: none"> • Clamp needed for blockage

OR, operating room.



Fig. 3. Final step of the surgical procedure: no evidence of ischemic events or pressure injuries.

during breast reduction or mastopexy, using an oxygen tube with nasal cannula.

This easily available device has proven to be useful in the breast squeezing maneuver and represents a valid alternative to conventional methods.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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