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How to Do a US-guided Preoperative Planning to Choose the Proper Location for Mastectomy Incision (with video)

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Rezumat

Cum se face o planificare preoperatorie ghidată pentru a alege locația adecvată pentru incizia mastectomiei

Mastectomia rămâne o procedură răspândită în chirurgia oncologică, determinată de incidența mare a cancerului de sân şi de rolul crucial al intervenției chirurgicale. În ultimele două decenii, tehnicile de mastectomie au evoluat semnificativ, abordările conservatoare, cum ar fi mastectomiile care economisesc pielea şi mameloanele, câştigând o adoptare pe scară largă. Această schimbare se aliniază cu cerințele contemporane ale pacienților de îmbunătățire a rezultatelor estetice şi a calității vieții. În acelaşi timp, tehnicile de reconstrucție, în special abordarea pre-pectorală, au avansat, concentrându-se pe reducerea complicațiilor precum necroza cutanată, optimizând în acelaşi timp rezultatele cosmetice. Studiul nostru subliniază importanța cartografierii vasculare preoperatorii folosind Doppler cu ultrasunete pentru a identifica vasele de sânge cheie care alimentează pielea sânului şi mamelonul. Această tehnică permite plasarea precisă a inciziei, păstrând vasele vitale şi minimizând riscul de necroză. Rezultatele demonstrează că cartografierea preoperatorie ghidată este o metodă rentabilă care îmbunătățeşte rezultatele chirurgicale şi satisfacția pacientului în reconstrucția sânilor după mastectomie.

Cuvinte cheie: mastectomie, reconstrucție mamară, reconstrucție pre-pectorală, Doppler cu ultrasunete, cartografiere vasculară, necroză cutanată

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Abstract

Mastectomy remains a prevalent procedure in oncologic surgery, driven by the high incidence of breast cancer and the crucial role of surgical intervention. Over the last two decades, mastectomy techniques have significantly evolved, with conservative approaches such as skin-sparing and nipple-sparing mastectomies gaining widespread adoption. This shift aligns with patients' contemporary demands for improved esthetic outcomes and quality of life. Concurrently, reconstructive techniques, particularly the pre-pectoral approach, have advanced, focusing on reducing complications like cutaneous necrosis while optimizing cosmetic results. Our study emphasizes the importance of preoperative vascular mapping using Ultrasound Doppler to identify key blood vessels supplying the breast skin and nipple. This technique allows for precise incision placement, preserving vital vessels and minimizing the risk of necrosis. The results demonstrate that US-guided preoperative mapping is a cost-effective method that enhances surgical outcomes and patient satisfaction in breast reconstruction following mastectomy.

Key words: mastectomy, breast reconstruction, pre-pectoral reconstruction, ultrasound Doppler, vascular mapping, cutaneous necrosis

Introduction

Mastectomy is currently one of the most performed procedures in oncologic surgery. This prevalence is attributed to the high frequency of breast cancer and the central role of surgical treatment (1,2).

Over the past 20 years, mastectomy procedures have undergone significant evolution. Indeed, without invoking Halstead's technique from the 19th century, the concept of conservative mastectomy emerged two decades ago (2-4).

Thanks to the influential push by Paolo Veronesi and the introduction and validation of the QUART, breast surgeons have increasingly embraced conservative approaches (3,5,6). Terms such as skin-sparing, nipple-sparing, and skin-reducing are now part of everyday discourse (7,8). Mastectomy, once aimed at aggressively removing as much tissue as morally permissible, has evolved into a surgery that aligns with patients' contemporary demands for esthetic outcomes.

This evolution is typical when there is substantial improvement in the treatment of a specific pathology or condition. Quality of life (QoL) has become a pivotal factor in our daily decision-making (9-11).

In this context, reconstructive components have also seen significant evolution. The pre-pectoral technique currently dominates the stage of breast reconstruction with excellent results (12,13).

Given the assumed oncologic radicality today, the objectives are to enhance esthetic outcomes and minimize complications. Our study focuses on reducing one of the most dreaded complications, cutaneous necrosis, while simultaneously managing scarring outcomes.

Preoperative assessment using Ultrasound Doppler allows us to identify, before surgery, the vessels that literature suggests predominantly supply blood to the breast skin and nipple, particularly the anterior intercostal branch of the fifth intercostal vessel(14-16). This enables mastectomy access to be positioned at the level of the sulcus, avoiding damage to these vessels (17-19).

Preoperative Planning

Ultrasound breast mapping is commonly performed in NAC-sparing mastectomy patients which are, at the same time planned to be reconstructed with pre-pectoral implants.

The day before surgery, patients were

Figure 1. Preoperative planning (red spots: vascular perforators to preserve; black line: incisions)

assessed by a US-trained Plastic Surgeon to confirm the indication for reconstruction and to perform vascular mapping using Ultrasound Doppler. The two main supply sources are internal mammary artery perforators (IMAP), anterior intercostal (AIP) and lateral thoracic perforators (LTP). Usually, IMAP are preserved because of their medial location. Specifically, the following perforators were identified and properly marked of: (1) fifth anterior intercostal vessel; (2) fifth lateral thoracic perforator; (3) sixth lateral thoracic perforator. These usually lie in the subcutaneous plane which should be preserved during mastectomies.

If it was not possible to preserve all three, the first of these vessels took precedence over the others because of its relevance (16,19). However, a 7-10 cm incision along the inframammary fold, if well placed allows to preserve them all. Right after vascular mapping a proper 10 cm incision is marked and used as the mastectomy access. In bilateral cases incisions may be different on each side, but the scar lies on the inframammary fold, becoming in a long-term view, almost invisible (*Video* and *Fig. 1* for full explanantion).

Conclusion

US-guided preoperative mapping is a very useful and costless tool to preserve nipple-areola complex vascular supply. This simple method could decrease NAC necrosis leading to better outcomes and patient satisfaction.

Conflict of Interest

The authors declare that they have no conflicts of interest to disclose.

Statement of Human and Animal Rights, or Ethical Approval

Our institutional ethics committee (Institutional Review Board IRB - DAME, Udine, Italy) approved the study design.

Informed Consent

A written informed consent was obtained from all patients enrolled in the study.

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