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**V. Bucaria, R. Elia, M. Maruccia,  
M. Vestita, A. Boccuzzi & G. Giudice**

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# Methylene Blue: A Color Test for a Quality De-epithelialization

V. Bucaria<sup>1</sup> · R. Elia<sup>2</sup>  · M. Maruccia<sup>2</sup> · M. Vestita<sup>2</sup> · A. Boccuzzi<sup>1</sup> · G. Giudice<sup>2</sup>



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Dear Sir,

The first stage of most techniques of breast reduction and mastopexy involves the de-epithelialization of a greater or lesser breast surface. This stage is known as time-consuming and demanding for surgeons, and it needs assistance to ensure adequate tension on the skin.

Different methods and instruments have been described in the literature to reduce the time of the de-epithelialization procedure. In addition to standard techniques involving the use of a scalpel or scissors [1], Barr et al. [2] advocated the use of an electrocautery device instead of a scalpel for the same procedure. Also the VersaJet hydro-surgery system has been proposed for quicker de-epithelialization [3].

Nevertheless, a review of the literature yields only a few articles discussing the depth required to properly de-epithelialize and does not highlight the risk of the procedure, namely the formation of epidermal inclusion cysts. An epidermal inclusion cyst is a benign cutaneous or subcutaneous lesion that is lined with mature stratified squamous

epithelium. It may be associated with breast surgery if epithelial elements are retained within the infolded dermoglandular structures or at any other skin closure. The development of this complication requires reoperation for resolution and may lead to a false-positive finding on a mammogram [4].

We recommend an extremely simple method to verify the quality of the de-epithelialization procedure through a “color test” with methylene blue dye.

We begin with the standard “hand and knife” technique with scissors or scalpel. Right after this quick step, we instill a few cubic centimeters of methylene blue, just enough to color all the de-epithelialized breast surface. The immediate flush with physiological solution highlights all the areas with intact epidermis as not colored. A precise and complete de-epithelialization can now be performed (Figs. 1, 2).

Methylene blue or 3,7-bis(dimethylamino) phenoza-thionium chloride tetramethyl thionin chloride is a phenothiazine derivative. It has been used in biologic stains, hair dyes, photodynamic treatment of herpes, treatment of methemoglobinemia, and lymphatic mapping, and it has been shown to be relatively safe with few adverse reactions being reported from its use. Unstaining of the epidermis during the “color test” is not surprising because methylene blue is an alcohol-soluble compound and it is not absorbed through the skin. On the contrary, dermal tissue immediately turns a blue color [5].

We believe that the “color test” with methylene blue dye could be an easy method to ensure accuracy during the de-epithelialization step of breast surgery and whenever a de-epithelialization procedure is required—harvest of dermal flap or graft. The simple and inexpensive application of the dye adds a little time to the overall procedure, but it enables a quality surgery.

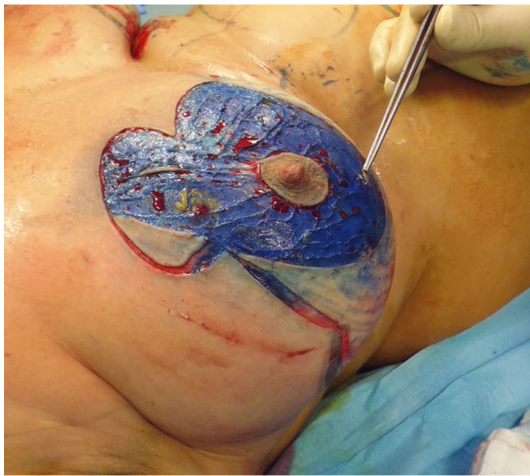
✉ R. Elia  
rossellaelia4@gmail.com; rossella.elia@hotmail.it

<sup>1</sup> Division of Plastic and Reconstructive Surgery, Mater Dei Hospital, 10 v. Samuel F Hahnemann, 70125 Bari, Italy

<sup>2</sup> Division of Plastic and Reconstructive Surgery, Department of Emergency and Organ Transplantation, University of Bari, 11, Piazza Giulio Cesare, 70124 Bari, Italy



**Fig. 1** Application of methylene blue



**Fig. 2** Evidence of the unstained epidermal areas, after the dye is washed out with saline solution

### Compliance with Ethical Standards

**Conflict of interest** All authors hereby declare not to have any potential conflict of interest and not to have received funding for this work. Each author participated sufficiently in the work to take public responsibility for the content and agree to its publication.

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