Vacuum Assisted Flap Delay, a Novel Strategy to Increase the Flap Survival: An Experimental Study in Rabbits

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Disclosure/Financial Support: Supported by Ataturk University Scientific Research Projects, with the project number 2012/040 (to Dr. Osman E. Aydin and Dr. Said Algan). None of the authors has a financial interest in any of the products, devices, or drugs mentioned in this manuscript.

INTRODUCTION: Flaps are the work horse in daily plastic surgery practice. To overcome the major complication of flap necrosis in risky groups, delay procedures have been defined. The golden standard method of delay is surgical delay. On the other hand, it has a major drawback; the two sessions of operations. Efforts have been made to omit one session and increase the patient safety and decrease the cost of the treatment.[1] Topical negative pressure has been used for assisting the wound closure. However, the mechanisms of action of the negative pressure are not still clearly elucidated. The topical negative pressure has been shown to induce neovascularization and increase vascular density.[2] With this respect, writers aimed to use topical negative pressure to prospective flap area prior to flap elevation and compare the survival and perfusion results, with the golden standard technique “Surgical Delay”.

MATERIALS AND METHOD: Thirty rabbits were equally divided in 3 groups; control group, surgical delay group (SD) and vacuum assisted flap delay group (VAFD). In a cranially based, 25x5 cm random flap model on the lateral thoracic region the study was conducted. In the VAFD group, a topical negative pressure system with an 80 mmHg pressure was applied prior to flap elevation, where the flap was planned to be elevated, for seven days. Surgical delay was conducted in the same flap model seven days before eventual flap elevation in the SD group. The flap area, necrosis area, necrosis ratio, histomorphometric vascular density, immunohistochemical evaluation of neovascularization (CD31/CD34), Laser Doppler images and computerized tomography contrast uptake were used to compare the groups.

RESULTS: In all the parameters, the VAFD group was equivalent to the SD group. Both were superior to the control group.

CONCLUSION: The main disadvantage of surgical delay is that it is a surgical procedure. Morykwas and Argenta showed that, TNP successfully increased the flap survival rates even after the elevation.[3] However, their results did not imply the use of the TNP systems as a delay procedure. Results of this study suggest that topically applied negative pressure induces vacuum assisted flap delay. This VAFD phenomenon is superior to surgical delay as it is cheap, practical and less morbid. Further studies are needed to elucidate its clinical significance.

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