

External Bleeding after Fingertip Replantation: Combination of a De-epithelialization Technique and Subcutaneous Heparin Injection

Kota Hayashi, MD; Yasunori Hattori, MD, PhD; Vijayendrasingh Gour, MS, MCh Plastic Surgery; Sotetsu Sakamoto, MD; Jun Sasaki, MD; Kazuteru Doi, MD, PhD

Fingertip replantation in Tamai zones 1 and 2 presents technical difficulties, especially due to small diameter of the veins, making venous anastomosis challenging. As a result, many reports highlight artery-only replantation. However, artery-only replantation can require postoperative venous drainage for congestion, posing risks of infection and the need for transfusion. We generally perform venous anastomosis during surgery to avoid these risks.^{1,2} However, there are times when a suitable vein for anastomosis cannot be found, or drainage from the anastomosed vein is not effective, necessitating postoperative venous drainage. Various methods, including medical leech application, fish-mouth incision, delayed venous anastomosis, and veno-cutaneous fistula, have been reported for postoperative congestion and venous drainage. We have performed fish-mouth incisions in the fingertip for external bleeding, but small incisions often result in impedance to persistent bleeding.

Recently, we have used the de-epithelialization technique with subcutaneous heparin injection. [See Video 1 (online), which displays the combination of a de-epithelialization technique and subcutaneous heparin injection.] [See Video 2 (online), which displays the case presentation.]

The de-epithelialization technique involves removing the epidermal layer on the fingertip steadily with a knife, maintaining bleeding from the vascular network in the dermal layer (Fig. 1). Additionally, by injecting sodium heparin (1000 IU/mL) subcutaneously into the fingertip, persistent bleeding can be achieved (Fig. 2). Typically, the injected volume does not exceed 0.5 mL at a time.³ As noted by Iglesias and Butrón,⁴ direct infiltration of high-dose heparin (1000 U/mL) yields local concentrations as high as 33,000–40,000 U per kg within the congested segment, with a significantly prolonged half-life of 24–48 hours. Injection frequency and volume vary, but in our experience, injections are typically



Fig. 1. De-epithelialization technique.

required every 6–12 hours. The time required for reestablishment of venous drainage likely varies with age and injury type, but our experience suggests that if external bleeding can be maintained beyond two-and-a-half days postsurgery, bleeding frequency can be reduced thereafter. In such cases, survival rates are high. Conversely, failed cases often see cessation of bleeding within two days postsurgery. Windows created through the de-epithelialization technique achieve clean epithelialization within 1–2 weeks, exclusively as a result of being maintained in a wet dressing.

Although many cases with small fish-mouth incisions witness persistent bleeding stop, repeatedly promoting bleeding through mechanical scrubbing poses the risk of

From the Department of Orthopaedic Surgery, Ogori Daiichi General Hospital, Yamaguchi, Japan.

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Fig. 2. Subcutaneous heparin injection.

deepening the wound and damaging the fingertip's soft tissue. There are also reports of prompting bleeding from the nail bed, which we do not favor. The primary advantage of the de-epithelialization technique is its ability to efficiently maintain bleeding without damaging soft tissue deeper than the dermal layer.

Previous reports sporadically mention the use of calcium heparin for local injections.⁵ We have found sodium heparin to be effective, but given that calcium heparin is more concentrated and thus requires smaller volumes, it

might be better suited for postreplantation in fingertips. In facilities without medical leeches, like ours, the de-epithelialization technique with subcutaneous heparin injection is effective.

Regarding systemic heparin therapy, in our practice, we have routinely ordered 5000 to 10,000 IU per day of heparin and 120 µg per day of prostaglandin E1 for seven days postoperatively. However, recently we have discerned these to be unnecessary in cases where venous anastomosis is possible during surgery but beneficial for artery-only replantation to promote external bleeding.

In conclusion, this method should be reserved for instances where a suitable vein for anastomosis cannot be found or when drainage from the anastomosed vein is ineffective.

Kota Hayashi, MD

Ogori Daiichi General Hospital

Yamaguchi, Japan

E-mail: the_kotable2@yahoo.co.jp

DISCLOSURE

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