Sir:

Venous insufficiency after digital replantation can lead to catastrophic ischemia and progressive tissue necrosis. In situations where surgical correction is either infeasible or fails, medicinal leeches (Hirudo medicinalis) can be used to facilitate egress and maintain physiologic requirements until microvenous circulation regenerates (i.e., 4 to 10 days). The focal improvements in flap perfusion observed with leeching are attributed to both direct (i.e., active feeding) and indirect (i.e., passive bleeding) mechanisms that exploit the anticoagulant, vasoactive and enzymatic properties of leech saliva. Despite reportedly high rates of replant/flap salvage (70% to 80%), the efficacy and reliability of medicinal leeches decline with increasing venous impairment.

Numerous “chemical” and “mechanical” alternatives have been described to promote blood loss and prevent clot formation within severely congested tissues. Basic strategies common to all successful protocols include controlled surgical wounding, chemical anticoagulation, mechanical agitation, and suction. Quantitative studies comparing the efficacy of mechanical versus traditional leech therapy demonstrate greater improvements in both spatial and volumetric measures of perfusion, blood retrieval, and flap survival with the former. Nevertheless, widespread adoption of more effective mechanical prototypes has been limited by the need for experimental and/or highly specialized equipment. Extrapolating from previous concepts, we describe a simple and effective technique for augmenting venous outflow and sustaining tissue viability in the setting of refractory venous compromise.

In cases of persistent or progressive congestion—despite optimal leech therapy—alternate mechanical avenues are pursued (Fig. 1). An 8-mm full-thickness ellipse is incised over the volar pad/middle phalanx to provoke drainage from more distal (zone 1)/proximal (zone 2) replants, respectively. Undermining between the dermal and hypodermal layers (10-mm diameter) in these areas provides access to larger cutaneous vessels. To further optimize bleeding, 5 intradermal injections (0.2 mL) of concentrated heparin (1,000 U/mL) are infiltrated into the replant and redosed every 24 to 48 hours by examination. Negative pressure wall suction (−120 mm Hg)—utilizing standard surgical tubing—is applied directly to the wound for 10 minutes each hour to facilitate removal of stagnated blood (approximately 5 to 10 mL). Endpoints for suction include a global improvement in replant color and bright-red capillary bleeding (Fig. 2). The site is reassessed hourly and swabbed with dilute heparinized saline (100 U/mL) to remove surface clots. This protocol is repeated/titrated until vascular stability is achieved and/or medicinal leech therapy can be resumed.

The technique described, herein, provides an applicable, cost-effective adjunct for digital replant salvage that utilizes readily available materials. Limited subdermal undermining through a small elliptical window increases the area of decongestion without the need for larger cutaneous defects. As noted by Iglesias and Butrón, direct infiltration of high-dose heparin (1,000 U/mL) produces local concentrations as high as 33,000 to 40,000 U/kg within the congested segment. At these levels, the half-life...
of heparin is significantly prolonged (i.e., 24 to 48 h)—permitting ongoing passive blood loss exclusively from the replant—without the systemic risks associated with therapeutic (100 U/kg) heparinization. This effect is further amplified through mechanical agitation with heparinized pledgets and/or interval use of moderate-pressure wall suction to minimize clot formation and expedite decompression, as indicated. Given the potential for significant/unpredictable blood loss, however, this method should be reserved for salvage of congested replants, unamenable to treatment with medicinal leeches.

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