

ICG-Based Fluorescence Imaging to Guide Local Tissue Rearrangement in Complex Soft-Tissue Wounds Around the Hip: A Technical Trick

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Purpose: Complex soft-tissue defects, dead space, and degloving injuries about the hip are rare but challenging cases. Exposed bone and /or hardware often requires complex coverage. Plastic surgery collaboration is beneficial, but not always readily available. The utilization of tissue perfusion assessment by indocyanine green (ICG)-based dynamic fluorescence imaging continues to evolve in orthopaedics. We present a technical trick to assist with local tissue rearrangement around the hip by utilizing this technology.

Methods: Following thorough staged debridements, large-volume complex sterile wounds about the hip were evaluated with intraoperative laser angiography using the SPY Elite system (Stryker). Intravascular ICG was injected and allowed to circulate for 60 seconds. Dynamic perfusion imaging of the proposed adjacent soft-tissue flap was then assessed to identify dominant perforating vessels. Keystone perforator island flaps (KPIFs) were designed with a flap-to-defect ratio of 1.5 to 1 by incorporating dominant perforating vessels identified on imaging. Flaps were mobilized by previously described principles. De-epithelization of the leading flap edge was used to decrease dead space over exposed hardware or bone if necessary. Closure was accomplished over multiple deep suction drains with monofilament inverted suture for the deep dermal layer and nylon sutures or staples for the epidermis. ICG-based fluorescence imaging was used again after closure to assess perfusion of flap edges.

Results: All complex hip wounds healed without dehiscence, infection, or need for secondary intervention.

Conclusion: Intraoperative ICG-based fluorescence perfusion assessment can help guide local tissue rearrangement by KPIFs to provide durable coverage of complex soft-tissue defects around the hip. With experience and discretion, this technique can be applied by the orthopaedic trauma surgeon who may not have robust plastic surgical services readily available.

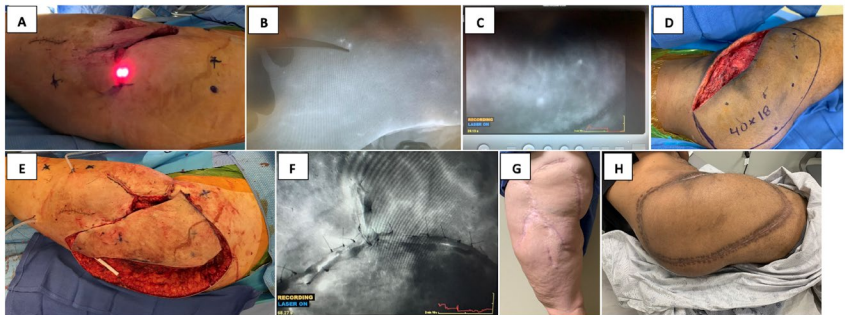


Figure 1. (A) The Spy Elite laser angiography machine is draped, buffered, and focused on the anatomic site of desired perfusion assessment. (B,C) Following intravascular injection of ICG, the operating room lights are turned down and perfusion is assessed. Dominant perforating vessels are then identified (D) Intra-operative photo demonstrating marked cutaneous perforators based on dynamic fluorescence imaging (marked in blue ink) (E) Intra-operative photographs demonstrating KPIF locoregional flap mobilizations in separate patients. (F) Perfusion is re-assessed following epidermal closure with ICG-based fluorescence imaging demonstrating perfused flap edges. (G,H) Final clinical follow-up photographs demonstrating healed flaps.

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.