Real-Time Assessment of Vascularized Osseous Flap Bipartite Perfusion Pattern Via Intraoperative Fluorescence Angiography

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Abstract Text:

Background: Large composite tissue defects exhibiting segmental bone losses often require vascularized osseous constructs/flaps for definitive reconstruction. However, failed osseous flaps due to poor perfusion can lead to significant complications and morbidity. Our group will outline the application of indocyanine green (ICG) fluorescence angiography within the operative setting to identify and objectively evaluate the bipartite perfusion pattern of vascularized osseous flaps to reduce perfusion-related complications.

Methods: A retrospective review was completed on osseous and osteocutaneous bone flaps where intraoperative ICG angiography was used to assess their perfusion patterns. The types of flaps, their success/failure rates, and perfusion-related complications were compiled and assessed.

Results: Over a 38-month period, 16 osseous free flaps evaluated with intraoperative ICG angiography to assess their corresponding bipartite perfusion patterns. Osseous flaps evaluated included 9 osteocutaneous fibulas, 1 osteocutaneous fibula revision, 2 osseous-only fibulas, 2 scapular/parascapular with scapula bone, and 2 quadricep-based muscle flaps containing a vascularized

femoral bone component. All flap reconstructions were successful, with the only perfusion-related complications being 1) a case of delayed partial skin flap loss, and 2) a successfully avoided near miss. The near miss consisted of a vascular pedicle compression secondary to mandibular hardware placement that was easily identified via this tool and replaced to ensure adequate perfusion to the osseous flap.

Conclusions: Intraoperative fluorescence angiography is useful in angiosome mapping, aiding in flap design, assessing soft tissue flap perfusion, and evaluating vascular pedicle or perforator flow. Our group has successfully extended the application of this intraoperative tool to critically assess vascularized osseous constructs/flaps for confirmation of bipartite endosteal and periosteal blood flow in an effort to reduce adverse outcomes related to preventable perfusion-related complications.