Abstract

Objective:
- Identification of vascular pedicle and its tributaries in the design of supraclavicular artery island flap can be difficult with conventional vascular mapping techniques.
- We introduce the application of indocyanine green angiography (ICG-A) to aid in the design and harvest of supraclavicular artery island flap (SCAIF).

Methods:
- Case report of a SCAIF performed with ICG-A for head and neck reconstruction.

Results:
- An 81 year old man with recurrent high grade squamous cell carcinoma of the left auricle status post radiation and surgical resection underwent a SCAIF to reconstruct his left auricle and neck defect.
- Intraoperatively, ICG-A SPY angiography was used to map the pedicle and its perforators prior to raising the SCAIF. SPY angiography was used to confirm full flap perfusion after inset.
- The flap remained viable with no evidence of ischemia or loss throughout the post-operative period.

Discussion:
- Few studies have assessed the use of ICG-A in pedicled flaps and none have assessed its use in the SCAIF.
- The SCAIF is praised for its versatility, good aesthetic results, and shorter operating time compared to free flaps.
- The use of ICG-A aids the surgeon in intra-operative planning by delineating the course of this often tenuous vascular pedicle in addition to confirming flap perfusion after inset.
- The use of ICG-A in the SCAIF can likely lead to improved flap survival and more efficient flap design.

Introduction

The supraclavicular artery island flap (SCAIF) was developed in 1949 by Kazanjian & Converse. Due to its unpredictable flap survival, the flap did not become popular until 1997 with Pallua. The SCAIF is now used in multiple clinical applications including head and neck oncologic defects, burn contractures, and full facial reconstruction.

This study incorporates the use of indocyanine green (ICG), a fluorescent marked used in angiography, with the SCAIF. ICG binds proteins in the serum and has a half life of 3-4 mins, then is excreted through bile. Thus, multiple injections and angiography studies can be done in one procedure.

The applications of ICG include sentinel lymph node biopsy, assessment of free flaps, evaluation of lymphedema, and in traumatic injuries.

Indocyanine green angiography has never before been applied to the SCAIF.

Clinical Case

An 81 year old man with twice recurrent high grade squamous cell carcinoma of the left auricle status post radiation and surgical resection presented for reconstruction of his left auricle and neck.

The supraclavicular artery island flap with ICG-A angiography was chosen to repair the defect.

Intraoperatively, ICG-A SPY angiography was used to map the pedicle and its perforators prior to raising the SCAIF.

A 7x20 cm myocutaneous flap designed around the supraclavicular artery was raised. (figure 2)

The flap was rotated into the defect and inset.

Subsequently, SPY angiography was used to confirm full flap perfusion. (figure 4 shows perfusion of dye to distal end of flap)

The donor site was repaired by shoulder advancement flaps.

Postoperatively, the patient did well and the flap has continued to appear healthy and viable.

Discussion

The recent rise in popularity of the SCAIF can be attributed to its versatility, good aesthetic results of both donor and recipient site, shorter operating time, and relative ease of technique compared to free flaps.

The flap has been used previously in irradiated patients with success, lending itself well to the complex head and neck patient.

We selected our patient who was previously irradiated and operated on for SPY angiography to better map the pedicle, improve flap planning, and ensure full viability intraoperatively.

ICG SPY angiography has been used popularly with plastic surgeons for breast reconstruction to help prevent flap necrosis due to under perfusion. This same ideology contributed to the author’s decision to pursue the integration of ICG angiography with the supraclavicular flap.

The senior surgeon noted that the ICG-A gave an additional degree of confidence when planning the flap boundaries and confirming flap viability intraoperatively.

With the flap’s history of unpredictability, indocyanine green angiography may be the tool necessary to improve the supraclavicular artery island flap’s reliability.

References

1. V.H. Kazanjian and J. Converse, The Surgical Treatment of Facial Injuries. Williams & Wilkins, Baltimore, Md, USA, 1949