Disclosures

• None
SPY angiography

- Also called fluorescent angiography
- A fluorescent dye Indocyanine Green (ICG) is injected intravenously: 5 mL of 2.5 mg/mL followed by a 10-mL normal saline flush
- A low level light source excites ICG and its fluorescence is captured in real-time and displayed on a monitor
Indocyanine Green

- Safe clinical record
- Tightly binds a plasma protein in the blood staying within the vasculature
- Excreted hepatically
  - not contraindicated in renal failure patients
- 3-5 min half life
- Only contraindication is iodide allergy
History

First used in the 1970’s during retinal angiography

SPY fluorescence technology developed in 1999

SPY introduced to US market for cardiac surgery applications in 2005

SPY used to assess skin perfusion in plastic surgery in 2007

SPY FDA cleared for organ transplant and GI procedures

SPY developed and introduced into wound care procedures in 2013
Information gained

- See the microcirculation: what the eyes can’t see
- Are there any areas devoid of perfusion
- Impact of revascularization on perfusion
- Did revascularization target the intended angiosome
- When is maximal “peak” perfusion post revascularization in order to plan ideal podiatric procedure timing
- Is a flap viable
- Is closure on too much tension
Literature

Early quantitative evaluation of indocyanine green angiography in patients with critical limb ischemia

Jonathan D. Braun, MD, Magdiel Trinidad-Hernandez, MD, Diana Perry, BS, David G. Armstrong, PhD, DPM, MD, and Joseph L. Mills Sr, MD, Tucson, Ariz

- Fluorescent angiography in 24 patients from 2011-2012 with CLI (26 limbs) after revascularization (13 patients pre and post intervention)
- Ingress, ingress rate, curve integral, egress, egress rate, end intensity
- All variables increased significantly after revascularization
Literature

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- Standardize protocol

Table 1. Indocyanine green angiography (ICGA) protocol

- Clear the patient of contraindications.
- Position the camera head perpendicular to the area of interest, adjusting bed height if necessary.
- Reconstitute 12.5 mg indocyanine green in 5 mL normal saline.
- Remove any dressings and extinguish overhead lights.
- Push 5 mL intravenously and immediately flush with normal saline.
- Start the buffering once the indocyanine green is administered and start capture when a blush appears on the screen. Capture the full sequence of 136 seconds without moving the camera or area of interest. Afterward, capture sequences of any other tissue that is relevant.
- Return the patient and machines to the original position.
Clinical Applications

- Pre and post vascular intervention
- Amputation level
- Wound healing
- Flap viability
- Perfusion at incision closure sites
Pre and Post Vascular Intervention

- 72yo male with PAD and ulcer between left toes 4/5 and base of 5
Pre and Post Vascular Intervention

- Angiogram with left external iliac stent
- Compare pre and post intervention images
Pre and Post Vascular Intervention

- Compare immediately to 1 day post intervention
- Post intervention day 2 5th toe amputation
- Subsequently healed and ambulating
Amputation level

- 65yo diabetic male with PAD with ulceration of 1st and 5th toe
- On visual inspection middle 3 toes viable
- Vascular ultrasound: non compressible arteries with flatline 1st toe waveforms
- Toe amputation versus TMA versus BKA
Amputation level

- Fluorescence angiography demonstrated poor perfusion to all digits except medial half of 1st toe even after vascular intervention.
Amputation level

- TMA performed
- Healed at 2 month follow up
- Ambulating without difficulty
Wound healing

- 81yo male with chronic venous insufficiency with recurrent right malleolar venous ulcer and cellulitis
- Venous and perforator ablation
- Weekly unna boots
Wound healing

- Post Debridement
- Serial SPY angiography
- Dermal substitute application
- 4 weeks then 12 weeks post application
- Eventually heals in 16 weeks
Flap viability

- TMA posterior flaps
- BKA posterior flaps
- Similar application as with plastic surgery
Perfusion at incision closure sites

- 85yo male with PAD and gangrenous non salvagable foot
- Intraoperative SPY angiography after below knee amputation
Perfusion at incision closure sites

- Suggestion of poor perfusion from closure
- Half of sutures removed with improvement in perfusion
Conclusions

• Assess perfusion in relation to surrounding structures
• Assess perfusion over time and after interventions
• Aid in decisions regarding limb preservation and/or amputation
• Assessing wound healing