The Reconstruction of Complex Tissue Defects: The Role of Near-Infrared Spectroscopy

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SAWC Fall

BACKGROUND

- The goal of wound healing is to reconstruct a tissue defect for the highest level of function with the lowest level of recurrence in the shortest time period.
- However, reconstruction requires a unique approach for each wound.
- Critical components of healings include adequate oxygenation, debridement, selection of basic wound care dressings, usage of advanced wound care therapies when required, and clinical judgement.
- Near-infrared spectroscopy (NIRS) may provide utility to clinicians as a point-of-care imaging technology that offers critical information on tissue oxygenation and inflammation.

OBJECTIVE

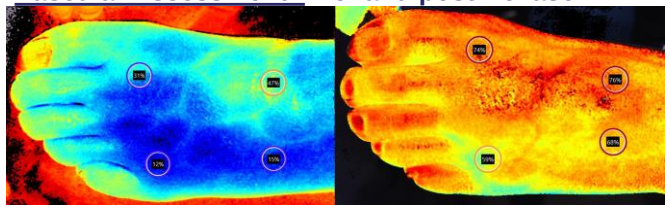
To evaluate the clinical utility of NIRS in common areas of wound healing. Specifically, use NIRS for:

1. ***Initial assessment of tissue oxygenation for wound healing***
2. ***Define wound healing end points***
3. ***Use as a vascular assessment tool***
4. ***Deciding when a wound bed is ready for a skin graft or flap***
5. ***Determining level of amputation***

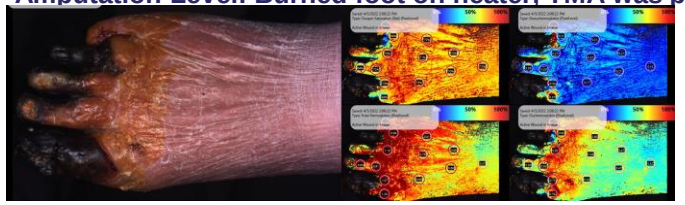
REPRESENTATIVE CASES

Wound Healing End Points: O2 becomes normalized

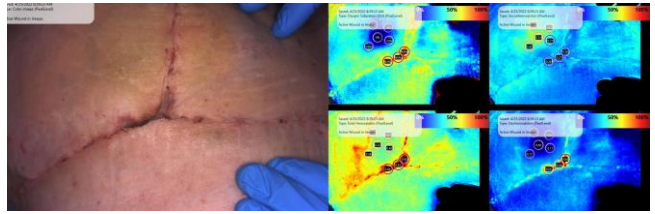
Vascular Assessment: Pre- and post- revasc



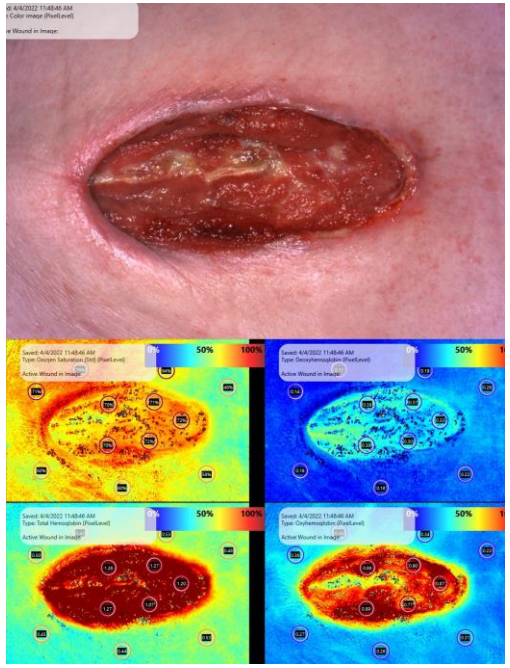
Amputation Level: Burned foot on heater, TMA was performed



Suture Lines & Flaps: Suture line broke down upon next visit



Graft or Flap Decision Making:
Hypertrophic and ready for flap



RESULTS & DISCUSSION

- A total of 200 patient evaluations were performed and reviewed over an 8-month period.
- All patients received a standard examination with basic wound assessment.
- In all cases, one or more NIRS assessments were performed to gain additional insight during treatment
- The information obtained from NIRS provided useful information in each of the objective areas.
- It was also observed that NIRS may show increased inflammation at pressure points by a localized hyperemia that is reflected in a heighted tissue oxygen saturation.
- Additionally, NIRS showed promise in assessing suture lines and flaps in the operating room and in the post-op clinic to identify at risk areas requiring advanced therapies (e.g., negative pressure wound therapy, topical oxygen).

CONCLUSION

NIRS is a beneficial point-of-care tool that quantifies tissue oxygenation and is a surrogate marker for inflammation. Using NIRS in routine wound care, it can provide critical information in patient care pathway for the reconstruction of complex tissue defects.