



Burn Depth Diagnosis Using Laser Assisted Indocyanine Green Fluorescence Angiography

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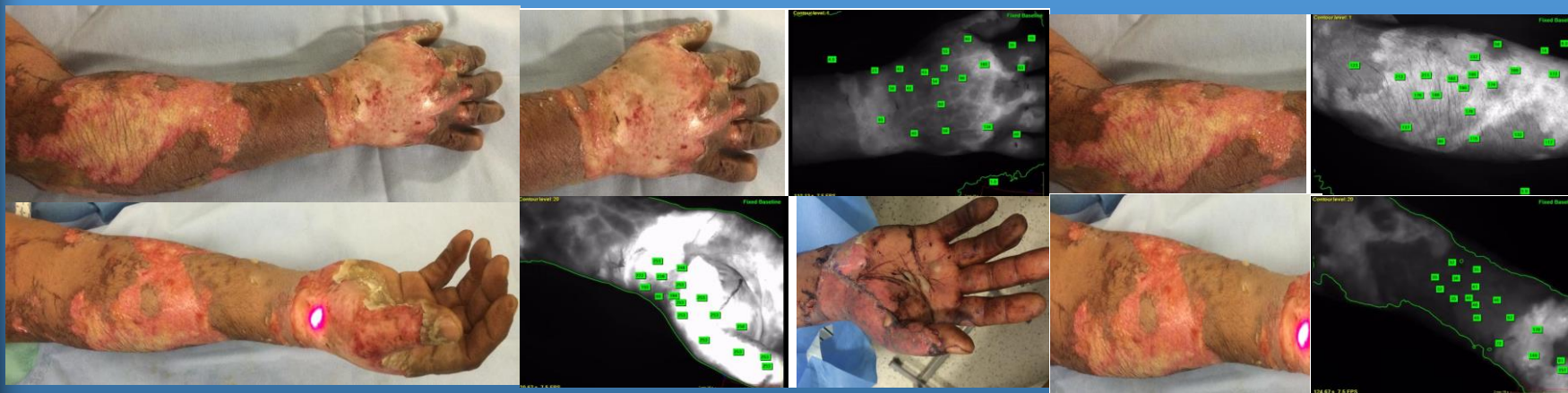


BACKGROUND: The current standard of care in determining the need to excise and graft a burn remains a subjective measure made by the burn surgeon, whose clinical judgment is often variable. For an experienced burns practitioner it is relatively easy to differentiate between the extreme ends of the spectrum of burns – superficial vs full thickness burns. Defining the ‘indeterminate’ category of burns which may or may not heal has occupied burns specialists for decades [1]. Early recognition of burns which will not heal is critical in allowing for earlier definitive surgical care, ultimately reducing hospital length of admission, and improving the functional outcomes of surgical management.

Methods: Indocyanine green is a non-toxic, protein-bound dye that is retained within the vasculature after intravenous injection for several minutes until rapid clearance by the liver. As a diagnostic pharmaceutical, ICG has been in clinical use for decades in the determination of cardiac output. ICG absorbs and fluoresces within the near-infrared spectrum, making deeper dermal vasculature visible using this dye [2]. Fluorescence can then be detected, quantified, and digitally translated into color-coded regions of relative perfusion for ease of interpretation using the SPY system [3].

The goal of our investigation is to utilise this technology to assess its accuracy of predicting burn depth compared to the gold standard of an experienced burns clinician and initial community assessment.

Case Report: A 54-year-old male was admitted with 7% TBSA burn to the left arm and hand following a work-related flame injury. He underwent assessments for 5 days, after which time it was determined that while certain areas of the burn were likely to heal, the majority of the burn required skin graft, and the study was concluded. The representative images with the ICG Perfusion analysis are below:



The images identify trends which will require further assessment with a larger trial:

- 1) Perfusion scores which correlate clinically with superficial dermal and deep dermal burns are lower than normal tissue
- 2) Areas of full thickness burns have lower perfusion scores with areas of increased perfusion in their peripheries correlating to areas of hyperaemia

Goal of this study is to assess the potential of fluorescent angiography at differentiating burn depth and compare its sensitivity to clinical assessment. A large scale trial has been commenced.