Assessing burn depth by indocyanine green: a systematic review and algorithm for clinical use

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INTRODUCTION

Only in 60-75% of cases, experienced burn surgeons can correctly diagnose the patient's degree of burn. There are several strategies to define the burn's degree, from clinical observation (most frequent) to biopsy and subsequent histological analysis. Among the various tools available, indocyanine green angiography is also gaining ground in burns. The objective of this study is to demonstrate the utility of using indocyanine green in the evaluation of burns.

MATERIAL AND METHODS

A systematic literature review was performed in Pubmed in February 2023 using the terms [ICG OR indocyanin green] AND [burn]. The selection of articles was performed according to PRISMA guidelines. The inclusion criteria were: human and animal studies, studies that exclusively considered indocyanine green as a method of analysis in the depth of burns.

RESULTS

The PubMed search initially yielded 177 results. Of these 177 articles, 167 did not meet the inclusion criteria. Among the 10 articles selected, 3 concerned studies in animal models and 7 in human models.

DISCUSSION

Qualitative analysis

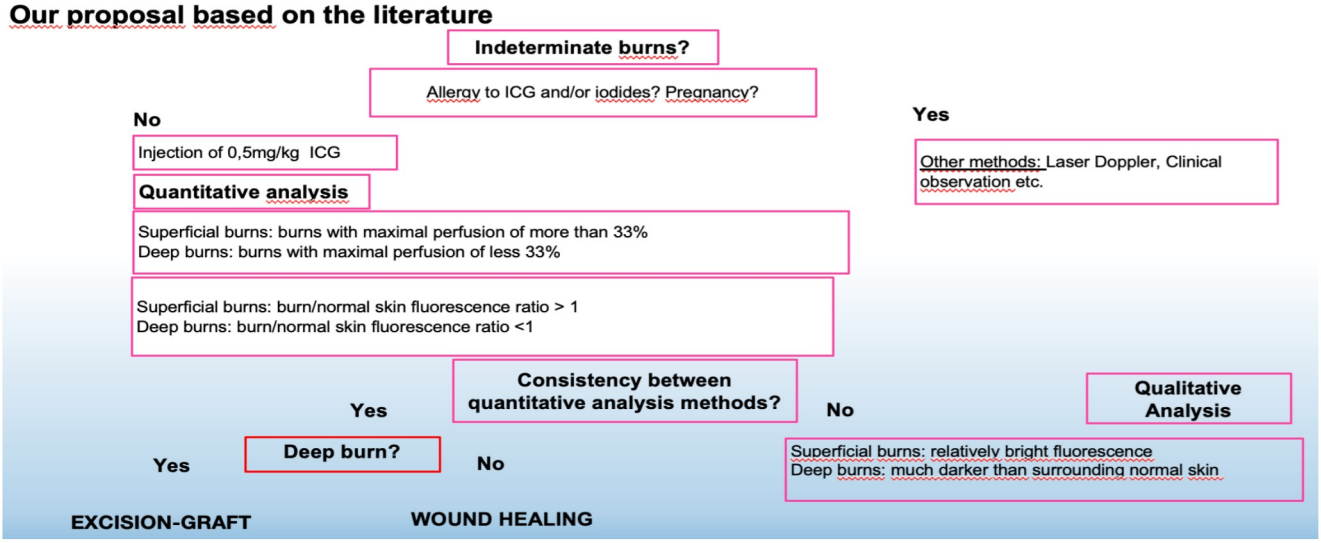
Superficial burns: relatively bright fluorescence
Deep burns: much darker than surrounding normal skin

Quantitative analysis:

1)
Superficial burns: burn/normal skin fluorescence ratio > 1
Deep burns: burn/normal skin fluorescence ratio < 1

2)
Superficial burns: burns with maximal perfusion of more than 33%
Deep burns: burns with maximal perfusion of less 33%

Our proposal based on the literature



CONCLUSION

- It is essential to determine burn wound depth and predict healing time accurately as early as possible
- Clinical observation is not always reliable
- Other methods should be used to define early the burn depth as ICG
- ICG permit to evaluate reliably the burn depth