

Understanding Healing Complications in Implant-Based Breast Reconstruction Using Novel Metrics for Indocyanine Green Angiography

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Background

- The use of indocyanine green angiography (ICG) for intraoperative evaluation of tissue perfusion during implant-based breast reconstruction (IBR) has become more common
- Wound healing complications such as mastectomy skin-flap necrosis can lead to increased morbidity for the patient
- Objective cut-offs to guide intraoperative clinical decision-making are lacking

Purpose

This study aims to apply a novel objective assessment of fill-rate dynamics in ICG to predict wound healing complications in implant-based breast reconstruction.

Methods

- Inclusion: women undergoing IBR with intraoperative ICG (PDE Neo-II)
- ICG videos were retrospectively reviewed and regions of transient ischemic deficits were identified
- Image J was utilized to measure fill-rate dynamics
 - Relative Surface Area of ischemic region
 - Relative Fluorescence of ischemic region

Results

Demographics & Clinical Characteristics

- 112 patients (201 breasts)
- 55.7% direct-to-implant reconstruction
- 44.3% two-stage reconstruction with expanders

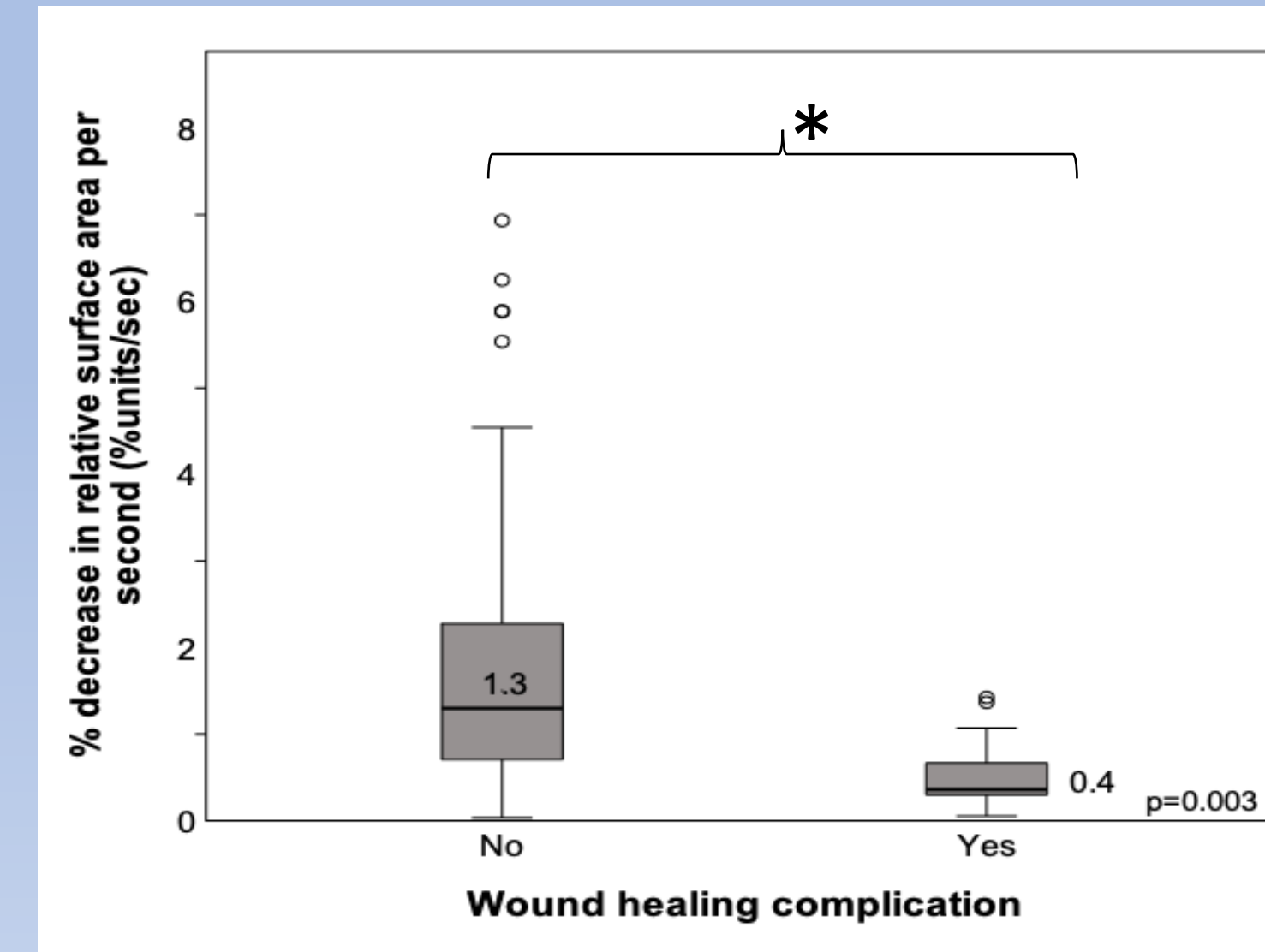
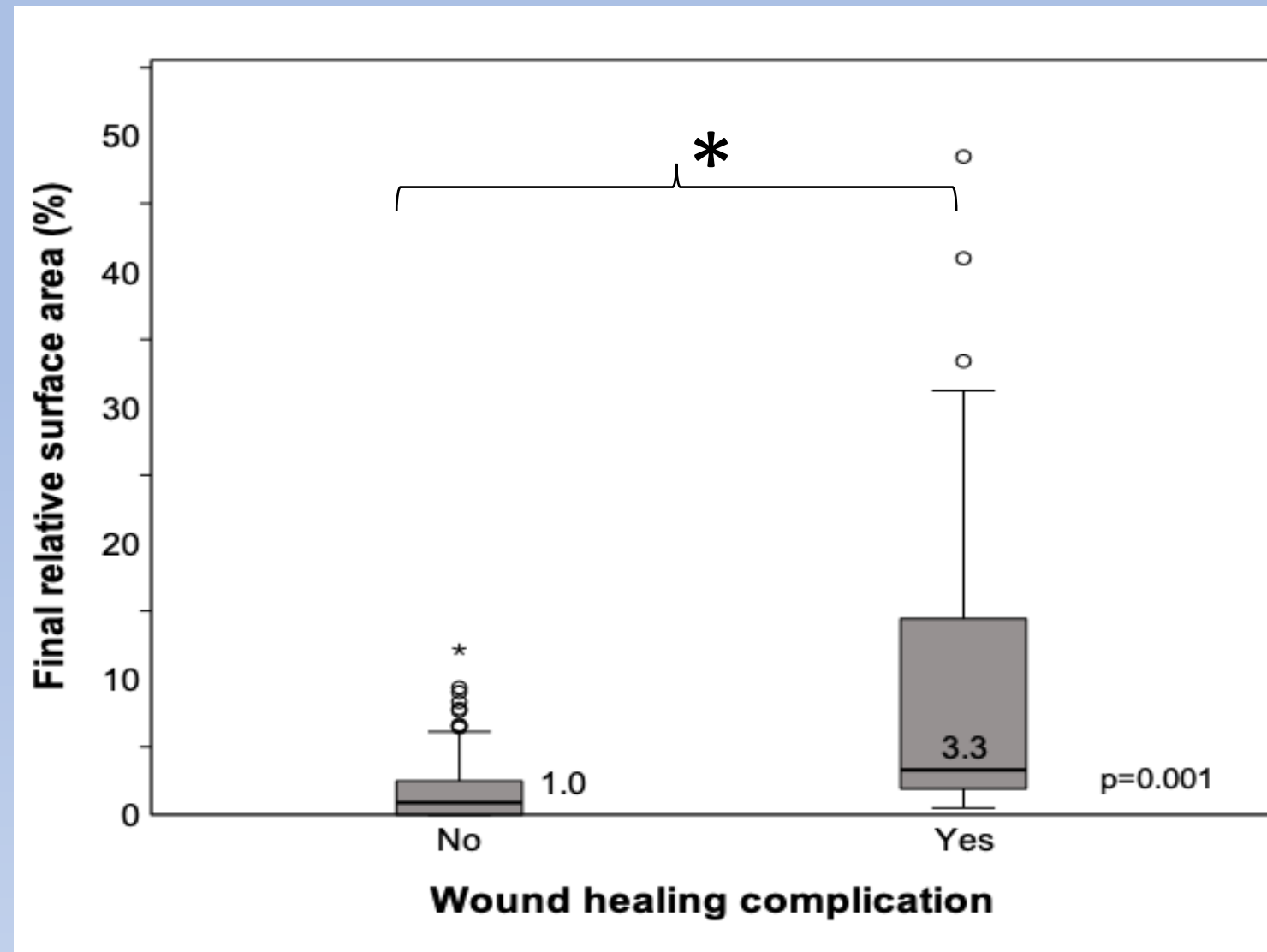
Figure 1. Image of intraoperative ICG angiogram with outlined region of focal ischemic deficit.



Table 1. Incidence of wound healing outcomes

	Number (%)
Total number (by breast)	201
Wound healing- related complications	26 (12.9%)
Wound healing complication leading to re-operation	12 (6.0%)
Intra-operative Change in Plan	
DTI to TE	12 (6.0%)
Reduced implant/TE volume	24 (11.9%)

Figure 2. Distribution of relative ischemic surface area (a) and rate of change in surface area (b) in patients with and without wound healing complications



Results cont.

Table 2. Multivariable logistic regression for wound healing complications based on final relative surface area, relative fluorescence, and duration of ischemic areas.

Factor	Adjusted OR	95% CI	P
Final relative surface area	1.27	1.05- 1.52	0.01*
Final relative intensity	0.97	0.94- 1.01	0.17
% decrease in rate of relative surface area	0.13	0.03- 0.50	0.003*
Duration of apparent transient ischemia (seconds)	1.02	1.00- 1.03	0.01*

Conclusion

- ICG angiography is a valuable tool that can aid in assessing the viability of mastectomy skin flaps
- When objectively evaluating ICG videos, surface area and duration of ischemic regions may predict wound healing complications
- Prospective studies with standardized protocols are needed to further elucidate the clinical application of these metrics

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