# The role of tumescence in split thickness skin grafting

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## Interim results of a comparison of the use of tumescence during split thickness skin graft (STSG) harvest do not demonstrate a clinically significant difference in STSG healing.

## Introduction

Split-thickness skin grafts (STSG) are often used to close free flap donor sites, particularly the radial forearm and fibula free flap donor site. **Poor skin graft take or failure can result in exposed muscle or tendon at the donor site.** While many of these wound-healing complications can be treated with simple dressings, this can create added stress, another site of potential infection, and delayed healing and return to function**.**[1–3]

**Tumescence** of the skin graft harvest site → deep dermal infiltration of normal saline with epinephrine to the thigh prior to skin graft harvest.
- previously demonstrated to minimize intraoperative blood loss[4–6]
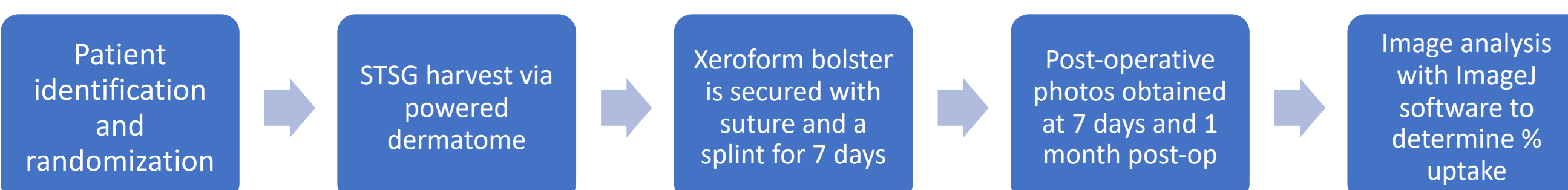- routinely utilized in burn surgery where extensive skin grafting is often required

The effect of tumescence on skin graft quality and take has not previously been evaluated.

**Hypothesis:** tumescence prior to skin graft may yield a lower graft failure rate thereby decreasing post-operative extremity immobility, risk of infection and wound care requirements.[2]

## Methods

**Tumescence** procedure: 100-150mL normal saline mixed with 1:500,000 epinephrine is infiltrated into the deep dermal thigh tissue with 18-gauge spinal needle

**Randomization** to either control (no tumescence) versus experimental (tumescence) group prior to surgery

Patient identification and randomization → STSG harvest via powered dermatome → Xeroform bolster is secured with suture and a splint for 7 days → Post-operative photos obtained at 7 days and 1 month post-op → Image analysis with ImageJ software to determine % uptake
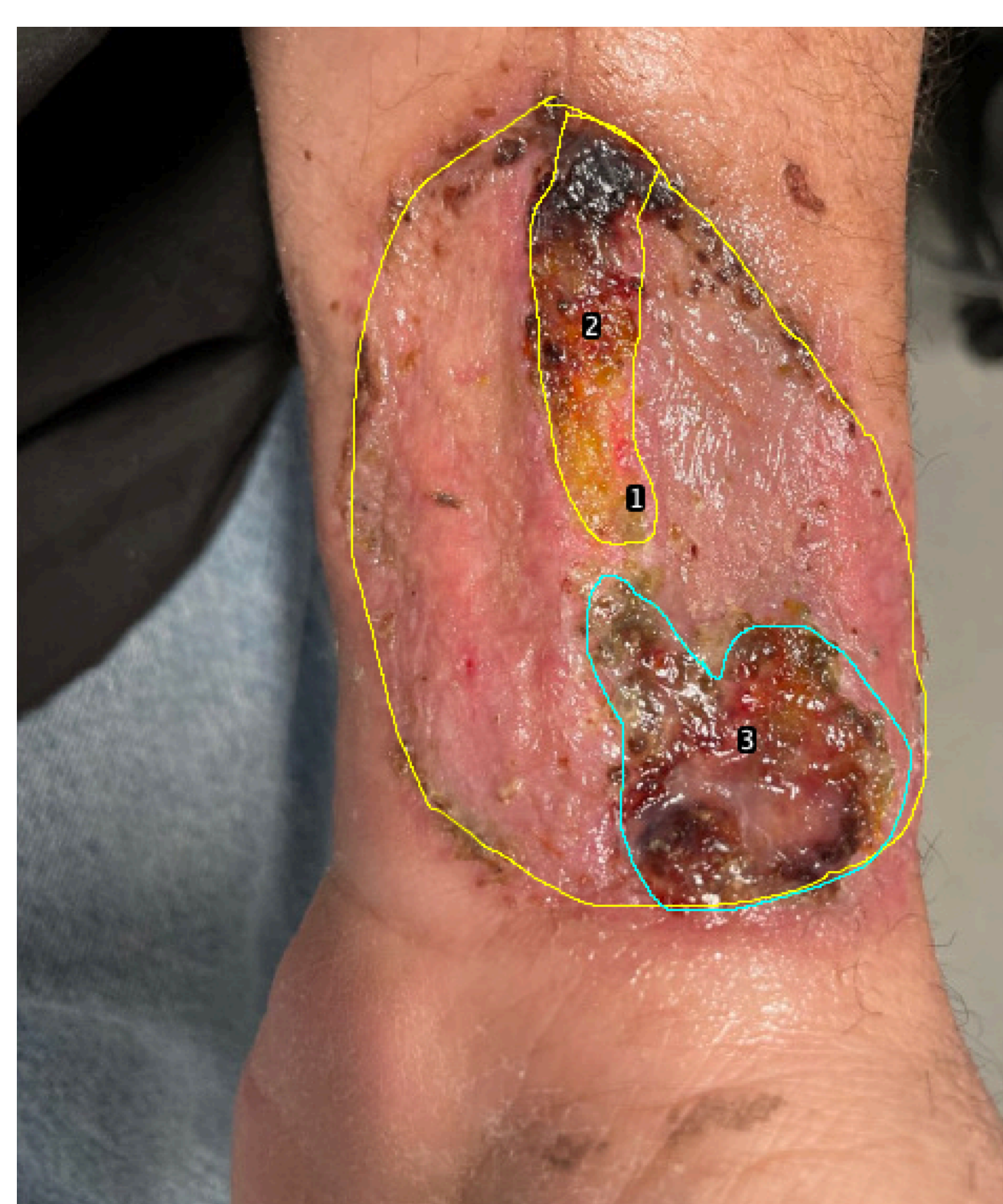
**Analysis of skin graft harvest:**
- **Excellent:** no clinically relevant gaps on the initial pass with the dermatome
- **Fair**: requiring suture repair to be usable for reconstruction
- **Poor**: defects requiring harvest of a second skin graft.

**ImageJ software** used for objective analysis of skin graft take at 7 days and 1-month post-op.

## Power Analysis

A sample size of 58 (29 per group) provides 80% power to detect a difference between treatment groups in mean graft uptake of 15% at the 0.05 level (2-sided), assuming a standard deviation of 20% using a 2-sample t-test.

These levels were selected based on our collective clinical experience and belief that **an improvement of 15% in skin graft uptake would constitute a meaningful difference** in outcomes that would justify a change in surgical technique.
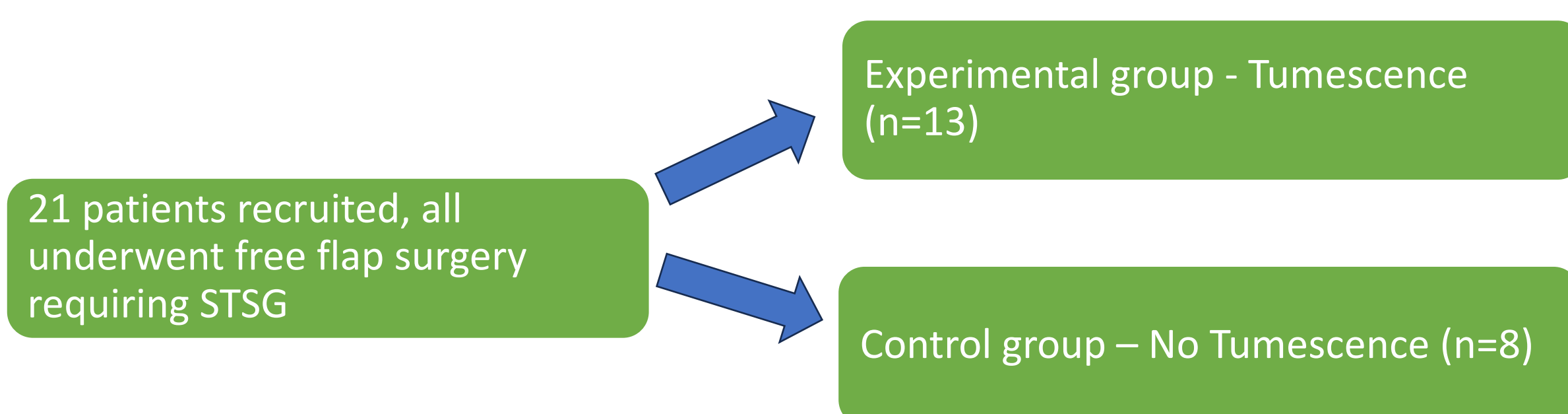
## Results

21 patients recruited, all underwent free flap surgery requiring STSG → Experimental group - Tumescence (n=13)

21 patients recruited, all underwent free flap surgery requiring STSG → Control group – No Tumescence (n=8)

| Summary of Demographic Information (n=21) | |
|---|---|
| Mean age | 63.36 |
| Gender | Male: 14<br>Female: 7 |
| Type of free flap | Fibula: 1<br>Forearm: 20 |
| Smoking status | Never smoker: 7<br>Former smoker: 12<br>Current smoker: 3 |
| Duration of bolster (mean days) | 6.35 |

## ImageJ Software Analysis



**100% STSG uptake**



**68% STSG uptake**

## Graft Uptake Results

Tumescence n=13, median 86% uptake

No tumescence n=8, median 100% uptake

No difference between groups (Wilcoxon test p=0.53)

## Graft Quality Results

Tumescence: 62.5% excellent; 37.5% fair

No tumescence: 92.3% excellent and 7.7% poor

Fisher's exact test p=0.042

## Discussion

**Tumescence may not make a significant difference in STSG uptake rates.**

Pending **secondary analyses** to determine the effect of graft location (fibula v forearm), graft size size, and comorbidities including diabetes, BMI, smoking status, and peripheral arterial disease have on graft uptake and quality.

Limitations: The Hawthorne effect is likely a major limitation of this study given in the increased scrutiny placed on these grafts during this ongoing clinical trial.

## Conclusions

These interim results suggest that using the additional surgical technique of **tumescence may not result in a clinically significant difference in STSG healing for patients**, however results may change as we complete enrollment for this study in the coming year.

## References

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