

Sterile Draping of Operative Microscopes in Breast Free Flaps: Are We Covering Up Ineffectiveness?

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Objective

This study aimed to determine whether the draping technique used during abdominally-based free flaps influenced the rate of surgical site infections.

Introduction

Operative microscopes are traditionally draped in single-use plastic to prevent infection theoretically. The necessity of this routine in breast free flap surgery is unclear. Alternatively, sterile wrapping of microscope handles would reduce operating room waste and provide a more cost-effective and environmentally sustainable approach to sterility.

Methods

We conducted a retrospective review of abdominally-based free flaps (Ab-FF) performed consecutively between March 2017 and August 2022. Patient demographics, comorbidities, perioperative data, and postoperative complications were collected. The primary outcomes included postoperative surgical site infections and environmental impact.

Results

Of the 281 identified breasts reconstructed with Ab-FF, operating microscopes were sterilely covered with microscope drapes (n=215) or handle covers (n=66) composed of polyethylene-based plastic. Overall, postoperative infections occurred in 9.3% of cases (n=26) in either the recipient breast (n=11, 3.9%) or abdominal donor site (n=15, 5.3%), primarily due to *S. aureus* and *Streptococcus* species. The handle (n=6, 9.1%) and drape (n=20, 9.3%) cohorts had similar infection rates with no sequelae of operative complications. In multivariate analysis, radiation was the only independent predictor of postoperative infection, while bilateral reconstructions were independently protective. Replacing a microscope drape with a handle reduces carbon emissions by 1276 grams of CO₂ and direct costs by \$7.84 per item.

Figure 1. Microscope Drapes versus Handles

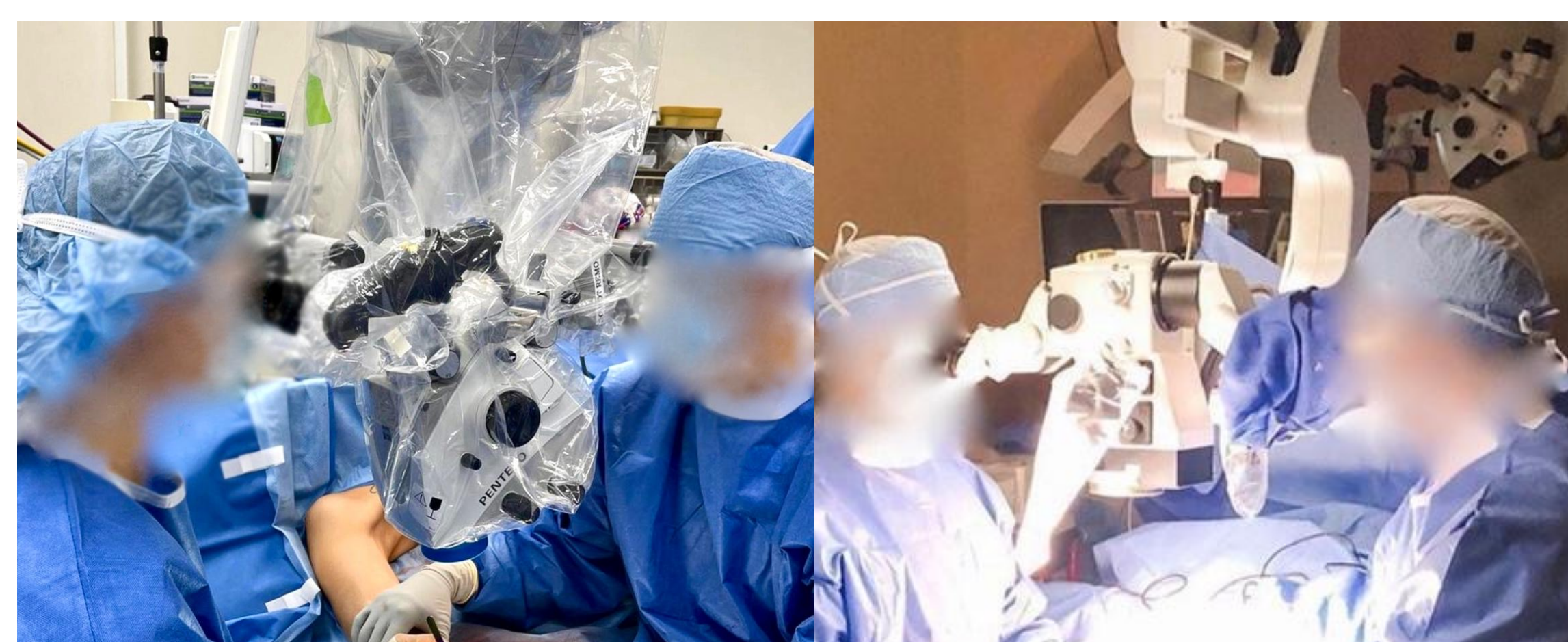


Table 1. Patient and Infection Characteristics

	Handle No. (%)	Drape No. (%)	p-value
CCI	66 (23.5%)	215 (76.5%)	
	2.3 ± 1.2	2.5 ± 1.3	0.296
Flap Type			
<i>DIEP</i>	42 (63.6%)	140 (65.1%)	0.883
<i>MS-TRAM</i>	24 (36.4%)	75 (34.9%)	
Infection	6 (9.1%)	20 (9.3%)	1.000
Location			0.910
<i>Breast</i>	3 (4.5%)	8 (3.7%)	
<i>Abdomen</i>	3 (4.5%)	12 (5.6%)	
Severity			
<i>Antibiotics required</i>	6 (9.1%)	19 (8.8%)	1.000
<i>Incisional</i>	2 (3.0%)	8 (3.7%)	1.000
<i>Drain site</i>	0 (0.0%)	4 (1.9%)	0.579
<i>Cellulitis</i>	3 (4.5%)	9 (4.2%)	0.737
Pathogen Type			1.000
<i>Beta-hemolytic</i>	0 (0.0%)	2 (0.9%)	
<i>Streptococcus Group G</i>			
<i>Staphylococcus aureus</i>	0 (0.0%)	2 (0.9%)	
<i>Coagulase-negative Staphylococcus</i>	0 (0.0%)	1 (0.5%)	
<i>Escherichia coli</i>	0 (0.0%)	1 (0.5%)	
Greenhouse Emissions			
<i>Weight of polyethylene (g)</i>	7 (0)	361 (0)	
<i>Carbon footprint (g CO₂/item)</i>	25.2 (0)	1301.2 (0)	
Cost	\$7.16	\$15	

Table 2. Predictors of Postoperative Infection after Ab-FF

	Univariate OR (95% CI); p-value	Multivariate OR (95% CI); p-value
Chemotherapy		
<i>Neoadjuvant</i>	0.32 (0.07, 1.41); 0.132	0.21 (0.02, 1.89); 0.164
<i>Adjuvant</i>	1.14 (0.49, 2.68); 0.755	0.39 (0.07, 2.07); 0.271
Radiation		
<i>Neoadjuvant</i>	3.17 (0.81, 12.34); 0.096	74.70 (4.60, 1213.71); 0.002
<i>Adjuvant</i>	1.72 (0.76, 3.89); 0.190	22.85 (3.05, 171.09); 0.002
Breast Procedure Laterality		
<i>Unilateral</i>	1 [Reference]	1 [Reference]
<i>Bilateral</i>	0.35 (0.00, 0.78); 0.011	0.05 (0.00, 0.28); 0.001
Microscope Sterility		
<i>Handles</i>	1 [Reference]	1 [Reference]
<i>Drapes</i>	1.03 (0.39, 2.67); 0.959	0.54 (0.11, 2.67); 0.45
Breast Drain		
<i>(days, median duration (IQR))</i>	1.01 (0.96, 1.06); 0.625	1.06 (0.95, 1.19); 0.289
Abdomen Drain		
<i>(days, median duration (IQR))</i>	1.05 (1.01, 1.09); 0.012	1.07 (1.00, 1.16); 0.066

Conclusion

The principles of “Lean and Green” surgery prioritize reducing OR-generated waste to achieve financial and environmental sustainability. This cohort study of 281 breast free flaps demonstrates that switching from whole microscope draping to handle wrapping was not associated with an increased rate or odds of infection. Adopting a microscope handle wrapping protocol decreased the carbon footprint and operative costs. The results of this study offer evidence to support adoption and further exploration of pragmatic, cost-effective, and sustainable approaches to microsurgical breast reconstruction.



Figure 2. Side by side comparison of microscope drape (left) versus handle (right)

