

The Impact of Postoperative Blood Transfusion on Flap Survival in Lower Extremity Trauma

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Background

- Blood transfusions are life-preserving and often necessary procedures for **adequate flap perfusion** for hemorrhaging trauma patients
 - However, transfusions have been found to be associated with an **increased risk of thrombosis**¹
- Few studies have investigated how perioperative transfusion impacts flap survival²
 - There's a paucity of studies **based in the trauma setting**, where transfusions play critical role stabilizing patients
- This study evaluates the impact of **postoperative blood transfusion** on flap outcomes in traumatic lower extremity (LE) reconstruction

Methods

- IRB-approved retrospective review using a prospectively maintained database at a **Level I Trauma Center** from January 2007 to June 2022
- *Inclusion Criteria:*
 - 1) Underwent microsurgical LE flap reconstruction
 - 2) **traumatic mechanism of injury**
- Demographics, medical comorbidities, **flap and injury characteristics**, transfusion status, and postoperative complications were collected
- **Flap complications** included flap revisions, partial flap necrosis, and complete flap loss
- Chi-squared and multivariate logistic regression analyses were used for statistical analysis

Table 1. Comparison of Postoperative Outcomes among Transfusion Cohorts

	Total n (%)	Postoperative Tf+ n (%)	Postoperative Tf- n (%)	p-value
Number of Flaps	n=318	n=46	n=272	
Any Flap Necrosis	33 (10.4%)	13 (28.3%)	20 (7.4%)	<0.001*
<i>Partial Flap Necrosis</i>	26 (8.2%)	12 (26.1%)	14 (5.1%)	<0.001*
<i>Flap Loss</i>	16 (5.0%)	4 (8.7%)	12 (4.4%)	0.219
Flap Revision	25 (7.9%)	10 (21.7%)	15 (5.5%)	<0.001*
Any Infectious Complication	35 (11.0%)	4 (8.7%)	31 (11.4%)	0.588
<i>Hardware infection</i>	17 (5.3%)	4 (8.7%)	13 (4.8%)	0.275
<i>Osteomyelitis</i>	19 (6.0%)	0 (0.0%)	19 (7.0%)	0.065
Amputation	10 (3.1%)	3 (6.5%)	7 (2.6%)	0.156

Table 2. Multivariate Logistic Regression of Factors Contributing to Partial or Full Flap Necrosis

	Odds Ratio	95% Confidence Interval	p-value
Postoperative Transfusion	11.756	[1.686 - 81.948]	0.013*
Active Smoker	2.175	[0.436 - 10.838]	0.343
Diabetes Mellitus	1.444	[0.180 - 11.601]	0.729
Arterial Injury	1.422	[0.078 - 25.898]	0.812
Hypertension	1.218	[0.114 - 12.974]	0.870
Estimated Blood Loss	1.000	[0.998 - 1.003]	0.685
Fasciocutaneous Flap	0.569	[0.078 - 4.141]	0.577
Free Flap	0.540	[0.132 - 2.204]	0.391
Preoperative Hardware Infection	0.270	[0.010 - 6.991]	0.430
Nerve Injury	0.207	[0.019 - 2.297]	0.200

† Multivariate logistic regression analysis was adjusted for age, sex, race, BMI, medical comorbidities, wound location, Gustilo-Anderson classification, injury characteristics, and flap characteristics

Results

- 318 LE flaps were placed on 280 patients: **46 postoperative blood transfusions (Tf+)** and **272 no blood transfusions (Tf-)**
- Overall flap survival and limb salvage rates were 95.0% and 96.9%, respectively
- Compared to the Tf- cohort, **Tf+ cohort** had *significantly higher rates of:*
 - **Any flap necrosis** (28.3% vs 7.4%; p<0.001*)
 - **Partial flap necrosis** (26.1% vs 5.1%; p<0.001*)
 - **Flap revisions** (21.7% vs 5.5%; p<0.001*)
- Multivariate logistic regression revealed postoperative blood transfusion as the **only significant independent predictor** of flap necrosis
- Patients who were transfused postoperatively were **11.756 times more likely** to experience partial or full flap necrosis (**p=0.013***)

Conclusion

- Postoperative blood transfusion resulted in a **higher incidence** of postoperative **partial-to-full flap necrosis**
- These results indicate that the **decision to transfuse postoperatively** should be made cautiously and strategically, limiting transfusion to **only life-threatening cases** to minimize morbidity and flap loss

References

1. Garcia-Roa M, Del Carmen Vicente-Ayuso M, Bobes AM, et al. Red blood cell storage time and transfusion: current practice, concerns and future perspectives. Blood Transfus. 2017;15(3):222-231.
2. Kim MJ, Woo KJ, Park BY, Kang SR. Effects of Transfusion on Free Flap Survival: Searching for an Optimal Hemoglobin Threshold for Transfusion. J Reconstr Microsurg. 2018 Oct;34(8):610-615. doi: 10.1055/s-0038-1648244. Epub 2018 Apr 28. PMID: 29704866.