

Clinical Outcome Differences Between Single and Multi-stage Transtibial Amputations



Background

- Transtibial (below-the-knee) amputations are necessary in cases of irreversible lower extremity tissue damage
- Indications for amputation include prolonged ischemia, septic gangrene, osteomyelitis, and malignancy^{1,2}
- Current transtibial (below-the-knee) amputation methods:
 - Single guillotine amputation
 - Multi-staged with primary and formalization amputations
- Advantages of multi-staged amputations:
 - Decreased post-amputation muscle retraction¹
 - Reduced risk of spreading infection/necrosis¹
 - Decreased need for stump revision³
- Disadvantages of multi-staged amputations:
 - Higher monetary costs
 - More time spent in the hospital
 - Increased utilization of clinical resources

Methods

Objective:

- Assess if multi-staged amputations provide improved clinical outcomes over single stage amputations
- Determine patient groups that possibly benefit from multi-staged amputations
- Retrospective study using records of patients who received single or multi-stage transtibial amputations from January 2015 through December 2020
 - 207 patient records were queried
 - 118 patient records were analyzed after accounting for exclusion criteria
- Built database from patient records in REDCap
- We performed a chart review while recording factors such as:
 - Demographic data
 - Comorbidities
 - Preoperative factors
 - Surgical factors
 - Complications
- Chi-squared or student's t-tests were used to test for differences in demographics, comorbidities, preoperative factors, and some surgical factors
- Regression analyses were used to relate clinical factors to the hazard of a complication and other functional outcomes between amputation groups

Results

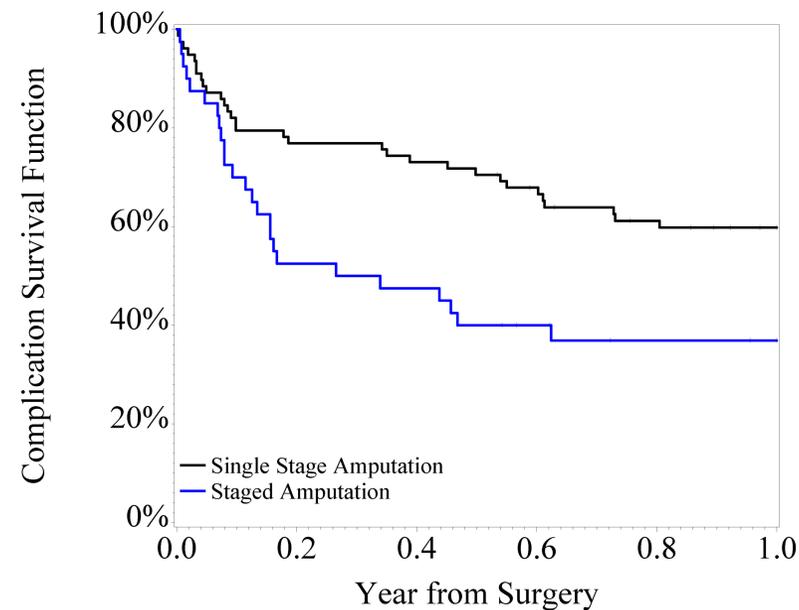


Figure 1: Complication survival in the single-stage vs. staged amputation groups

- Wound Vac: Y vs N
- WBC: Per 1 cell*10⁹L
- Staged: Y vs N
- Sepsis: Y vs N
- Prior Amp: Increase in Severity
- Peripheral Artery Disease: Increase in Severity
- Osteomyelitis: Y vs N
- Obesity: Y vs N
- Neuropathy: Y vs N
- Myodesis: Y vs N
- Married: Y vs N
- Insurance: Private vs Other
- Heart Failure: Y vs N
- Female vs Male
- ESRD: Y vs N
- Dyslipidemia: Y vs N
- Diabetes: Y vs N
- Current Smoker: Y vs N
- Chronic Ulcers: Y vs N
- Age: Per 1 Year

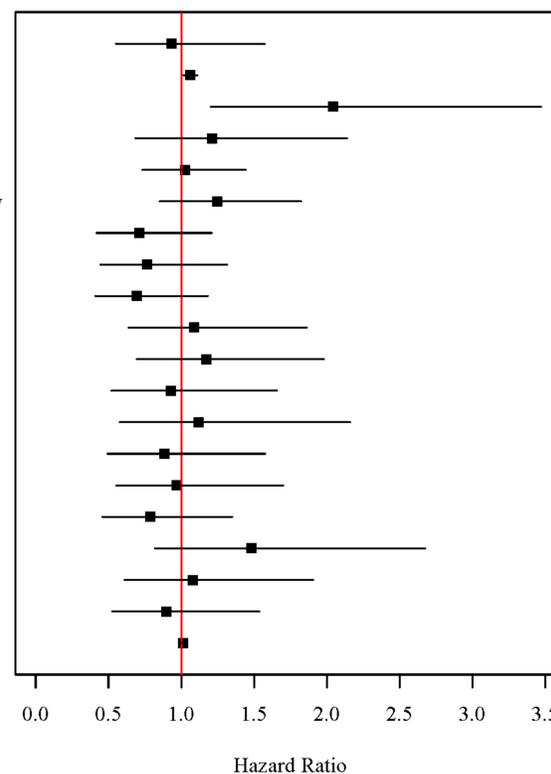


Figure 2: Univariate analysis of factors associated with hazard of a complication within the first post-operative year

Results

	Single Stage		Staged	
	n	%	n	%
Abscess	3	3.8%	4	10.0%
Cardiac Event	1	1.3%	1	2.5%
Cellulitis	11	14.1%	5	12.5%
Death	19	24.4%	13	32.5%
Osteomyelitis	6	7.7%	6	15.0%
Other	8	10.3%	2	5.0%
Pulmonary Event	1	1.3%	0	0.0%
Readmission	17	21.8%	12	30.0%
Wound Dehiscence	9	11.5%	9	22.5%

Table 1: Summary of complications (patients may have multiple complications)

- 40 patients (34%) from the analyzed records received multi-stage transtibial amputation
- Diabetes and increased age are significantly associated with an increase in hazard of revision amputation
- Chronic ulcers are associated with a decrease in likelihood of successful prosthetic fitting within one year of surgery

Discussion

- Multi-stage transtibial amputations are associated with an increased risk of developing a complication compared to the single stage group
 - Patients requiring multi-stage amputations may have worse preoperative health compared to single-stage patients
- Further analysis needed to examine and compare electively staged amputations to single-stage amputations, as disease severity is currently not controlled for

References

1. Altindas. Foot Ankle Surg. (2011). 17(1): pp. 13-8.
2. Berceli. Journal of Vascular Surgery. (2006). 44(2): pp. 347-352.
3. Silvia. Annals of Vascular Surgery. (2018). 46: pp. 218-225.

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