Predictors of Digit Replantation and Revascularization Outcomes

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Purpose: The purpose of this study was to determine how different factors affect digit replantation and revascularization outcomes. We hypothesized that positive outcomes would be associated with primary arterial/venous repairs, less comorbidities, and shorter ischemia times.

Methods: Patients that received digit replantation or revascularization procedures between 2019-2024 were queried through our institution's electronic medical record system using ICD-10 code. Extracted data included demographics, injury characteristics, peri-operative management, and surgical techniques. Statistical analysis was performed using Fisher's exact tests and Mann-Whitney U tests, with $p<0.05$ for statistical significance.

Results: Our analysis included 19 replantation patients (21 digits) and 25 revascularizations patients (39 digits), with success rates of 37% and 80%, respectively, and an overall success rate of 61%. Time from injury to presentation for replants had a mean time of 2.7 hours for successful replants and 4.9 hours for failures (P=.04). The mean Elixhauser comorbidity index for revascularization patients was 0.4 for successes and 5.0 for failures (P<.001), with the most significant comorbidity being cardiac arrhythmia (OR 0.02, P=.004). Sharp injuries had a revascularization success rate of 95% while crush/avulsion injuries were 47% (P=.001). Replants with one artery repaired by venous autograft and at least one repaired vein had a 78% higher success rate compared to other vessel repair combinations (OR 23, P=.03). In non-sharp injuries, increased success rates were associated with primary venous repairs (OR 20, P=.03), while primary arterial repairs were negatively associated (OR 0.1, P=.049). Revascularization success was 66% higher when concomitant nerve repair was performed (OR 35, P<.001). *Intra-op use of papaverine during vessels anastomosis decreased revascularization success rates by 45% (OR 0.08,* P=*.002)*. Heparin drip at 500 U/h post-op to discharge increased replant patient success rate by 55% (OR 13, P=.04). Patients receiving leech therapy after a salvage procedure had a 46% lower success rate compared to those without (OR 0.14, P=0.007). However, leech therapy had a mean initiation time of 1.0 hour after surgery for success, and 4.3 hours after surgery for failures (P=.03). Surgeons with hand fellowship training had a 55% higher digit revascularization success rate compared to plastic surgeons without hand fellowship training (OR 12, P=.04).

Conclusion: Success rates in digit salvage are influenced by a multitude of factors. Ischemia time, mechanism of injury, and comorbidities seem to be the strongest pre-operative indicators of digit salvage. Some treatment options had better success rates with certain injury groups, suggesting injury-specific management may improve outcomes.