Timing of Flap Coverage and Surgical Site Infections in Open Fractures of the Upper Extremity: A Nationwide Analysis

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INTRODUCTION:
The management of open fractures that are associated with significant soft tissue loss may require reconstruction via flap coverage. Depending on the injury severity and concomitant trauma, definitive flap coverage may be delayed multiple days to allow for wound debridement and definitive internal fixation. It has previously been shown that delayed flap coverage in lower extremity fractures increases the risk of wound infection. However, few studies have analyzed the effect of time to flap coverage in upper extremity fractures. We used a national database to analyze the influence of time to flap coverage on surgical site infections in open fractures of the upper extremity.
METHODS:
The National Inpatient Sample was queried for open fractures of the upper extremity that required flap coverage from 2015-2019. Patients who underwent simple skin grafts but not flap closure were excluded. The number of days from admission to coverage was determined using the inpatient stay day on which the flap closure procedure was conducted. An injury severity scale using ICD-10 codes was used to control for injury severity. The primary endpoint was surgical site infection (SSI) acquired during the hospital stay. Mann-Whitney U test and binomial logistic regression were used to analyze association between time to coverage and SSI.
RESULTS:
Our study included 2,895 patients who underwent flap coverage for open fractures of the upper extremity. Fractures of the hand and wrist constituted the majority (73.4%), followed by radius (15.4%), ulna (14.9%), and humerus (7.3%). The percentage of SSI was 1.7%. The median time to flap coverage was significantly greater in the SSI group compared to the nSSI group (12 days, vs 2 days). After controlling for confounding variables, time to flap coverage was significantly associated with SSI, with the risk increasing by approximately 2.2 times for each day of delay (OR: 2.202, 95% 1.836-2.640)
DISCUSSION AND CONCLUSION:
This study is the first large database study to analyze time to flap coverage in open upper extremity fractures. It is also unique in that we did not employ arbitrary endpoints for coverage such as “late” and “early” coverage. Instead, we provide more general evidence in support of early flap coverage. We found that every additional day definitive flap closure was delayed, the risk of SSI is roughly doubled. Thus, treatment protocols should aim to achieve definitive wound closure in the shortest time possible.