

Predicting Blood Loss in Burn Surgery: A Search for Measured Approach to Transfusion of the Burn Patient

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Abstract

Introduction: Surgical management of large burn wounds frequently results in significant blood loss leading to multiple perioperatively transfusions. The pattern of blood loss and subsequent replacement result in abrupt hemodynamic instability and coagulopathy that may be prevented through a measured approach. The objective of this study is to create a means to more accurately predict and quantify perioperative blood loss and provide for preemptive resuscitation.

Methods: A retrospective multi-center study was conducted to identify adult patients (>17 years old) with greater than 15% TBSA burn requiring surgical management who presented from January of 2015 to January of 2019. Demographic data including age, gender, as well as burn etiology, percent of total body surface area burned (%TBSA), area treated with autografts, number of surgeries, and presence of inhalational injury was collected. Outcome data on blood loss, number of days in the hospital, or occurrence of complications were gathered. Blood loss was measured using different modalities including estimated blood loss (EBL), change in hemoglobin before and after each surgery using “hemoglobin balance” formula for blood loss, and number of blood products used.

Results: Total of 185 patients and 1650 surgeries from 4 centers were included. Greater %TBSA burn injury, flame/fire etiology, greater burn area requiring skin autografts, presence of inhalational injury, as well as prolonged hospitalization positively correlated with greater EBL and greater total number of blood product use during the hospitalization. For every 500 cm² of wound requiring autografting, total number of blood products used increased by 1 unit. For each 1% increase in TBSA, total EBL increased by nearly 5000 mL for entire hospitalization. Greater EBL correlated with development of complications such as GI bleeding and DVT/PE while greater number of blood product use didn't. Age, gender, etiology of burn did not have any significant effect on blood loss or total use of blood products.

Conclusion: Patients in a burn unit may be screened for factors that correlate with blood loss. Using appropriate risk factor coefficient, the degree of blood loss may be quantitated and preemptive replacement could be provided. This may result less hemodynamic instability and coagulopathy in during the period of the hospitalization.

Learning Objectives

1. Identify a way to more accurately predict and quantify perioperative blood loss in burn patients
2. Determine whether preemptive resuscitation is needed based on screening factors that correlate with blood loss