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Original Article

Impact of Intubation Time on Survival following Coronary Artery Bypass Grafting: Insights from the Surgical Treatment for Ischemic Heart Failure (STICH) Trial

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Objective: The authors aimed to assess determinants of intubation time and evaluate its impact on 30-day and 1-year postoperative survival in Surgical Treatment for Ischemic Heart Failure (STICH) trial patients.
Design, Setting, Participants, and Interventions: A multivariable Cox proportional hazards model was used among the 1,446 surgical patients from the STICH trial who survived 36 hours after operation, in order to identify perioperative factors associated with 30-day and 1-year postoperative mortality. A multivariable logistic regression model was used to determine risk factors associated with intubation time.
Measurements and Main Results: At 36 hours post-operation, 1,298 (out of 1,446) were extubated and 148 (10.2%) still intubated. Median postoperative intubation time was 11.4 hours. Among patients surviving 36 hours, a multivariable model was developed to predict 30-day (c-index = 0.88) and 1-year (c-index = 0.78) mortality. Intubation time was the strongest independent predictor of 30-day (hazard ratio [HR] 5.50) and 1-year mortality (HR 3.69). Predictors of intubation time > 36 hours included mitral valve procedure, New York Heart Association class, left ventricular systolic volume index, creatinine, previous coronary artery bypass grafting (CABG), and age. Results were similar in patients surviving 24 hours post-operation, where intubation time was also the strongest predictor of 30-day (HR 4.18, c-index 0.87) and 1-year (HR 2.81, c-index 0.78) mortality.
Conclusions: Intubation time is the strongest predictor of 30-day and 1-year mortality among patients with ischemic heart failure undergoing CABG. Combining intubation time with other mortality risk factors may allow the identification of patients at the highest risk for whom the development of specific strategies may improve outcomes.

Key Words: coronary artery bypass grafting; intubation; coronary artery disease; heart failure

THE SURGICAL Treatment for Ischemic Heart Failure (STICH) trial demonstrates that in patients with left ventricular ejection fraction (LVEF) ≤ 35% and coronary artery disease (CAD) amenable to coronary artery bypass grafting (CABG), CABG prolongs survival, and that adding surgical ventricular restoration (SVR) to CABG in patients with predominant anterior akinesis did not improve outcomes.[1–4]

The overwhelming majority of STICH patients survived to 24 to 36 hours after operation, a time when the outcome of patients becomes better defined and adjustments to the course of the patient are ongoing.[5,6] Intubation time, which likely reflects the convergence of multiple pre-, intra-, and post-operative parameters, has proven to be associated strongly with a poor prognosis in patients undergoing cardiac surgery. Combining intubation time with other independent risk factors for a poor outcome in early post-operation survivors could identify patients at highest risk and lead to proactive therapeutic interventions that could improve outcome.

The aims of the present analysis were to: 1) assess the determinants of 30-day and 1-year postoperative mortality when including intubation time; and 2) evaluate the pre- and intra-operative determinants of death or still intubated by 24 and 36 hours after operation.

Materials and Methods

Patient Population

The overall objective of the STICH trial was to assess the role of surgical revascularization in patients with severe left ventricular (LV) dysfunction, ischemic heart failure, and CAD amenable to CABG.[1–4] Between July 2002 and May 2007, 2,136 eligible patients were enrolled in the STICH trial. Of these, 1,534 patients were assigned randomly to surgery along with medical therapy; 1,460 did receive surgery and were allocated as CABG (n = 965), CABG + SVR, (n = 495). Among the 1,460 surgical patients, 5 (0.3%) died in the operating room (OR), and 9 (0.6%) in the intensive care unit (ICU) within the first 36 postoperative hours (Fig 1). Only 1 patient died in the ICU between 24 and 36 hours. Risk factors associated with 30-day and 1-year postoperative mortality were assessed in the 1,446 STICH patients who received surgery and still were alive at 24 and 36 hours following discharge from the OR (Fig 1).

Data Collection

In the STICH trial pre-, intra-, and postoperative data were acquired prospectively using structured data forms with standardized definitions of common operative and postoperative conduct. Follow-up was performed at the time of hospital discharge or at 30 days following surgery if the patient remained hospitalized for ≥ 30 days, and at 4-month intervals for the first year of follow-up, and thereafter at 6-month intervals over the entire follow-up period.[1–4]

Intubation Time

Intubation time was defined in patients discharged from the OR as the time from ICU arrival to the time of extubation. Prolonged intubation time was considered when intubation time was > 24 or 36 hours. Decisions for both extubation and reintubation were made by the surgical/medical staff at each site on an individual case-by-case basis. Cause of death was determined by an independent clinical endpoint committee.[7] Deaths that occurred prior to 30 days after operation generally were deemed to be the result of the surgery.

Ethical Considerations

As detailed elsewhere, the Duke University Medical Center Institutional Review Board and the institutional review board or ethics committee for each participating center

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