

The Impact of Early Intervention on the Outcomes After Decompressive Craniectomy for Stroke: A Nationwide Analysis

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Introduction

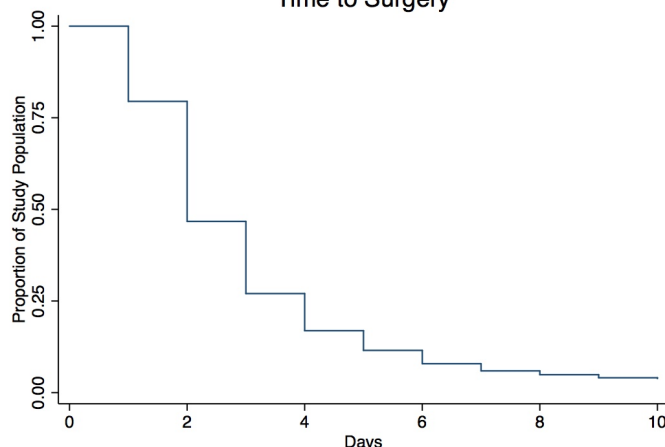
Although evidence supports the performance of decompressive craniectomy for malignant cerebral infarction within 48 hours of presentation, no nationwide analysis has evaluated the predictors of undergoing early intervention in the United States.

Methods

- Data Source: Nationwide Inpatient Sample (2002-2011).
- Inclusion Criteria: Primary diagnosis of an acute ischemic stroke & procedure code for decompressive craniectomy.
- Patient Stratification: By timing of intervention, within 48 hours of admission.
- Covariates: Patient sex; admission year; comorbidities; stroke risk factors (atrial fibrillation, cardiac valvular disease, carotid stenosis, carotid dissection, and hypercoagulability); anticoagulant usage; intravenous thrombolysis; ventriculostomy placement; cerebral herniation; and hospital characteristics.
- Statistical Analysis: Hierarchical multivariate logistic regression.

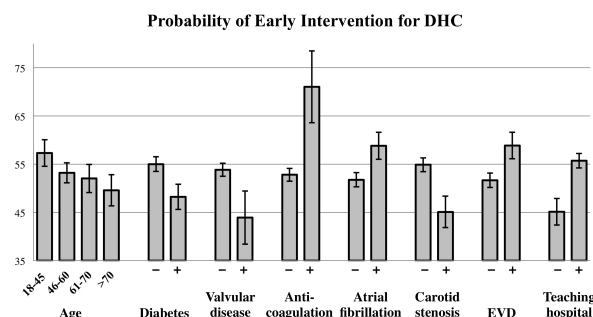
Figure 1

Time to Surgery



Kaplan Meier curve showing the time to surgery.

Figure 2

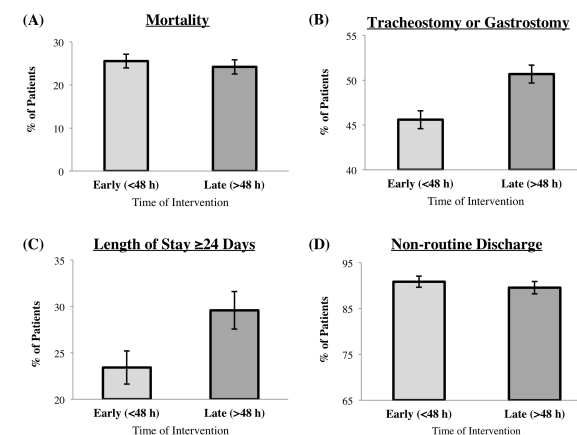


Predictors of early intervention among patients undergoing craniectomy for stroke.

Results

- 1,432 admissions were included, of whom 53.3% ($n=763$) underwent surgery within 48 hours.
- Atrial fibrillation, anticoagulation usage, ventriculostomy placement, and teaching hospital admission were associated with increased odds of undergoing early surgery ($P=0.02$).
- Age greater than 70 years, cardiac valvular disease, diabetes, and carotid stenosis were associated with a lower odds of early intervention ($P=0.03$).
- No significantly different adjusted odds of in-hospital death (Odds Ratio (OR): 1.12, 95% Confidence Interval (CI): 0.85-1.46, $P=0.43$) or of a non-routine hospital discharge (OR: 1.35, 95% CI: 0.87-2.09, $P=0.19$) were seen based on the timing of intervention.
- However, early intervention was associated with lower adjusted odds of undergoing a tracheostomy or gastrostomy (OR: 0.75, 95% CI: 0.60-0.94, $P=0.001$) and of a hospital stay of at least 24 days (OR: 0.62, 95% CI: 0.47-0.85, $P=0.002$).

Figure 3



Variations in the crude rates and associated standard errors of outcomes, by timing of intervention.

Conclusions

- In this nationwide analysis, patient age, comorbidities, anticoagulation, stroke etiology, and hospital characteristics were associated with differential odds of undergoing early surgery.
- Although early intervention was not associated with differential mortality, superior outcomes were seen favoring early surgery on some measures including tracheostomy or gastrostomy placement and length of stay.

References

- Frank *et al.* Hemicraniectomy and durotomy upon deterioration from infarction related swelling trial. *Stroke*. 2014.
- Hofmeijer *et al.* Hamlet. *The Lancet Neurology*, 2009.
- Vahedi *et al.* Early decompressive surgery in malignant infarction of the middle cerebral artery: A pooled analysis of three randomized controlled trials. *The Lancet Neurology*, 2007.