Performance of EuroSCORE II in Predicting Long-Term Mortality in Indian Patients Undergoing Valvular Heart Surgery: A Prospective Observational Study

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Abstract

Background: EuroSCORE II is widely used for predicting short-term (in-hospital or 30-day) mortality in cardiac surgery. Its predictive validity for long-term (up to 1 year) mortality remains poorly studied in the Indian population, especially in the context of valvular heart surgery.

Objective: To evaluate the accuracy and discriminatory performance of EuroSCORE II in predicting long-term mortality in Indian patients undergoing valvular heart surgery.

Methods: A prospective observational study was conducted at Sher-i-Kashmir Institute of Medical Sciences (SKIMS), Srinagar, from 2018 to 2021. Fifty-six adult patients undergoing elective or urgent valvular heart surgery were enrolled. EuroSCORE II was calculated preoperatively. Patients were followed for mortality outcomes at 6 and 12 months postoperatively. Discriminatory performance was evaluated using AUC of the ROC curve, and calibration assessed via Hosmer-Lemeshow goodness-of-fit test.

Results: Observed late mortality (6–12 months) was 7.1% (4 out of 56 patients). The area under the ROC curve for EuroSCORE II in predicting long-term mortality was 0.493 (95% CI 0.367–0.641), indicating poor discriminatory power. Calibration analysis was not significant (Hosmer-Lemeshow test).

Conclusions: EuroSCORE II fails to accurately predict long-term mortality in Indian valvular heart surgery patients. It is recommended that new models incorporating region-specific risk factors and long-term outcome data be developed.

Keywords

EuroSCORE II, Valvular Heart Surgery, Long-term Mortality, Indian Patients, Risk Prediction Model

Introduction

Valvular heart disease (VHD) is a significant contributor to cardiovascular morbidity in developing countries, often driven by untreated rheumatic disease. Surgery, especially valve replacement or repair, remains essential for improving survival and quality of life.

The EuroSCORE II, developed in Europe, is designed to estimate in-hospital or 30-day mortality risk using a

combination of patient, cardiac, and operation-related factors. Its validation in Indian cardiac surgery populations is limited, particularly for long-term mortality beyond the early postoperative period.

Accurate long-term risk prediction is critical for patient counseling, perioperative management, and long-term follow-up planning, especially in resource-limited settings. This study evaluates EuroSCORE II's ability to predict mortality at 6 and 12 months in Indian patients undergoing valvular heart surgery.

Materials and Methods

Study Design and Setting: This prospective observational study was conducted in the Department of Anaesthesiology and Critical Care at SKIMS, Srinagar, India, from 2018 to 2021.

Inclusion Criteria:
• Adult patients (age >18 years)
• Undergoing elective or urgent single-valve surgery
• ASA physical status I-IV

Exclusion Criteria:
• Patient refusal
• Age <18 years

EuroSCORE II Calculation: Preoperative EuroSCORE II was calculated using the interactive online calculator (http://www.euroscore.org/calc.html).

Follow-Up: Patients were followed for mortality at 1 week, 1 month, 6 months, and 12 months. Late mortality was defined as death occurring between 1 month and 12 months postoperatively.

Statistical Analysis: Discrimination was assessed by AUC of the ROC curve, and calibration tested by Hosmer-Lemeshow test. Significance was set at $p < 0.05$.

Results

A total of 56 patients were included in the study. The mean age was 48.6 ± 12.21 years. There were 26 males (46.4%) and 30 females (53.6%). Critical preoperative state was present in 48.2% of patients, and 25% had insulin-dependent diabetes.

Late Mortality: Four patients (7.1%) died between 1 month and 12 months postoperatively. Causes of death included:
• Intracranial hemorrhage secondary to deranged anticoagulation
• Heart failure secondary to paravalvular leak
• Embolic stroke
• Respiratory failure from bilateral pneumonia

Discrimination and Calibration: The AUC for EuroSCORE II in predicting late mortality was 0.493 (95% CI 0.367–0.641). Hosmer-Lemeshow test indicated poor calibration.

Discussion

The results demonstrate that EuroSCORE II has poor discriminatory power in predicting late mortality in Indian patients after valvular heart surgery. This aligns with previous literature suggesting that EuroSCORE II was primarily designed for early mortality prediction and does not incorporate factors relevant to long-term outcomes.

Key reasons for poor performance in this cohort include:
1. Socioeconomic factors not considered in EuroSCORE II, such as poor access to follow-up care, nutrition, and medication adherence.
2. Clinical factors influencing long-term mortality but absent in EuroSCORE II, such as deranged anticoagulation,

chronic infections, and immune disorders.
3. Late presentation of Indian patients with advanced disease, complicating long-term recovery.

This study emphasizes the need for India-specific risk prediction models that incorporate demographic, genetic, and healthcare access variations.

Conclusion

EuroSCORE II is not reliable for long-term mortality prediction in Indian patients undergoing valvular heart surgery. Developing a new risk prediction model tailored to regional demographics and comorbidities is strongly recommended.

References

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