Establishment and validation of a predictive model for the development of hypoxemia after sleeve gastrectomy in obese patients

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01 Background

Postoperative hypoxemia (PH) is the most common postoperative pulmonary complications (PPCs) after bariatric surgery. However, there is a lack of clinically validated tools and tests to predict the risk of hypoxemia after bariatric surgery in obese patients.

02 Aim

To analyze the independent risk factors for hypoxemia in obese patients within the first 24 hours after laparoscopic sleeve gastrectomy (LSG). We further develop and validate a nomogram prediction model to predict the probability of hypoxemia after LSG in obese patients.

03 Methods

Univariate and multivariate logistic regression were used to analyze the independent risk factors for hypoxemia in obese patients within 24 hours after surgery.

This nomogram's discrimination, calibration, and clinical applicability were assessed using receiver operating characteristic curves (ROC), calibration curves, and decision curve analysis (DCA).

The nomogram was internally validated using bootstrap resampling.

04 Results

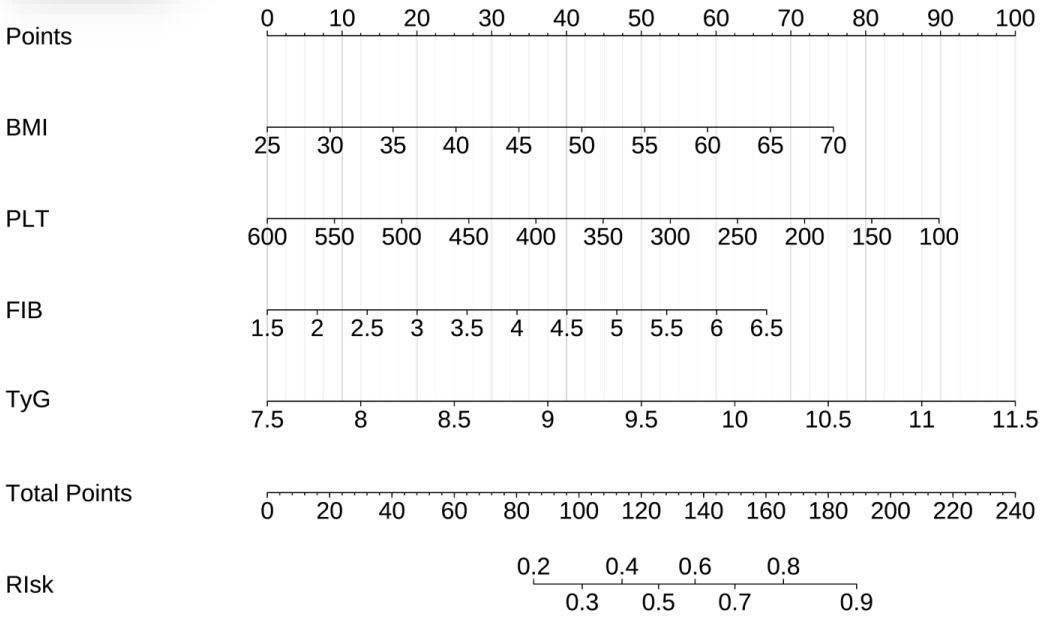

Figure 1: Nomogram for predicting the probability of hypoxemia in obese patients within 24 hours after LSG.

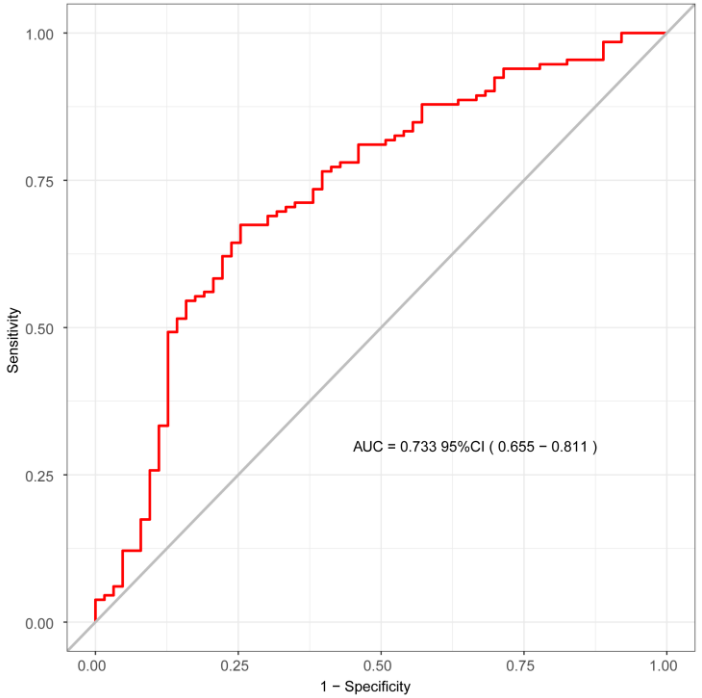

Figure 2: ROC curves for predicting the occurrence of hypoxemia after LSG in obese patients

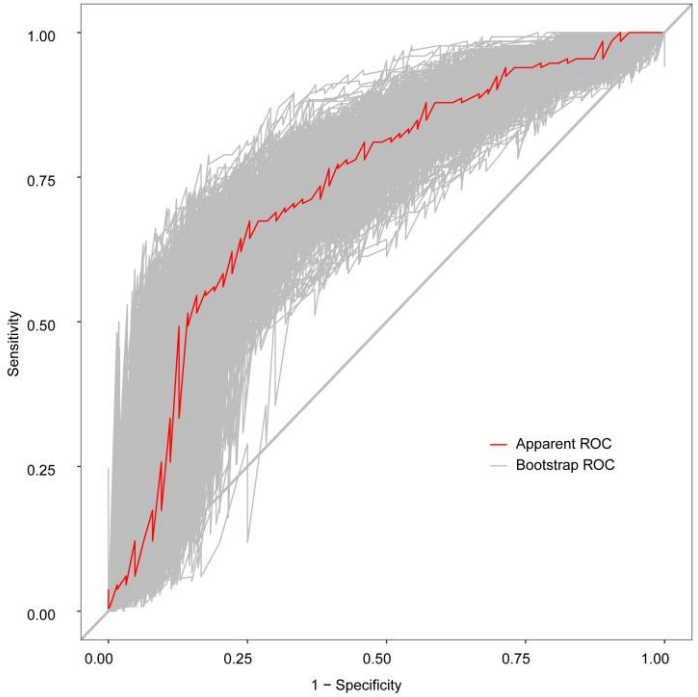

Figure 3: ROC curves from internal validation using Bootstrap

- Multivariate logistic regression showed that preoperative body mass index (BMI), fibrinogen level (FIB), and triglyceride-glucose (TyG) index were independent risk factors and preoperative platelet count (PLT) was an independent protective factor. A nomogram was developed based on the results of the multivariate logistic regression analysis (Figure 1).
- The area under the curve (AUC) of the nomogram was 0.733 (95%CI=0.655,0.811) (Figure 2). Internal validation using the bootstrap repeated sampling method yielded an AUC of 0.757 (95%CI=0.686,0.828) (Figure 3).

04 Results

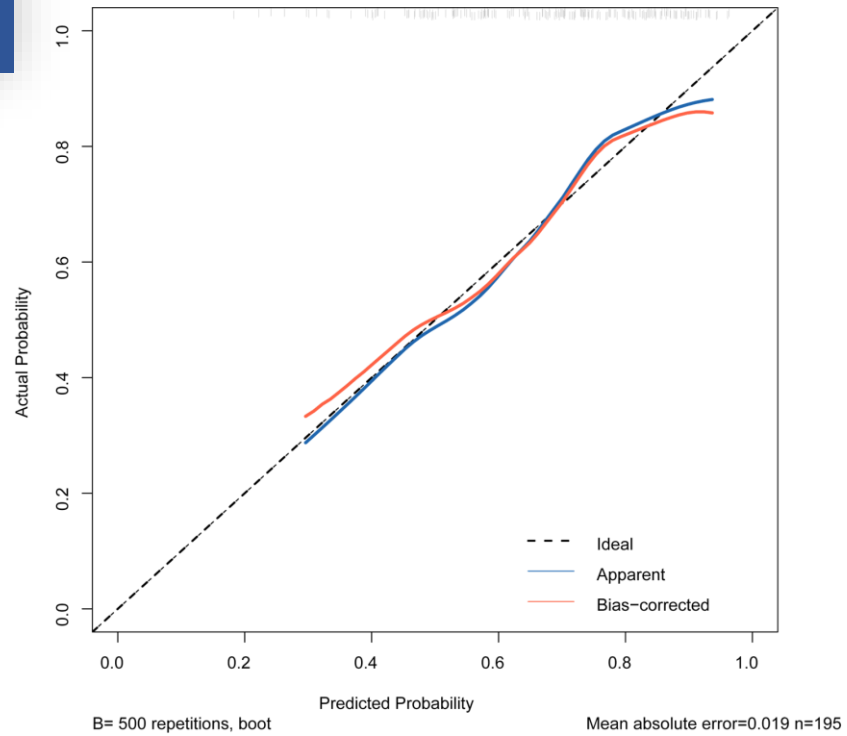

Figure 4: Calibration curves of the nomogram prediction.

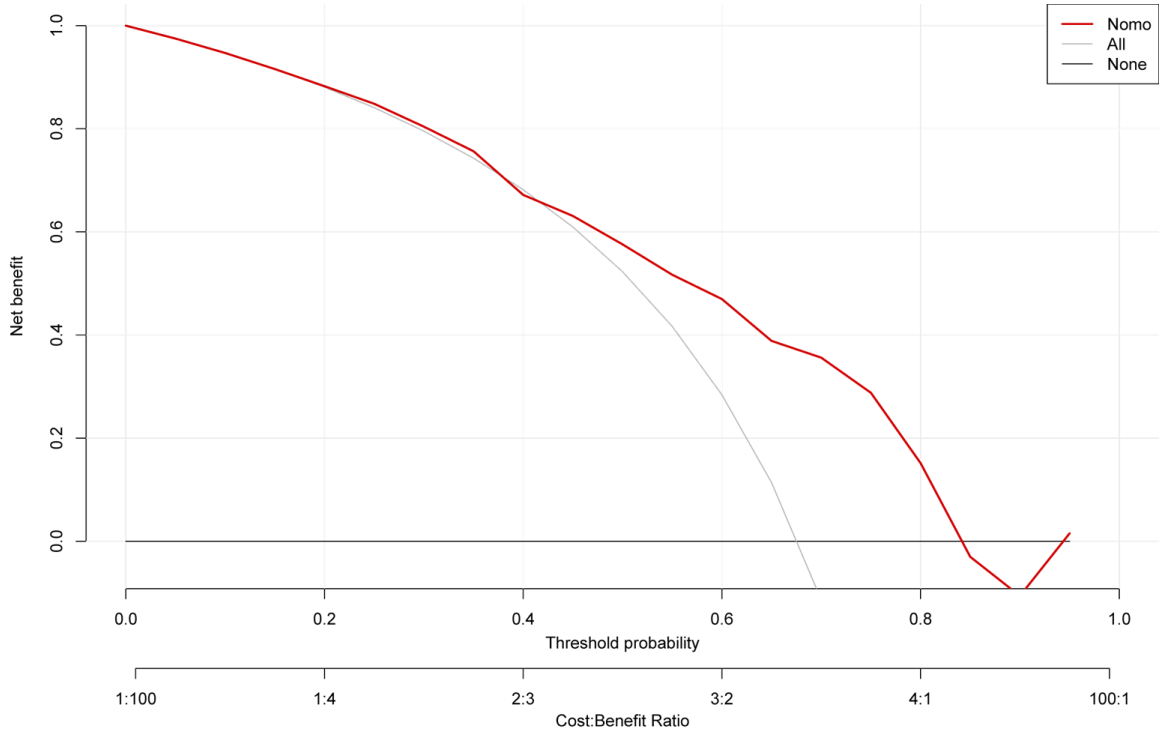

Figure 5: Clinical decision curves of the nomogram prediction.

- The calibration curves of the nomogram model were close to the ideal diagonal for both the predictive model and calibration curves after the bootstrap repetitive sampling method (Figure 4).
- Clinical decision curves of the nomogram prediction demonstrated that for threshold probabilities of 42%–84%, the use of the nomogram to predict the probability of PH and intervention provided more net benefits than interventions or no interventions in all patients (Figure 5).

05 Conclusion

- We found that preoperative body mass index (BMI), platelet count (PLT), fibrinogen level (FIB), and triglyceride-glucose (TyG) index were independent risk factors for postoperative hypoxemia in obese patients. Clinicians can use this model to identify high-risk patients and implement timely preventive and therapeutic actions to reduce postoperative complications, improve surgical safety, and promote patient recovery.
- The results of this study broaden the clinical application of the TyG index and reveal possible mechanisms underlying postoperative hypoxemia after bariatric surgery.