Enhanced Risk Stratification for Gastrointestinal Leaks After Bariatric Surgery: A Comparative Analysis of Predictive Models

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Background

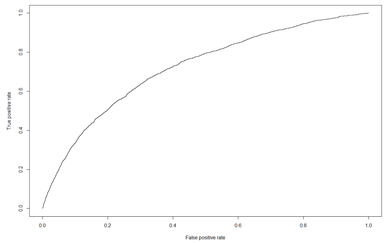
- Recognizing key risk factors for gastric leaks (GL following to bariatric surgery holds substantial potential for mitigating significant morbidity and mortality rates
- Machine learning (ML) has demonstrated promise in prognosticating postoperative outcomes
- However, data on GL and ML remains limited
- The objective of this study was to evaluate and compare GL prediction models in bariatric surgery using logistic regression (LR) methods and ML

Methods

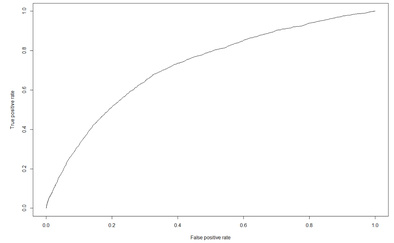
- An observational study utilizing the MBSAQIP database was conducted from 2015 to 2019
- Patients undergoing sleeve gastrectomy (SG) and Roux-en-Y gastric bypass (RYGB) were included
- A prediction model for GL was developed using: (1) LR, (2) neural network (NN), and (3) XGBoost model
- A randomized 50/50 split of the complete dataset were used for both training and validation of each model
- Overall model performance was assessed using the area under the receiver operating curve (AUC)

Results

- This study included a total of 755,506 patients, with a GL rate of 0.5% (n=3,767)
- Out of the entire group, 79.6% were female, with a mean age of 44.4 years (± 11.9)
- The initial mean body mass index (BMI) was 45.3 kg/m² (± 7.8)
- The most prevalent comorbidities were hypertension (47.7%), diabetes (26.2%), hyperlipidemia (23.6%) and recent tobacco use within one year (8.4%)
- The AUC for the three different GL prediction models was: 0.723 for LR, 0.723 for NN and 0.717 for XGBoost
- A sub-analysis by surgical procedure indicated that the AUC values were as follows: SG: 0.638 for LR, 0.626 for NN and 0.619 for XGBoost. RYGB: 0.625 for LR, 0.618 for NN and 0.618 for XGBoost

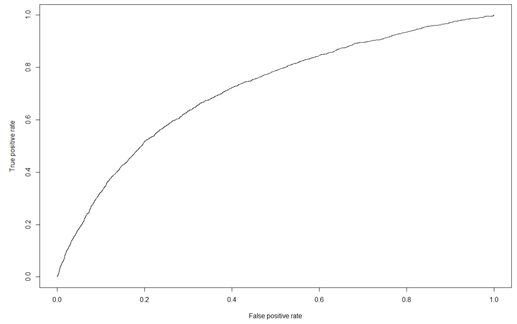


- **Figure 1.** Receiver operating characteristic curve for logistic regression Model for Roux-en-Y gastric bypass and sleeve gastrectomy combined. AUC of 0.723



- **Figure 2.** Receiver operating characteristic curve for neural networks model for Roux-en-Y gastric bypass and sleeve gastrectomy combined. AUC of 0.723

Results



- **Figure 3.** Receiver operating characteristic curve for extreme gradient boosting model for Roux-en-Y gastric bypass and sleeve gastrectomy combined. AUC of 0.717

Conclusions

- The ML models demonstrated noteworthy discrimination in predicting GL compared to LR
- However, when stratifying by technique, the AUCs dropped, likely due to a lower number of GL events per procedure
- To our knowledge, this is the first study to use the updated MBSAQIP dataset from 2015 to 2019, extending the previous research that only considered data up to 2017

Disclosures

- Authors have no conflicts of interest relevant to this publication