

Post-Dissection Thresholds to Predict Voice and Vocal Fold Function After Thyroid Surgery

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Introduction

Damage to the recurrent laryngeal nerve (RLN) during thyroid surgery can have significant impact on quality of life. Nerve injuries can result from transection, or neuropraxia from manipulation, compression, or thermal injury. A growing proportion of surgeons are utilizing various types of intraoperative nerve monitoring (IONM) in thyroid surgery. Evidence has been variable and demonstrates a reduction in transient nerve damage with the use of IONM in some studies and in rates of permanent weakness in others. IONM can assist in neural mapping, in localizing injured nerve segments, and in decision making to perform staged surgery. The purpose of this study was to examine the correlation of IONM parameters and functional outcomes.

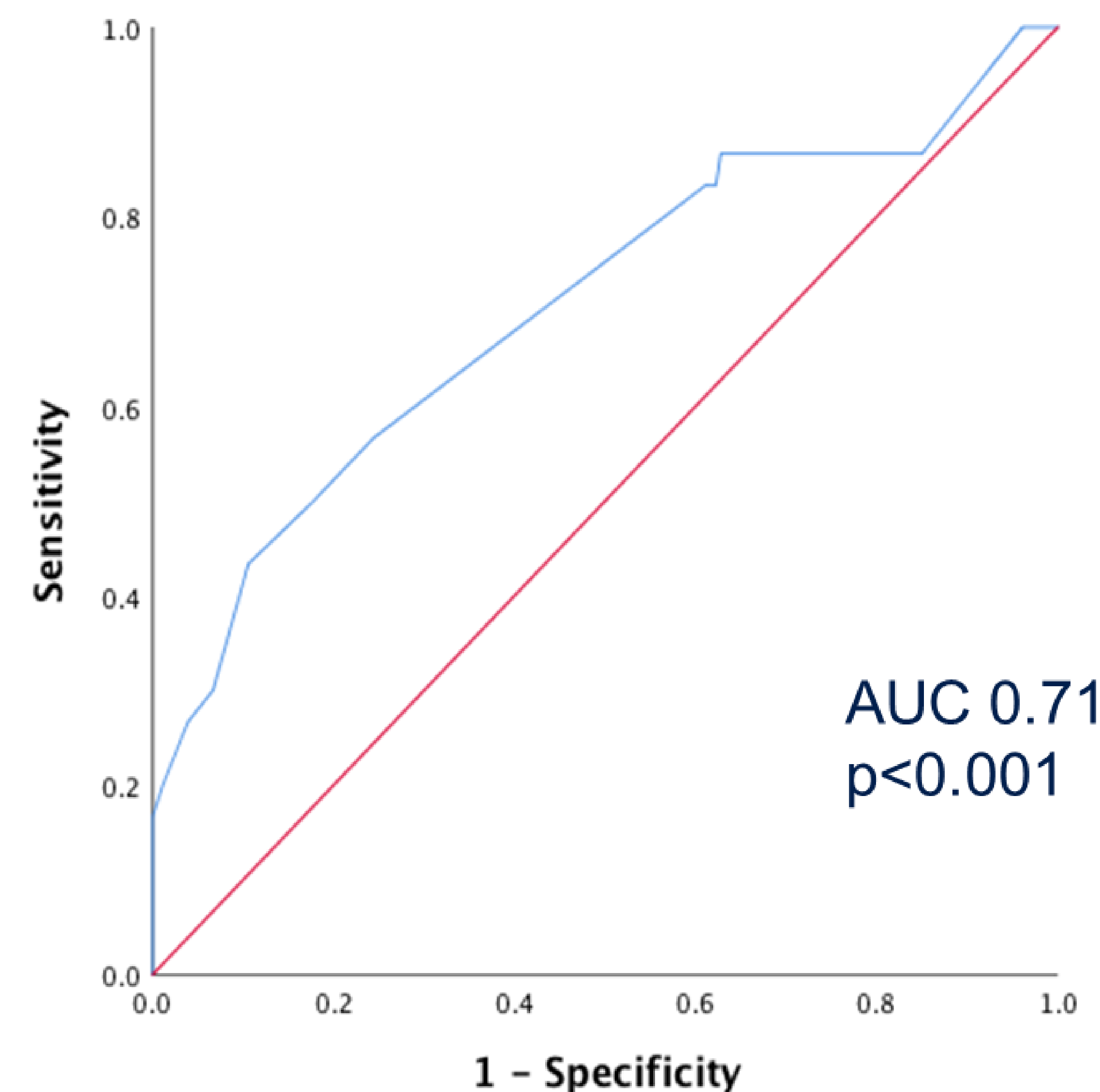
Methods

Post-dissection thresholds determined by expert-attended IONM and subjective postoperative voice changes were collected retrospectively. If performed, vocal fold mobility on postoperative laryngoscopy was recorded. Receiver operating characteristic (ROC) curves were used to determine RLN post-dissection thresholds predictive of voice function and vocal fold mobility.

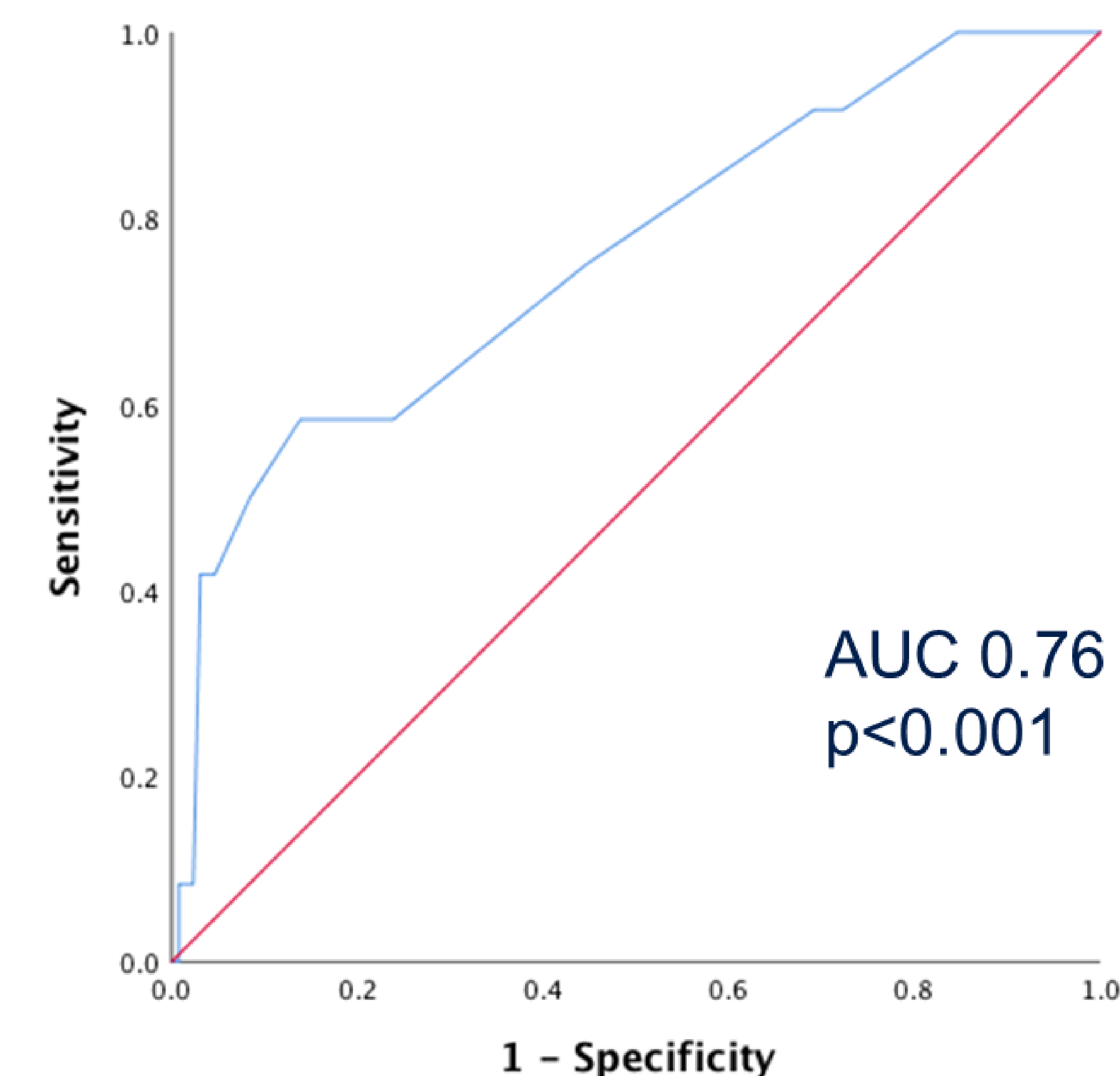
Patients

There were 207 patients in our cohort which included 125 (61%) women and 80 (39%) men and 317 nerves at risk. The average patient age was 48.9. 114 patients (166 nerves) had postoperative flexible laryngoscopy available for review.

1. Subjective Voice Outcomes



2. Vocal Cord Function



Results

Post-operative voice disturbances were noted in 14.5% of patients (30/207). The overall mean post-dissection threshold was 0.47 mA (range 0.1-1.5) and was significantly higher in patients with voice complaints compared to those without voice changes (0.73 vs 0.45 mA, $p<0.001$).

Post-dissection threshold predicted post-operative voice outcomes (AUC 0.71, $p<0.001$, Figure 1). A cutoff value of ≤ 0.3 mA maximized negative predictive value (NPV) (95% CI 87-98%) and sensitivity (87% (95% CI 69-96%)). A cutoff value of ≥ 0.7 mA maximized positive predictive value (PPV) (32% (95% CI 23-43%)) and specificity (82% (95% CI 76-88%)).

Flexible laryngoscopy was performed in 114 patients (166 nerves); 9.0% (15/166 nerves) had vocal fold dysfunction. Post-dissection threshold predicted post-operative vocal fold function (AUC 0.76, $p<0.01$, Figure 1). A cutoff value of ≤ 0.3 mA maximized NPV (97% (95% CI 84-100%)) and sensitivity (92% (95% CI 62-100%)), whereas a cutoff value of ≥ 0.7 mA maximized PPV (28% (95% CI 17-43%)) and specificity (86% (95% CI 79-92%)).

Conclusions

IONM is used with increasing frequency during thyroid surgery. Post-dissection thresholds can be used to predict voice complaints and VC function postoperatively. Cutoff values of 0.3 mA and 0.7 mA are associated with favorable and unfavorable outcomes and may be used to influence the decision to stage surgery and provide postoperative counselling.