Pediatric Tonsillectomy: PlasmaKnife Vs. Coblator

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INTRODUCTION
Tonsillectomy is a common surgical procedure used to treat obstructive sleep apnea and recurrent tonsillitis in children. Techniques and instruments to perform tonsillectomy vary widely and an increase in the use of newer technologies has been recently described. Of these, PlasmaKnife and Coblator are similar bipolar radiofrequency devices with multiple applications in otolaryngologic surgery including tonsillectomy. Each instrument deposits at low temperatures and cause less thermal injury compared to monopolar electrocautery. This feature may lead to reduced post-operative pain in tonsillectomy, however, it may be at the expense of increased delayed hemorrhage.

PlasmaKnife has been shown to have better wound healing and less inflammation than Coblator in a porcine model. Therefore, the goal of this study is to evaluate the peri-operative practicality, utility, safety and effectiveness of the PlasmaKnife and Coblator in tonsillectomy and to compare the post-operative clinical outcomes between the two techniques.

METHODS AND MATERIALS
A retrospective, randomized, single blinded chart review was performed on all patients who underwent tonsillectomy with either PlasmaKnife or Coblator. Surgeries were performed at a university affiliated tertiary care center over a eight month period. All patients were between the ages of 2 years and 18 years. Data was collected from pre-operative consultation notes, operative reports, anesthesia records and post-operative follow up clinic notes. The student t-test was utilized for comparison of mean values. The chi-squared test was utilized for comparison of qualitative values. The p value was set at 0.05 for statistical significance.

RESULTS
164 patients underwent tonsillectomy with either PlasmaKnife or Coblator between May 2007 and January 2008. Of these, 108 patients were included in the study. Reason for exclusion was largely secondary to failure of post-operative follow up.

57 patients underwent PlasmaKnife tonsillectomy (49% female, 51% male, mean age: 6.8 years) and 51 patients underwent Coblator tonsillectomy (53% female, 47% male, mean age: 6.5 years). Age and gender were equally distributed amongst the two groups.

Patients were further divided into procedure groups of tonsillectomy and adenoidectomy alone and with bilateral myringotomy tubes. In the peri-operative period, there were no differences between groups in estimated blood loss or analgesic use immediately post-operatively. However, the PlasmaKnife group had significantly longer operation time in both procedure groups (Table 1). One primary bleeding event in the Coblator group returned to the operating room for hemostasis.

In the post-operative period, secondary hemorrhage was noted five times in four patients. All were in PlasmaKnife patients. Comparing number of patients with secondary hemorrhage, the difference among the two groups approached significance (p=0.053). However, the number of events of hemorrhage was significantly higher in the PlasmaKnife group (p<0.05) (Table 2).

DISCUSSION
Tonsillectomy technique remains controversial as one method has failed to provide clear advantage in decreasing morbidity, namely secondary hemorrhage and pain. Lower temperature dissection technologies may provide a superior method and the goal of this study is to compare two relatively novel instruments. Coblator is gaining popularity among pediatric otolaryngologists and PlasmaKnife is a recently introduced alternative.

Post-operative comparison shows that estimated blood loss and immediate analgesic use was similar between the PlasmaKnife group and the Coblator group. The finding that PlasmaKnife operations were longer was surprising but may relate to a learning curve associated with using new technologies. Post-operative comparison showed that PlasmaKnife patients were more likely to have a secondary hemorrhage event. This result is similar to findings of a recent report showing secondary hemorrhage in 3 of 24 patients undergoing PlasmaKnife tonsillectomy. Unfortunately, pain symptoms were sporadically reported and no definite conclusions could be made between groups. Overall number of participants was adequate to demonstrate significant differences but was reduced because of poor follow-up commonly found in tonsillectomy studies.

CONCLUSIONS
In this study, PlasmaKnife is comparable to Coblator except for increased duration of surgery and secondary hemorrhage events. To further characterize potential benefits in PlasmaKnife pediatric tonsillectomy, a larger prospective study is needed to include pain scores as an important post-operative outcome which would influence selection of technique.

REFERENCES

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