INTRODUCTION

Tonsillectomy is one of the most frequently performed pediatric ambulatory surgeries in the United States, comprising 16% of surgeries in this age group. Post-operative taste dysfunction is a known risk and was historically hypothesized to be secondary to damage to the chorda tympani fibers within the lingual nerve via pressure on the tongue from the retractor. This hypothesis was considered when the dysgeusia presented very soon after surgery. As additional cases were reported, other etiologies were proposed such as decreased zinc secondary to poor oral intake, and possible effect of local infection and wound healing on the lingual branch of the glossopharyngeal nerve (LBGPN). However, another possible etiology that is increasingly reported is surgical damage to the LBGPN.

Theoretically, the LBGPN lies deep to the pharyngeal constrictor muscles, which should protect the nerve during subsacapular dissection of the tonsils. An adult cadaver study revealed that the location of the nerve relative to the constrictors is variable, with nearly 25% of nerves firmly adhered to the tonsillar capsule. Thus, in some patients the nerve might not be safe from damage during tonsillectomy. It is important to explore the visibility of the pediatric LBGPN in vivo and there has been no study that illustrates this relationship of the nerve and the tonsillar fossa to date. The goal of our study is to discern the incidence of exposure of the LBGPN in the tonsillar fossa after pediatric tonsillectomy.

METHODS

Institutional review board approval was obtained from Dartmouth Medical College. A retrospective review of charts identified children through age 17 who underwent total tonsillectomy for any indication at Dartmouth Hitchcock Medical Center between November 2013 and May 2014 with the pediatric otolaryngology service.

Data collected included age, sex, surgical indication, surgical time, presence of other procedures, tonsil size, congenital abnormalities including bifid uvula, submucous cleft palate, cleft palate, and history of congenital neck anomalies. Tonsil size was categorized as either small (1-2+) or large (3-4+). Patients were included even if they underwent additional procedures in the same surgical encounter, however their surgical time was excluded for analysis. Visualization of the lingual branch of the glossopharyngeal nerve and its laterality were recorded.

Analysis was performed both with descriptive and quantitative statistics, specifically the Fisher exact test and t-test. Statistical significance was set at less than 0.05.

RESULTS

There were 138 children who underwent tonsillectomy in the time period of the study. Their ages ranged from 1 to 17 years with an average of 7.04 years and median of 6 years; 68 (49.3%) were males. The indication of obstruction alone accounted for 71% of patients (n=98), infection alone comprised 10.1% (n=14) and 26 children (18.8%) had both obstruction and infection. There were three children with bifid uvula and two children with cleft palate; no congenital neck abnormalities identified.

Twenty-eight children (20.3%) were found to have at least one exposed LBGPN after tonsillectomy; nine had bilateral exposed nerves. There were 37 visible nerves in the 276 tonsillar fossae examined. Figure 1 depicts an exposed nerve in our series. The nerve was more commonly visualized on the left (Figure 2). There was no statistically significant difference between the children who did not have exposed nerves versus those who did with regard to their age, sex, tonsil size, or surgical time (Table 1). Only one child with a visualized nerve had a congenital abnormality which was bifid uvula.

DISCUSSION

This study represents the first in vivo anatomical description of the course of the lingual branch of the glossopharyngeal nerve in the pediatric post-tonsillectomy fossa. Approximately 20% of children had at least one LBGPN exposed during this procedure, and 6.5% had both nerves exposed.

The glossopharyngeal nerve exits the skull base at the jugular foramen and travels toward the tongue base, terminating in the tonsillar and lingual branches. The pharyngeal constrictor muscles are thought to separate the LBGPN from the tonsil. A cadaver study revealed that in adults there was a gradient of nerve coverage and in 23% of fossae, there was no intervening muscle between the nerve and the tonsil. Our findings are similar with approximately 20% of children with at least one exposed nerve.

We found no identifiable factors that contributed to the likelihood of exposing an LBGPN during tonsillectomy. Age, sex, tonsil size and operative time did not significantly correlate with a visualized nerve.

There was a predilection for exposure of the nerve on the left. It could be that surgeon handedness plays a role in depth of dissection. Perhaps more pertinent is the predilection for fourth branchial arch anomalies to occur on the left side and the fact that the pharyngeal constrictors arise from this arch. This anatomical study confirms that there is an undeniable risk to the LBGPN during pediatric tonsillectomy. Whether or not surgical damage occurs and contributes to post-operative taste disturbance remains unknown. Even a transient change in taste could affect dietary habits in the impressionable pediatric population, as school age is one of the most important times for dietary habit formation and possibly for body weight determination. With increasing reports of post-tonsillectomy weight gain in children, prospective studies are needed to investigate any correlation between post-operative dysgeusia and increasing BMI in children.

CONCLUSIONS

Approximately 20% of children undergoing tonsillectomy have exposure of at least one LBGPN which might place them at higher risk for nerve damage that could manifest as post-operative taste disturbance. The effect this has on taste and subsequently BMI in the long-term remains a subject for future, prospective research.

REFERENCES

10. Skelton K et al. Prospective relevance of dietary patterns at the beginning and during the course of primary school to the development of body composition. Br J Nutr 2014;111:1488-98.