Improvement in the Reflux Symptom Index Following Cricopharyngeal Myotomy, With Or Without Zenker's Diverticulectomy

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Abstract

Objectives: Gastroesophageal reflux likely contributes to the development of cricopharyngeal dysfunction and Zenker's diverticulum. Common dictum suggests that if the upper esophageal sphincter is weakened by performing a cricopharyngeal myotomy, symptoms of laryngopharyngeal reflux (LPR) may worsen, and patients are routinely counselled regarding this concern. If this is indeed the case, then it could be hypothesized that patients who undergo endoscopic partial myotomy would have less severe reflux symptoms post-operatively than patients who undergo an open complete myotomy.

Methods: A retrospective chart review was performed. Inclusion criteria included all patients who underwent endoscopic or open cricopharyngeal myotomy, with or without Zenker's diverticulectomy. Patients were excluded if they underwent revision surgery. The preoperative and postoperative reflux symptom index (RSI), voice handicap index (VHI-10), and eating assessment tool scores (EAT-10) were compared.

Results: A total of 30 patients were included in the study. Fourteen patients underwent an endoscopic procedure and 16 patients underwent an open procedure. The average follow up time was 212 days. The overall average pre- and postoperative RSI were 22.1 and 9.0, respectively ($p < 0.001$). The average pre- and postoperative RSI for the endoscopic group were 21.3 and 8.3, respectively ($p < 0.001$). The average pre- and postoperative RSI for the open group were 22.8 and 9.6 ($p < 0.001$). There was no significant difference in VHI-10 scores pre- and post-operatively. The EAT-10 scores were significantly improved in all groups.

Conclusions: Patients' LPR symptoms significantly improved after cricopharyngeal myotomy. Concern for worsening of reflux symptoms following surgery does not appear to be clinically common.

Introduction

Cricopharyngeal achalasia and Zenker's diverticulum are physiologically related in etiology as both are due to a dysfunction of the cricopharyngeus muscle. In Zenker's diverticulum, cricopharyngeal dysfunction leads to the formation of a pharyngeal pouch from dehiscence in Killian's triangle. In both cases, treatment involves cricopharyngeal myotomy. Myotomy can be performed either via an open transcervical or an endoscopic transoral approach. With the endoscopic stapler approach, myotomy has been shown to be incomplete on postoperative barium swallow studies, whereas with an open approach, a complete myotomy is obtained.[1-3] This has been cited as the main reason for the higher rate of recurrent disease with the endoscopic approach compared to the open approach.[4]

Gastroesophageal reflux disease has been hypothesized to contribute to the etiology of cricopharyngeal dysfunction[5]. Cricopharyngeal myotomy, which impacts upper esophageal sphincter tone and continence, could potentially allow for regurgitation of refluxate into the hypopharynx and larynx and worsen systems of laryngopharyngeal reflux (LPR). Similarly, patients who undergo a partial myotomy would hypothetically have less reflux symptoms than patients who undergo a complete myotomy.

In this paradigm, we hypothesize that following cricopharyngeal myotomy, symptoms of LPR are worse than the pre-operative symptoms and that these symptoms are less severe in the endoscopic partial myotomy approach than in the open complete myotomy approach.

Methods

A retrospective chart review was performed at a single tertiary care institution. Inclusion criteria consisted of all patients who underwent endoscopic or open cricopharyngeal myotomy, with or without Zenker's diverticulectomy between April 1, 2010 and May 1, 2014. Patients were excluded if they subsequently underwent revision surgery. Endoscopic techniques included CO_2 laser myotomy for patients with cricopharyngeal achalasia alone and staple diverticulotomy for patients with a Zenker's diverticulum. To determine pre- and postoperative symptoms of LPR, the reflux symptom index (RSI), a self-administered nine-item outcomes instrument for LPR, was used.[6] Voice handicap index (VHI-10) and eating assessment tool scores (EAT-10) were also compared pre- and post-operatively. The postoperative scores were obtained from the patient's most recent follow-up appointment. The Wilcoxon signed rank test was used to compare data between groups. A significant difference was defined as a p-value < 0.05. All statistical analysis of the data was performed using SPSS version 22.0 (SPSS, Inc., Chicago, IL).

Results

A total of 30 patients were included in the study. Seventeen (57%) were male patients and 13 (43%) were female patients. The average age was 75 years old (range 49-93 years). Fourteen patients underwent an endoscopic procedure and 16 patients underwent an open procedure. The average follow up time was 212 days (ranging from 9 days to 2.7 years).

The overall average pre- and postoperative RSI were 22.1 and 9.0, respectively ($p < 0.001$), which was a significant difference. The overall average pre- and postoperative VHI-10 was 4.5 and 3.5, respectively ($p=0.363$), which was not significantly different. The overall average EAT-10 scores pre- and postoperatively were 19.1 and 4.7, respectively ($p<0.001$), which was significantly different. This data is summarized in Figure 1.

The average pre- and postoperative RSI were then compared for the open group and the endoscopic group. In the open group, the average pre- and postoperative RSI were 22.8 and 9.6 ($p < 0.001$), which was significantly different. The average pre- and postoperative RSI for the endoscopic group were 21.3 and 8.3, respectively ($p < 0.001$), which were also significantly different. This data is summarized in Figure 2. These results suggest that there was a similar decrease in LPR symptoms post-operatively, regardless of technique.

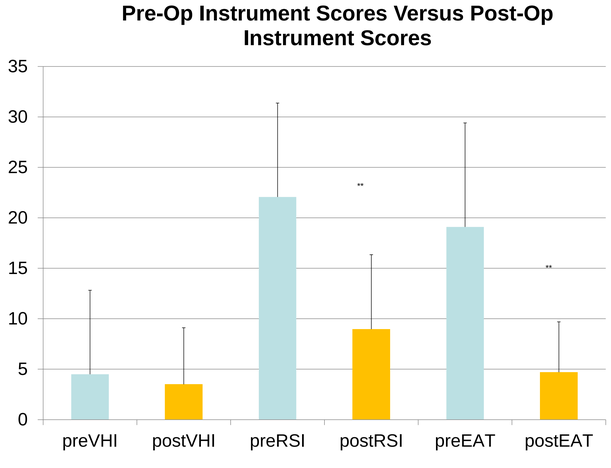

Figure 1. Comparison of preoperative and postoperative VHI-10, RSI, and EAT-10 scores. **Indicates significant difference ($p<0.05$).

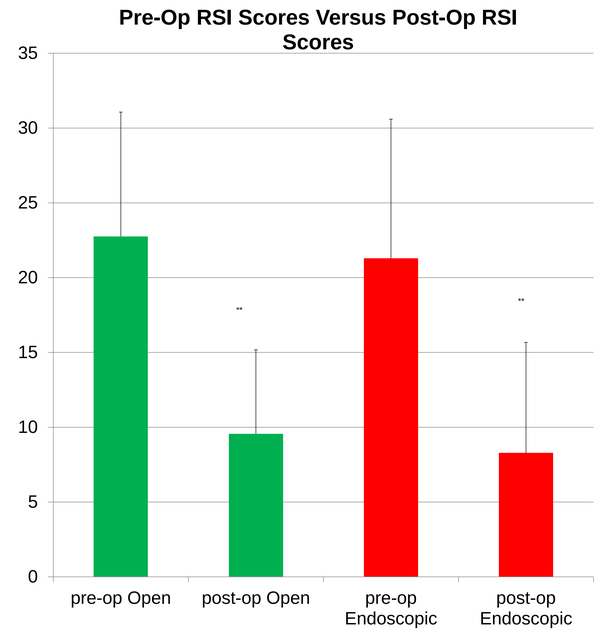

Figure 2. Comparison of preoperative and postoperative RSI scores in the open versus endoscopic patients. The green bars indicate an open approach and the red bars indicate an endoscopic approach. **Indicates signficant difference ($p<0.05$).

Discussion

It is speculated that cricopharyngeal myotomy can worsen symptoms of gastroesophageal and laryngopharyngeal reflux because loss of upper esophageal sphincter tone will facilitate refluxate into the hypopharynx. Classic dictum suggests that severe reflux should be considered a possible contraindication to cricopharyngeal myotomy.[7-8] However, evidence to support this hypothesis is lacking.

Interestingly, our study showed that symptoms of LPR significantly improved after cricopharyngeal myotomy. This significant change was seen regardless of the technique used. The average RSI score was above 13 preoperatively, which according to Belafsky et al[6], suggests that on average, these patients likely had LPR pre-operatively. Post-operatively, the average RSI decreased to less than 13, suggesting resolution of LPR. This decrease in RSI scores was very similar between the endoscopic and open groups. There was also a significant improvement in EAT-10 scores postoperatively, a validated outcome instrument for dysphagia.[9] This suggests that the surgery was successful in treating these patients' dysphagia.

Similar findings were reported in a study conducted by Dale et al.[10] In this study, RSI was measured before and after endoscopic laser cricopharyngeal myotomy. They found that the RSI improved in 88% of patients post-operatively. Williams et al[11] used objective measures to determine if reflux was worse after cricopharyngeal myotomy and their study found no difference in reflux postoperatively. In their study, dual pH monitoring was performed preoperatively and postoperatively after open cricopharyngeal myotomy. The basal upper esophageal sphincter pressure was significantly reduced postoperatively, but esophagopharyngeal reflux was a rare event and there was no change in frequency of reflux postoperatively.

Discussion (con't)

Limitations of our study include the retrospective nature of the study design and the lack of objective data in determining pre- and postoperative reflux. Because the data was collected retrospectively and the average follow up period was less than 1 year, it is unknown if the symptoms of LPR worsen over a prolonged period of time after surgery, such as 5 or 10 years postoperatively. Also, pre- and postoperative impedance/pH-metry testing was not done, so objective evidence of any changes in reflux was not determined. However, our study does show that symptomatically, patients do not have worsening LPR after cricopharyngeal myotomy. Therefore, counselling the patient that reflux symptoms could worsen after surgery is not warranted.

Conclusions

There is a significant improvement in RSI scores after cricopharyngeal myotomy, with or without Zenker's diverticulectomy. This is seen in cases of both partial myotomy (endoscopic approach) and complete myotomy (open approach). Therefore, incontinence of the upper esophageal sphincter after myotomy does not worsen symptoms of LPR and does not warrant pre-operative counselling.

References

1. Witterick IJ, Gullane PJ, Yeung E. Outcome analysis of Zenker's diverticulectomy and cricopharyngeal myotomy 1995. Head Neck 17:382–388.
2. Jaramillo MJ, McLay KA, McAteer D. Long-term clinicoradiological assessment of endoscopic stapling of pharyngeal pouch: a series of cases 2001. J Laryngol Otol 115:462–466.
3. Ong CC, Elton PG, Mitchell D. Pharyngeal pouch endoscopic stapling—are post-operative barium swallow radiographs of any value? 1999. J Laryngol Otol 113:233–236.
4. Verdonck J, Morton RP. Systematic review on treatment of Zenker's diverticulum. Eur Arch Otorhinolaryngol 2014[Epub ahead of print].
5. Veenker EA, Andersen PE, Cohen JI. Cricopharyngeal spasm and Zenker's diverticulum. Head Neck 2003;25(8):681-94.
6. Belafsky PC, Postma GN, Koufman JA. Validity and reliability of the reflux symptom index (RSI). J Voice 2002;16(2):274-7.
7. Peters JH, DeMeester TR. Surgery for esophageal motor disorders. In: Castell DO, ed. The esophagus. Boston: Raven Press, 1993:395– 434.
8. Bokstein F and Korczyn AD. Gastrointestinal Manifestations of Muscle Disease. In: Quigley EMM, Pfeiffer RF, ed. Neuro-gastroenterology. Philadelphia: Elsevier, 2004:125.
9. Belafsky PC, Mouadeb DA, Rees CJ, Pryor JC, Postma GN, Allen J, Leonard RJ. Validity and reliability of the Eating Assessment Tool (EAT-10). Ann Otol Rhinol Laryngol 2008;117(12):919-24.
10. Dale OT, Mackeith S, Burgess CA, Rourke TJ, Winter SC, Corbridge RJ. Functional outcomes following endoscopic laser cricopharyngeal myotomy with mucosal repair. Eur Arch Otorhinolaryngol. 2014;271(6):1631-4.
11. Williams, R.B.H., Ali, G.N., Hunt, D.R., Wallace, K.L., Cook, I.J. Cricopharyngeal myotomy does not increase the risk of esophagopharyngeal acid regurgitation. American Journal of Gastroenterolog 1999;94(12).