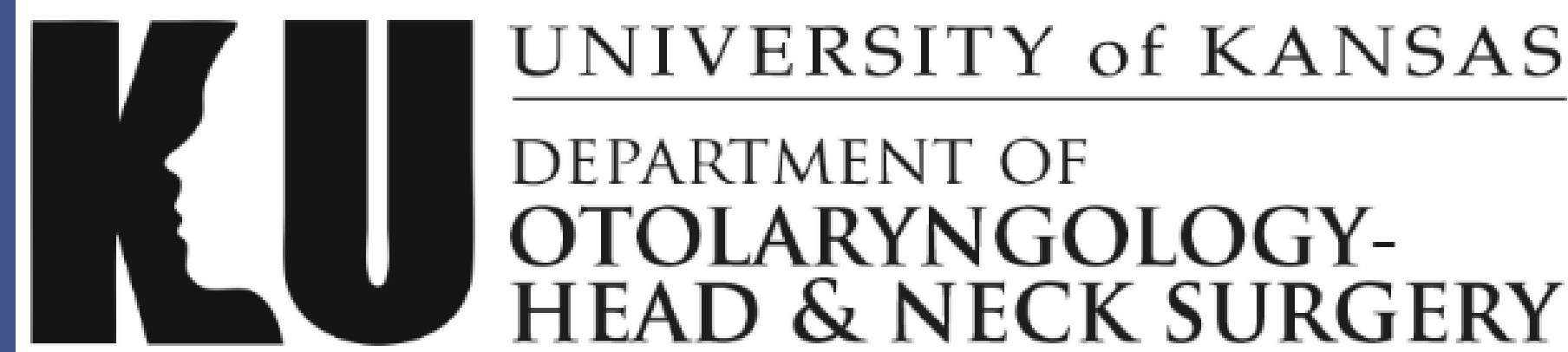
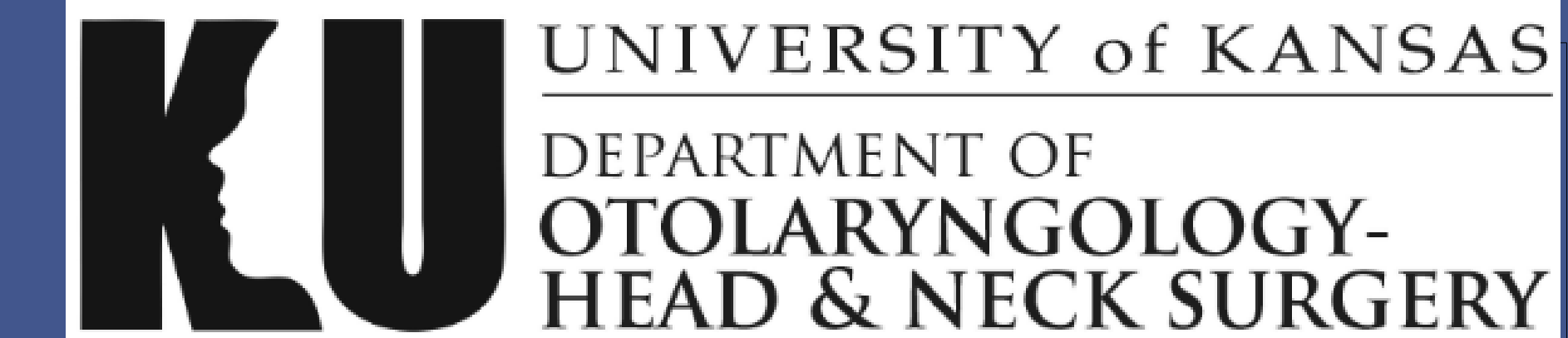


# Evaluation of Surgical Outcomes for Nasal Pharyngeal Stenosis Surgery



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## ABSTRACT

**Educational Objective:** Assess long term outcomes of revision pharyngoplasty. Performed to correct nasopharyngeal stenosis.

**Objectives:** To determine whether velopharyngeal insufficiency (VPI) revision surgeries performed on subjects with nasopharyngeal stenosis improved their speech, sleep, and nasal breathing.

**Study Design:** A retrospective chart review.

**Methods:** 32 subjects were examined who had VPI surgery during the study period. Five subjects were identified to have had revision VPI surgery, four of which had revision surgery for nasopharyngeal stenosis. All four subjects had their primary surgery at another institution or by another surgeon. Speech evaluations were completed by a certified Speech and Language Pathologist who specializes in cleft care. Nasal emission, hypernasality, hyponasality, degree of deviation, impact on speech intelligibility, and VP symptoms contribution to the communication deficit were all examined. In the nasal emission, hypernasality, and hyponasality categories there were three trials and the average of the scores in each trial was used as the overall rating for that specific trial. All of the ratings were given on a 1-5 scale according to the score given to the subject by the speech therapist during the encounter. The four subjects' pre-revision ratings were averaged in each of the three categories, nasal emission, hypernasality, and hyponasality respectively. The same was done for the post-revision ratings. Particularly, hyponasality was examined to assess if there was an improvement in nasal breathing and speech.

**Results:** Nasal emission scores improved post-revision, going from 1.1 pre-revision to .94. Hypernasality scores improved from 1.3 pre-revision to .86 post-revision. And, hyponasality scores improved from 2.13 pre-revision to 1.63 post-revision. The decrease in hyponasality supports an improvement in breathing and speech, and the decrease in hypernasality and nasal emission represents an improvement in speech.

**Conclusions:** On average, the re-vision surgery helped improve their nasal air flow and breathing and positively affected their speech.

## STUDY DESIGN

A retrospective chart review.

## Contact

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## INTRODUCTION

Velopharyngeal insufficiency occurs when the nasopharynx fails to completely close during speech, allowing air to pass through the nose unnecessarily. Of the complications seen in patients with cleft lip and palate, VPI is the most common, with a 20% occurrence. Surgical correction is typically necessary to treat VPI. A rare complication of VPI surgery is nasopharyngeal stenosis. When this occurs, nasal airflow is limited affecting breathing and speech outcomes.

Our retrospective chart review examined whether VPI revision surgeries, performed on subjects with nasopharyngeal stenosis, improved their nasal breathing, sleep, and speech. We hypothesized that revision surgery improves nasal breathing and speech outcomes.

## RESULTS

### Subject Demographics

- Four subjects who underwent velopharyngeal insufficiency revision surgeries for nasopharyngeal stenosis.
- Primary VPI surgeries were done at outside institutions or by physicians no longer practicing.
- Surgical Indications: nasopharyngeal stenosis
- Study Population: 3 males, 1 female
- Subject mean age range: 6-13

**Individual Scores:** Nasal emission scores for Subjects 1, 2, 3, and 4 pre-revision were 3.11, 1.11, 0, and 0, respectively, and post-revision were 1, 1.57, 1, and 0.18, respectively. Hypernasality scores for the subjects were 4, 1.25, 0, and 0 pre-revision, and 1, 1, 1, and .44 post-revision, respectively. For hyponasality the scores were 1, 2.5, 3, and 2 pre-revision and 3.5, 1, 1, and 1 post-revision, respectively.

**Averages:** The subjects' average pre-revision nasal emission score was 1.1 and was .94 post-revision. The subjects' average pre-revision hypernasality score was 1.3 and was .86 post-revision. The subjects' average pre-revision hyponasality score was 2.13 and was 1.63 post-revision.

## CONCLUSIONS

According to our results, nasal emission, hypernasality, and hyponasality improved post-revision. This suggests that nasal air flow improved due to a decrease in hyponasality and speech improved as shown by a decrease in hypernasality and nasal emission.

Although uncommon complications arise from primary VPI surgery, in our experience a revision procedure is sometimes required and the results are variable. Based on our average scores, revision VPI surgery ultimately benefits the subject with regards to improved nasal air flow suggesting improved breathing and speech outcomes. Therefore, revision VPI surgery for nasopharyngeal stenosis subjects is overall beneficial.

## DISCUSSION

Velopharyngeal insufficiency occurs when the velopharyngeal sphincter remains slightly open during speech leading to air flow through the nose rather than the mouth. VPI can be corrected with one of three surgical procedures: furrow palatoplasty, sphincter pharyngoplasty, or pharyngeal flap. A rare complication of VPI surgery is nasopharyngeal stenosis. Nasopharyngeal stenosis occurs secondary to scar tissue in the nasopharynx, which prevents air flow between the nasopharynx and oropharynx. Some hallmarks of nasopharyngeal stenosis include: sleep apnea, snoring, hyponasality and speech disturbances. To date, no study has specifically addressed post-operative nasopharyngeal stenosis as a result of VPI surgery, or nasopharyngeal stenosis improvement post revision VPI surgery.

Pre and post VPI surgery speech data for 32 subjects was collected. Of those, 5 subjects had revision VPI surgeries, resulting in a 16% revision rate. When compared with another retrospective analysis of VPI surgeries, Carlisle et al had a 13% revision rate with sphincter pharyngoplasty and furrow palatoplasty. One subject of theirs underwent revision for obstructed sleep; whereas, 4 subjects of ours had obstructed sleep.

For the purpose of our study, average scores were used for the results. It is important to consider that when individual scores are examined, the results differ. Subject 1 had increased hyponasality post-revision suggesting the possibility of greater nasal obstruction. In this subject, nasal emission and hypernasality decreased. A decrease in hypernasality and nasal emission post surgery is a positive speech outcome, but is also consistent with greater obstruction to nasal air flow. Post-revision the subject was more hyponasal than before, but less hypernasal. For Subject 2, hyponasality decreased, hypernasality decreased and nasal emission increased slightly. Overall the subject was considered to have improved speech (i.e., less hyponasality and less hypernasality). Subject 3 had less hyponasality post-revision suggesting improved nasal air flow. However, nasal emission and hypernasality increased. This suggests the revision surgery successfully opened the airway (less hyponasality), but was somewhat detrimental to speech (increased hypernasality). Subject 4 also had less hyponasality post-revision and a slight increase in hypernasality. Similar to subject 3, this suggests an improved open airway but a slight degradation to speech in the form of increased hypernasality.

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