Injection Pharyngoplasty With a Hyaluronic Acid and Dextranomer Copolymer to Treat Velopharyngeal Insufficiency in Adults

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Abstract

Objective: To describe the treatment of adult velopharyngeal insufficiency (VPI) with injection of a hyaluronic acid and dextranomer copolymer (Dx/HA).

Patients and Methods: This was a retrospective case series of 25 consecutively treated adults with VPI who underwent Dx/HA injection pharyngoplasty in a multidisciplinary clinic from January 1, 2011, to December 31, 2014. Data recorded included etiology of VPI, perceptual analysis of resonance, nasalance scores, and estimation of velopharyngeal gap characteristics on video nasendoscopy before and after the intervention. Statistical comparisons were made using a 2-tailed Wilcoxon signed rank test and the Kruskal-Wallis test.

Results: Patients had VPI due to a neurologic etiology, due to a benign anatomic etiology, or acquired after treatment for a head and neck malignancy. Injections were performed with local anesthesia, monitored anesthesia care, or general anesthesia. There were statistically significant improvements in speech resonance, nasalance, and velopharyngeal gap size after treatment. Patients with neurologic or benign anatomic etiologies of their VPI had more significant improvement than those with VPI after treatment of malignancy. Nineteen of the 25 patients required only 1 injection to achieve their final result.

Conclusion: Injection pharyngoplasty with a readily available Dx/HA is an effective treatment for VPI that allows for titration to complete velopharyngeal closure under local anesthesia or light sedation. It is most effective in patients with nonmalignant etiologies of VPI and in those with good lateral wall motion. Complications experienced were postoperative neck pain and occult retropharyngeal fluid collection, highlighting the importance of follow-up.

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Results of injection pharyngoplasty are promising, with improvement in patients' VPI and with less morbidity than traditional surgical repairs. However, optimal patient selection and the ideal injection material have yet to be determined. A copolymer gel consisting of hyaluronic acid and dextran polymer microspheres (Dx/HA) has been used with success in the treatment of vesicoureteral reflux, an anatomic deficiency of a sphincter similar to that in VPI. Herein, we report the first series of adult patients treated for VPI with injection pharyngoplasty using Dx/HA. We also discuss the indications, complications, efficacy, and durability of this minimally invasive technique.

PATIENTS AND METHODS
A single-center, retrospective review of 25 consecutively treated adult patients who underwent injection pharyngoplasty for VPI from January 1, 2011, through December 30, 2014, was completed. This study was approved by the Mayo Clinic Institutional Review Board. The study patients represented the initial 25 adult patients who were offered injection pharyngoplasty with Dx/HA. There were no inclusion or exclusion criteria applied, and patients were offered injection pharyngoplasty if they had symptomatic VPI. Before treatment, patients were informed that the use of Dx/HA in the pharynx was off-label, and all the patients agreed to proceed. All the procedures were performed by the senior author (S.A.C.).

Patients were evaluated in a multidisciplinary clinic with an otolaryngologist and a speech-language pathologist. A thorough evaluation of the etiology of each patient’s VPI was undertaken before treatment because VPI can be the presenting symptom of a more serious condition. A standardized multidisciplinary evaluation performed during each clinic visit consisted of a speech evaluation to determine perceptual judgment of nasality, presence of nasal grimace and nasal emission, and instrumental assessment of nasalance. This evaluation was followed by flexible nasopharyngoscopy, with a standardized speech sample elicited during direct visualization of velopharyngeal function. Data recorded included the perceptual rating of nasality as scored by a speech-language pathologist according to a subjective scale of normal resonance, or mild, moderate, or severe hypernasality. Nasalance was recorded using a Nasometer II (model 6450; KayPENTAX) while reading the zoo passage. The zoo passage is a standardized sample of connected speech with a mean ± SD nasalance of 11.25%±5.63% in normal English-speaking adults. Nasalance data were not available for every patient because we began obtaining this objective value of nasal resonance in 2012. Velopharyngeal gap size and velopharyngeal closure pattern were recorded during flexible nasopharyngoscopy. Gap sizes were scored according to a standardized scale: small gaps as less than 20% of the resting velopharynx, moderate gaps as 20% to 50%, and large gaps as greater than 50%. Closure was described as a circular or coronal pattern with no, poor, or full lateral wall motion.

After injection pharyngoplasty, patients were requested to return to the VPI clinic for follow-up 4 to 6 weeks postoperatively and again every 6 months, or sooner if recurrent symptoms of VPI developed. At each visit, the standardized multidisciplinary evaluation described previously herein was repeated. If patients were deemed to have VPI limiting speech intelligibility or swallowing, repeated injection was offered. All the patients attended at least 1 follow-up appointment.

Statistical Analyses
Presurgical and postsurgical measures of perceptual speech nasality, nasalance, and estimated velopharyngeal gap size were analyzed. Categorical variables (speech nasality and gap size) are presented in contingency tables, and the continuous variable (nasalance) is presented as median (range). Although this is largely a descriptive report of our initial experiences with a novel surgical method of treating adults with VPI, limited statistical analyses were performed on these paired measures using a 2-tailed Wilcoxon signed rank test and the Kruskal-Wallis test. A Kruskal-Wallis test was also used to assess for a difference in response to injection pharyngoplasty with Dx/HA based on the etiology of a patient’s VPI. Statistical comparisons were made between the preoperative values and data obtained at the patient’s initial follow-up visit. Data obtained during any subsequent follow-up evaluations,
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