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Surgery for velopharyngeal insufficiency: The outcomes of the University Hospitals Leuven☆

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ABSTRACT

Objectives: We reviewed the outcomes of patients who underwent a velopharyngoplasty and subsequent speech therapy for velopharyngeal insufficiency (VPI) to determine possible prognostic variables.
Methods: During the period 2002–2010, 91 patients with VPI underwent a velopharyngoplasty (either the Honig velopharyngoplasty, the modified Honig velopharyngoplasty or the Hynes pharyngoplasty). Of these, 62 had complete data for long-term evaluation of speech outcome and analysis of variables potentially influencing this outcome. Speech outcome was assessed using five criteria that were evaluated pre- and postoperatively: hypernasality, nasal emission, facial grimacing, retro-articulation and glottal stops. The former two variables were transformed into a semi-objective nasality index (NI), the latter three variables were assembled to form a subjective articulation index (AI). Prognostic variables for outcome that were studied included age at velopharyngoplasty, associated 22q11.2 deletion syndrome, intervention type, primary or secondary surgery and pre-intervention speech therapy.
Results: Before surgery, based on the NI, 15 patients had mild VPI and 44 patients had moderate to severe VPI. Postoperatively at 12 months, 46 patients had a good speech outcome (normal or mild VPI), 13 patients had moderate VPI and no more severe VPI was observed. The overall success rate of 78% after one year increased to 90% in the long-term (median 27 months) with further speech therapy. Patients without the diagnosis of 22q11.2 deletion syndrome had better speech outcomes than patients with the syndrome. No statistically significant effect of the age at velopharyngoplasty on speech outcome was found. No cases of sleep apnea syndrome were reported.
Conclusions: Our protocol of patient tailored surgical interventions and further postoperative speech therapy results in good speech outcomes, with no or only mild remaining VPI for the majority of patients. The correction of VPI is more difficult for the subgroup of patients with 22q11.2 deletion syndrome.

Velopharyngeal insufficiency is the inability to completely close the velopharyngeal port during speech production or feeding. It results from a discrepancy of velar length versus the depth of the nasopharynx, or from insufficient lifting of the velum towards the posterior pharyngeal wall. This insufficiency may provoke excessive nasal resonance (hypernasality), escape of air through the nose while speaking (nasal emission), unclear or distorted articulation, aberrant facial movements during speech (facial grimacing) or nasal regurgitation of food and liquids [1,2]. The unclear or distorted articulation can be explained by the inability to increase the intra-oral air pressure that is required for the formation of several consonants (in particular the plosives like/p/,/t/and/d/). As a compensation, patients may form sounds more in the back of the throat:/k/and/g/. This is called retro-articulation. Oral plosives may also be substituted by glottal stops, as the glottis is the only point in the vocal tract where the child can achieve an increase in air pressure. Facial grimacing is the use of the nasal or

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facial muscles in an attempt to prevent the escape of air through the nose. A variety of factors may cause VPI, the most common being an overt or submucous cleft of the soft palate [2].

If hypernasality persists after primary repair of the cleft palate and after intensive speech therapy, surgery is indicated to improve velopharyngeal function. A large number of surgical techniques are described to address VPI. These can be grossly divided in palatoplasties (aimed at increasing the length and/or the mobility of the palate), pharyngoplasties (aimed at decreasing the velopharyngeal space) and palato-pharyngoplasties (a combination of both) [3,4]. In the University Hospitals Leuven, the conventional Honig velopharyngoplasty and the modified Honig procedure were the most common surgical procedures to treat VPI between 2002 and 2010. Both techniques combine palatal lengthening by retropositioning the velum, with the insertion of a pharyngeal flap. The modification can be found in the type of palatal flap used for retropositioning, with the conventional Honig velopharyngoplasty using full thickness mucoperiosteal flaps for the oral lining of the defect and the modified Honig procedure using mucosal (supraperiostal) flaps, thus preserving the periosteum and the palatine artery [5].

The used pharyngeal flap is a superiorly based midline myomucosal flap from the posterior pharyngeal wall (superior pharyngeal constrictor fibres and horizontal fibres of the palatopharyngeal muscle). The flap is inserted to the nasal side of the posterior border of the hard palate, creating a midline obstruction of the oral and nasal cavities with 2 lateral velopharyngeal openings, or ports [4,5].

In 2007, the Hynes procedure was introduced in our hospital. The goal of this procedure is to augment the posterior pharyngeal wall and thus to diminish the velopharyngeal gap. This is accomplished by transposing bilateral superiorly based myomucosal flaps, raised from the lateral pharyngeal walls, to the posterior pharyngeal wall and to each other [4].

Primary closure of the donor defect also approximates the horizontal fibres of the palatopharyngeal muscles.

The Hynes technique was used for persistent mild VPI despite reaching the maximum outcome of speech therapy, due to a relatively small velopharyngeal defect in the presence of a good, posterior position of the levator sling.

The aim of this study was to evaluate the results of correction of VPI using a conventional Honig velopharyngoplasty, a modified Honig velopharyngoplasty or a Hynes procedure and the postoperative speech therapy course. A chart review was performed of the pre- and postoperative speech analyses of patients who underwent one of this procedures in our institution. A distinction was made between patients with and patients without 22q11.2 deletion syndrome, who are observed to have VPI that is more difficult to correct [7]. The relation to possible prognostic variables (intervention type, age at surgery, primary or secondary surgery and the duration of pre-intervention speech therapy) was also explored.

1. Patients

The records of all patients who underwent a conventional Honig velopharyngoplasty, a modified Honig velopharyngoplasty or a Hynes pharyngoplasty for VPI in our hospital between 2002 and 2010 by one senior surgeon (V.V.) were reviewed. For all patients, the decision to proceed to surgery was made based on a combination of elements from the clinical examination, the evaluation by the Cleft Lip and Palate team speech therapist, and a videofluoroscopic study at the initial presentation. The latter study resulted in the immediate decision to proceed to surgery in case of documented anatomic velopharyngeal disproportion that was judged not correctable using further speech therapy. If videofluoroscopy indicated a minor anatomical defect in combination with inconsistent VPI, speech therapy was continued as long as progress was made, turning to surgery in case of 6 months of progress stagnation. The group consisted of 91 consecutive patients. Of 29 patients one or more data were missing, reducing the study population with complete records to a group of 62 patients, 30 females and 32 males. The average age at the time of surgery of this last group was 10 years (127 months), ranging from four to 46 years of age. The VPI was due to a submucous cleft palate (16), a cleft palate (12), a congenital short velum (11), unilateral complete cleft lip and palate (9), bilateral complete cleft lip and palate (6), or followed adenoidectomy and/or tonsillectomy (8) (Fig. 1). Fourteen patients were known with 22q11.2 deletion syndrome (of which six had a submucous cleft and one had a cleft palate – the others had VPI due to hypo- or atonia of the muscles). All patients with VPI due to a congenital short velum and VPI following adenoidectomy and/or tonsillectomy underwent a primary velopharyngoplasty, as did 12 patients with VPI due to a submucous cleft palate, and 2 patients with VPI due to a cleft palate. The remaining 29 patients underwent a secondary velopharyngoplasty of which 21 patients underwent the primary surgery in another hospital (Fig. 1).

Of the 91 studied patients, one or more data were missing in 35 patients for the NI and in 32 patients for the AI. Median follow-up was 17 months, the range being 8–79 months.

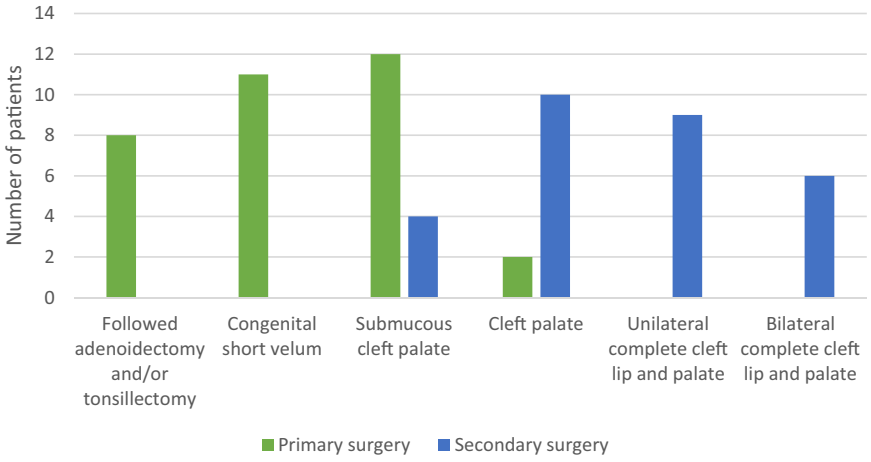

Fig. 1. Distribution of patients based on cleft type with a distinction between primary and secondary velopharyngoplasty.