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Time course of improvement after re-repair procedure for VPI management

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Summary *Objectives:* Palatal re-repair aims to improve velar function by retro-positioning the levator veli palatini muscles. The surgery includes extensive dissection, leading to tissue edema and scar formation which may need time to remodel. Together with the change of muscle orientation and tension, it is expected that a period of time is needed to reach the final functional performance. This study attempts to determine how much time is required to reach the optimum performance of the palate after re-repair.
Methods: A retrospective chart review identified consecutive cleft patients with VPI who underwent palate re-repair procedure by a single surgeon from 2000 to 2015 and achieved normal or borderline normal VP function. Only patients who had regular postoperative follow-up visits for speech assessments until resolution of speech abnormalities were included. The percent of patients cured at each time point following surgery was recorded.
Results: Forty-five patients met the inclusion criteria. The mean age at surgery was 6.6 ± 3.2 years. Speech abnormalities had resolved in 44.5% of patients within the first 6 months after surgery, 62.2% after up to 1 year, 75.6% after up to 2 years and 88.9% after up to 3 years post re-repair palatoplasty. The remaining 11.1% continued to improve after 3 years up to 6 years.
Conclusions: Re-repair procedures may take a longer time than previously thought for the final outcome to manifest. Close monitoring of improvement with continued speech therapy is recommended before deciding to move to the next surgical step in management.

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Introduction

The palate re-repair procedure is considered to be a physiologic approach for the management of velopharyngeal incompetence (VPI) and is accomplished by complete dissection and repositioning of the abnormally oriented levator veli palatini muscles into a more posterior, horizontal and functional position (IVVP).[1] The re-repair procedure was popularized by Sommerlad et al (1994; 2002) who described clear operative details of the surgical procedure with the use of the operative microscope and suggested IVVP as a first line treatment for VPI.[1,2] Re-repair has since become a popular procedure. In a recent survey of VPI management in the UK and Ireland, palatal re-repair was the most frequently utilized corrective surgical procedure for VPI.[3] The surgery includes multi-plane tissue dissection and extensive muscle release from the oral, nasal mucosa and the tensor aponeurosis. This degree of muscle manipulation could be expected to result in tissue edema and subsequent scar formation. Scars are known to take a long time to remodel and soften which in turn makes it easier for the muscles to move and lift up the palate. Also, with the change in muscle direction and tension, time might be needed for muscle re-training to take place. So, it is expected that a certain time is needed to reach the final optimum performance of the palate. A search of the palate re-repair literature revealed that no publication exists documenting the time course of this functional resolution or for any other VPI procedures.

This study aims to examine the time course to functional resolution and answer the question of how much time is needed after the re-repair procedure for those who will resolve to achieve their final recovery. This information is important for the cleft team to aid decision making about the timing of the next surgical procedure in the algorithm of the VPI management protocol.

Patients and methods

A retrospective chart review approved by the institutional review board (IRB) of the authors' institution included single surgeon experience with consecutive cleft patients who underwent a palate re-repair with radical muscle dissection for VPI management during the period from 2000 to 2015 at UAB cleft and craniofacial center. Only patients who achieved normal or borderline normal speech post re-repair were included. Inclusion criteria also mandated that patients have regular serial follow-up speech assessments in order to facilitate localization of the time point at which the change to normal or borderline normal nasality and nasal emission scores occurred. These patients were further divided into two groups; older (>6 years) and younger patients (≤6 years).

The indication for re-repair included all post-palatoplasty VPI cases where the velar muscle position is not ideally transverse as evidenced by oral and nasoendoscopic examination regardless of the velopharyngeal gap size. Endoscopic evidence includes a dorsal groove and the concavity of the nasal side of the soft palate, as well as an oblique muscle bulge seen on the nasal surface of the palate with phonation during awake nasoendoscopy.

The speech assessment was done by two experienced speech pathologists (MA and LS) during patients' routine cleft clinic follow-up and assessment schedules. Each patient had his/her own assigned speech pathologist for follow-up assessments. Speech data were obtained by reviewing the clinical records retrospectively. The nasality and nasal emission score components of the Pittsburgh Weighted Speech Score (PWSS) were used because these score components best identify velopharyngeal closure as distinct from language skills such as articulation.[4] These speech scores were assessed preoperatively and at serial postoperative visits spaced three months, six months, one year and then yearly after the re-repair. Patients were kept in follow-up as long as their serial evaluations demonstrated improvement. The definition of normal or borderline normal speech is the nasal emission or nasality scores are 0 or 1 for each category.

The cleft center protocol included that all patients received speech therapy as part of the usual cleft care after the primary palatoplasty once the child demonstrated compliance and postoperatively after re-repair, until achieving either: normal speech or (in the event of failure to progress) a decision was made for the next VPI surgical procedure according to our center management protocol.

The re-repair surgical procedure was performed by a single surgeon (JHG) under loupe magnification (3.5X) and included complete dissection and skeletonization of the velar muscle bundle (levator and overlying palatoglossus, palatopharyngeous and part of the tensor tendon) from the posterior edge of the hard palate, tensor aponeurosis anterolaterally, oral and nasal mucosa until the muscle was able to move freely to be sutured with the contralateral muscles transversely across the posterior border of the palate (Figure 1). At the completion of this dissection, the levator muscles are seen as distinct muscles, free of any tethering attachments to the nasal mucosa or adjacent muscles. The origin at the skull base is clearly demonstrated and the levator muscle can therefore be verified to lie in a transverse orientation.

The technique is similar to that described by Sommerlad et al[1] with the following differences; the dissection does not aggressively skeletonize the nasal mucosa but rather leaves a submucous white fascial layer to preserve good nasal lining vascularity; closure of the velar muscles with Lembert-like interrupted inverting stitches[5] on the anterior and oral sides to invert the redundant muscle length posteriorly and nasally, achieving a proper tension for the muscle sling (this may need 2–4 sutures) with Vicryl 4-0; the remaining lateral palatopharyngeous fibers running posterioanteriorly are cauterized to release them; and if there is tension on the posterior excursion of the oral mucosal layer, a small Z-plasty is done in the old midline scar over the area of muscle repair.[6]

Statistical analysis

Data analysis was done using GraphPad® Prism software (version 7). Descriptive statistics were used. Chi-square analysis and Fisher's exact test were used to test the differences between older and younger patient groups.

Results

Forty-five patients met the study criteria. The mean age at surgery was 6.6 years (range, 3 to 14 years). The mean