

Original article

Outcomes of Soft Palate Lengthening for Persistent Nasal Speech in Post-Palatoplasty Patients Over Five Years of Age

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Velopharyngeal Insufficiency (VPI); Hypernasality; Soft Palate Lengthening; Intravelar Veloplasty; Posterior Pharyngeal Flap.

ABSTRACT

Having nasal speech due to velopharyngeal insufficiency (VPI) remains one of the most difficult complications to manage after cleft palate repair. Over early childhood, persistent hypernasality can impede the psychosocial and communicative development of a child. The purpose of this study was to assess the results of secondary soft palate lengthening surgery on children older than five years with a history of primary palatoplasty and persistent nasal speech. In this study, 60 non-syndromic patients with cleft palate whose nasal speech was persistent after cleft palate repair were included from January 2018 to December 2024 at Misurata Medical Center, Libya. Each of them underwent soft palate lengthening, most by intravelar veloplasty, and some by posterior pharyngeal flap. All the patients had preoperative and 12-month postoperative speech evaluation from both perceptual (Pittsburgh Weighted Speech Scale) and instrumental (nasometry) analysis. For statistical analysis, paired t-tests were used, with $P < 0.05$ considered significant. Of the total, 80% of patients had complete hypernasality correction, and 13.3% had partial correction. There was a significant improvement postoperatively on nasalance scores ($48.5 \pm 9.2\%$ to $24.1 \pm 6.8\%$, $P < 0.001$). 85% of the patients had improved speech intelligibility, with more than 86% of parents satisfied with the overall results. 10% had transient snoring and 5% had wound dehiscence, both classified as minor complications and were conservatively managed. For patients older than five years, soft palate lengthening is a secondary procedure that is both safe and effective for persistent nasal speech after cleft palate repair. It shows remarkable positive outcomes in resonance, intelligibility, and psychosocial confidence.

Introduction

Cleft lip and palate anomalies are the most frequent congenital craniofacial anomalies and occur with a global prevalence of approximately 1 in 700 live births [1]. First surgery, primary palatoplasty, focuses on the restoration of the anatomy and the continuity of the palate and functionality of the velopharynx. However, it is estimated that about 20–30% of patients have residual dysfunction and/or VPI [2,3]. This condition can include hypernasality, nasal air emission, and poor intelligibility in speech, which can have major social and educational ramifications [4].

In order to correct the persistent VPI, secondary surgical interventions such as soft palate lengthening are required, and usually focus on intravelar veloplasty, double-opposing Z-plasty (Furlow technique), and posterior pharyngeal flap [5–7]. All of which focus on augmenting the soft palate length and improving the closure of the velopharyngeal. The present study evaluates the clinical outcomes of soft palate lengthening in patients older than five years with persistent nasal speech following primary cleft palate repair, focusing on speech improvement, parental satisfaction, and postoperative complications.

One of the key functions of the velopharyngeal sphincter is the closure of the oral and nasal cavities during speech [8]. Following cleft palate repair, persistent VPI can occur as a sequela. [9]. The cleft palate secondary surgery was revolutionized in 1986 with the introduction of Furlow's double-opposing Z-plasty [10]. This technique combined palatal lengthening with muscle repositioning. Further studies by Witt and D'Antonio [11] and others showed similar success rates for the procedures of intravelar veloplasty and posterior pharyngeal flap. In a systematic review, Smith et al. [12] found improvement rates of 75–90%, despite the complications that had occurred, including airway obstruction and snoring. More recent studies focus on individualized approaches to surgical planning and integrated speech therapy for achieving optimal results [13–15].

Methods

A prospective cohort study was conducted at Misurata Medical Center, Libya, from January 2018 to December 2024. The study population was 60 children, 32 males and 28 females, aged above 5 years (mean $\pm$ SD = 8.7 ± 2.3 years). The inclusion of participants was based on having confirmed VPI after primary cleft palate repair, persistent nasal speech, and having non-syndromic patients who followed up for at least a

year, where the exclusion criteria are syndromic clefts, severe airway compromise, or incomplete follow-up.

For the Surgical technique

All patients had soft palate lengthening. For 40 patients who had soft palate lengthening, intravelar veloplasty was performed based on Sommerlad's technique (5). The remaining 20 patients had the posterior pharyngeal flap added for closure, who were the patients with wide velopharyngeal gaps (7-11).

Speech evaluation

The perceptual analysis in speech evaluation was based on the Pittsburgh Weighted Speech Scale, and objective nasalance analysis was done with the Nasometer II (KayPENTAX, Lincoln Park, NJ, USA) following Henningsson et al. guidelines [14]. Speech evaluation and the assessment of parents' satisfaction were done by 2 speech pathologists and a structured 5-point Likert satisfaction questionnaire, respectively.

Statistical analysis:

The data were analyzed using SPSS data analysis tools (version 25.0; IBM; USA). The Shapiro-Wilk test was performed for all variables to test for normal distribution. For pre- and postoperative data comparisons, paired t-tests were performed, considering $P < 0.05$ statistically significant. For all major outcome variables, 95% confidence intervals were calculated.

Results

Among the sixty patients, forty-eight (80%) achieved notable resonance improvement with hypernasality fully resolving. Partial improvement was observed in eight patients (13.3%), whereas four (6.7%) exhibited little to no change in their speech outcome (Figure 1). There was a significant change in the mean nasalance score, decreasing from $48.5\% \pm 9.2$ before surgery to $24.1\% \pm 6.8$ at the one-year mark postoperatively ($P < 0.001$). This demonstrates a marked improvement in the patient's velopharyngeal closure ability. Improvement in speech intelligibility postoperatively was observed in 85% of the patients, which is consistent with other studies [11,12].

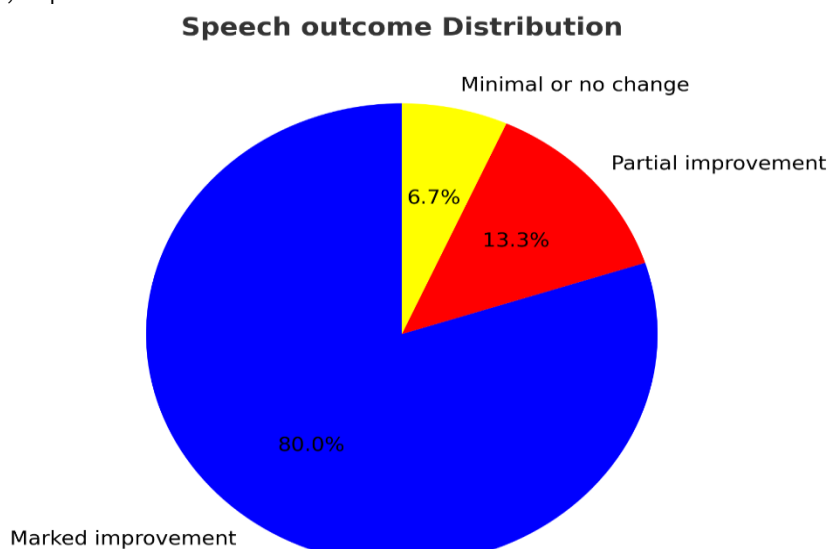


Figure 1. Speech Outcome Distribution

The satisfaction levels among parents were high since more than 86% reported positively on their child's speech improvement after the surgery, as well as on their confidence in social situations. Complications were infrequent; three patients (5%) had minor wound dehiscence, and six patients (10%) had transient snoring and mild airway obstruction. Importantly, none of the patients had severe airway compromise, and all the complications were managed conservatively, as shown in (Figure 2). These findings are consistent with the international literature reporting similarly low complication rates after secondary palate surgery [9,12].

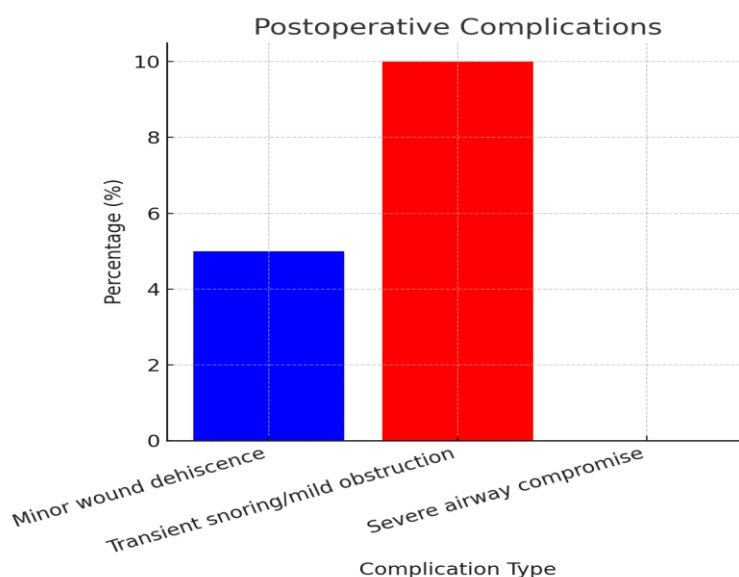


Figure 2. Post-operative complications

Discussion

This study makes clear that soft palate lengthening surgery is effective for addressing nasal speech in patients over five years old with previously operated cleft palates. In our cohort of sixty patients, eighty percent of hypernasality fully resolved, and an additional thirteen percent partially improved hypernasality, culminating in over ninety percent net success. Nasalance scores also provided data in support of reduced nasal resonance, and prior studies have also reported that secondary palatal surgeries improve velopharyngeal function [11,12].

Velopharyngeal insufficiency is still one of the most common complications following primary cleft palate repair, with persistent hypernasality having a profound effect on speech intelligibility and social communication [2,3,4]. Our findings highlight the need for secondary interventions, such as intravelar veloplasty and posterior pharyngeal flap, which aim to gain adequate soft palate length and improve the primary line of velopharyngeal closure for speech. The addition of a posterior pharyngeal flap in about one-third of our wide velopharyngeal gap patients who had marked improvement was in accordance with the literature on the use of combined techniques for complex cases [5,7,11].

The study demonstrates that significant improvements in speech are possible even if surgery is done after the age of five years. Although earlier surgery is advised to improve speech, for regions with little access to specialized cleft management, there is still improvement with later surgical correction [10,12,13]. This study confirms the flexible timing of surgery as functional results can still be enhanced when secondary surgery is done later in the early years.

The study shows low complication rates; complications were primarily minor and transient snoring, mild airway obstruction, and minor wound dehiscence. These complications were conservatively managed with no long-term morbidity. The safety profile is in line with international literature regarding soft palate lengthening and is reliable and effective [9,12,14].

In our cohort, most parents were very satisfied, with over eighty-six percent saying that their child's speech and social confidence improved dramatically. This highlights the importance of the psychosocial aspects of secondary surgical intervention and educational inclusion, along with the restoration of anatomical function [3,4,12,15]. This is a key component in the overall management of cleft patients.

The results from this study strengthen the integration of soft palate lengthening as a foundational procedure for persistent velopharyngeal insufficiency with functional and psychosocial advantages. Attention to surgical technique, objective speech evaluation, and comprehensive multidisciplinary follow-up contributes to the positive results and the increasing literature on the value of secondary palate surgery in older children [5,7,11,12,14].

The prospective study offers evidence demonstrating that soft palate lengthening can achieve notable corrective results as a safe secondary surgical option for patients with persistent nasal speech, having undergone surgery for cleft palate, even for those patients older than five years. I found that most of the sixty patients included in the study showed notable improvements in speech intelligibility in addition to speech resonance. The study also included nasometric assessments that showed a nasalance score reduction, an objective metric that supports the study's claims. These findings highlight the importance of

secondary surgery for patients who suffer from unaddressed velopharyngeal insufficiency, which remains prevalent in about 25% of patients after cleft palate repair. [2,3]

The safety of the technique is further supported by the relatively low complication rate seen in this cohort. The minor issues of wound dehiscence and transient snoring were easily handled and did not affect the overall results. These findings are in agreement with the international literature, which cites similar case safety for secondary palatal surgeries [9,12].

Conclusion

To conclude, even beyond the preschool years, soft palate lengthening continues to be a mainstay in the treatment of velopharyngeal insufficiency following cleft palate repair. Outcomes from this study support its value, emphasizing the need for early recognition of speech disorders and the integration of multiple disciplines in treatment. For children who continue showing hypernasality after primary palatoplasty, early perceptual and instrumental evaluation is suggested so secondary procedures do not get delayed. It is equally important to integrate speech therapy before and after surgery, as this combination has proven to have better results. Clinically, the formation of multidisciplinary cleft care teams, integrating plastic surgeons, speech pathologists, and orthodontists, becomes important for ongoing management. More large-scale multicenter studies with extended follow-up care are needed to assess outcomes better and improve surgical techniques.

Conflict of interest. Nil

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