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Speech intelligibility in children with submucous cleft palate: a case study

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SHORT INTRODUCTION

Submucous cleft palate (SMCP) is a congenital condition affecting the underlying muscular and bony structure of the palate, often diagnosed later in development and frequently impacting speech intelligibility (Kummer, 2020).

Speech intelligibility indicators in children with cleft palate are significantly lower than in typically developing children (Sell, Pereira, Wren, & Russell, 2021; Whitehill et al., 2011).

Cleft palate can significantly affect velopharyngeal closure, which ensures proper speech production and resonance. Even after surgical correction, children often continue to exhibit hypernasal speech and compensatory articulation patterns, resulting in reduced speech intelligibility and the need for long-term speech therapy (Beckett, 2022).

At the Cleft Lip, Palate and Facial Clefts Centre in Latvia, 30 patients with the diagnosis Q35.3 – cleft of the soft palate, majority of patients with SMCP– sought assistance between 2020 and 2025 (RSU Institute of Stomatology, 05.12.2025).

OBJECTIVE(S) AND METHODS

Objective

To evaluate the speech intelligibility of a 4;6-year-old child with Submucous Cleft Palate (SMCP) before and after surgical intervention and following six months of speech therapy.

Methods

Speech assessment included the Latvian Phoneme Test (LAMBA; Markus et al., 2016). Intelligibility in Context Scale (ICS) (McLeod et al., 2012). Speech samples were recorded and analyzed using PRAAT. Percent Intelligibility of Words (PIW) was calculated based on transcriptions by unfamiliar listeners (n = 5) and teachers (n = 3). Additional measures included Percentage of Correctly Produced Consonants (PCC), and percentage of compensatory articulation errors. Speech therapy targeted velopharyngeal function through soft palate activation, diaphragmatic and differentiated breathing exercises, non-speech oral motor tasks, phonem acquisition, phonological awareness, and voice exercises.

RESULTS (1)

After surgery, nasality was notably reduced. The patient’s nasal score decreased to 2 on a 3-point scale.

Intelligibility in Context Scale scores (parent-reported) improved from 2.7 (pre-surgery) to 3.5 (post-surgery), and 3.8 after therapy.

Paercentage of Correctly Produced Consonants remained at 21% after surgery 21% but improved to 40% post-speech therapy.

Percent Intelligibility of Words (PIW) scores imroved from 20.2% to 26.6% for teachers and from 13.3% to 23.6% for unfamiliar listeners. Following speech therapy, both groups scored 49% of PIW.

The fundamental frequency range for the word [bite] was from 309 to 313 Hz. The fundamental frequency range for the word [jaka] was from 132 to 289 Hz. As a result of speech therapy sessions, the frequency normalized.

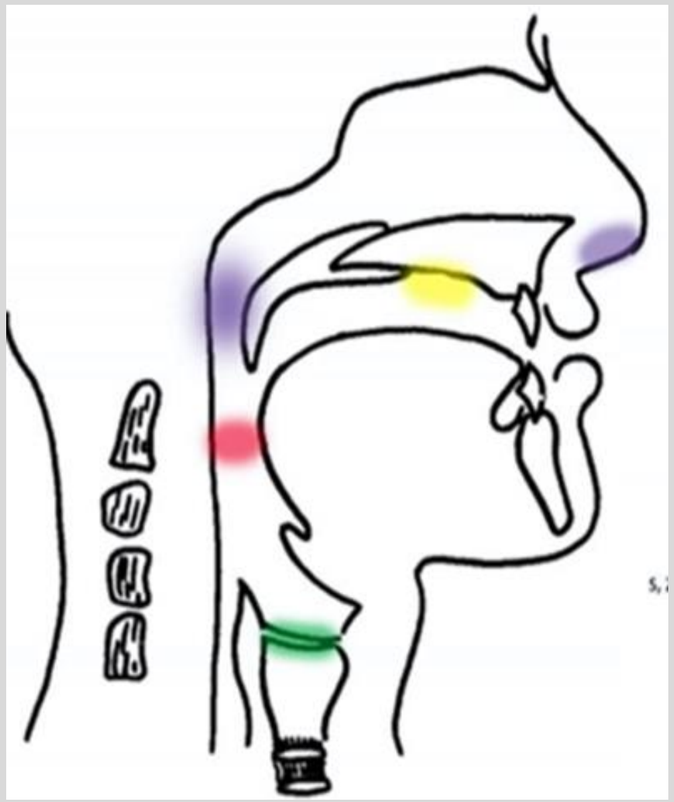
RESULTS (2)

	Word [Bite] transcription	Fundamental frequency Hz	Intensity dB	Word [jaka] transcription	Fundamental frequency Hz	Intensity dB
Pre-surgery	[pihe]	313	69	[jaha]	289	60
Post-surgery	[pihe]	376	69	[jaha]	132	65
Post-speech therapy	[pite]	309	66	[jaka]	241	63

Figure 1: Changes in Fundamental Frequency and Intensity

RESULTS (3)

Pharyngeal fricatives and pharyngeal stop substitutions were the most frequent compensatory error. Articulation disorders (pharyngeal fricatives) decreased by 5% after surgery and by 29% after speech therapy.



Compensatory articulation placements (ASHA, 2014)

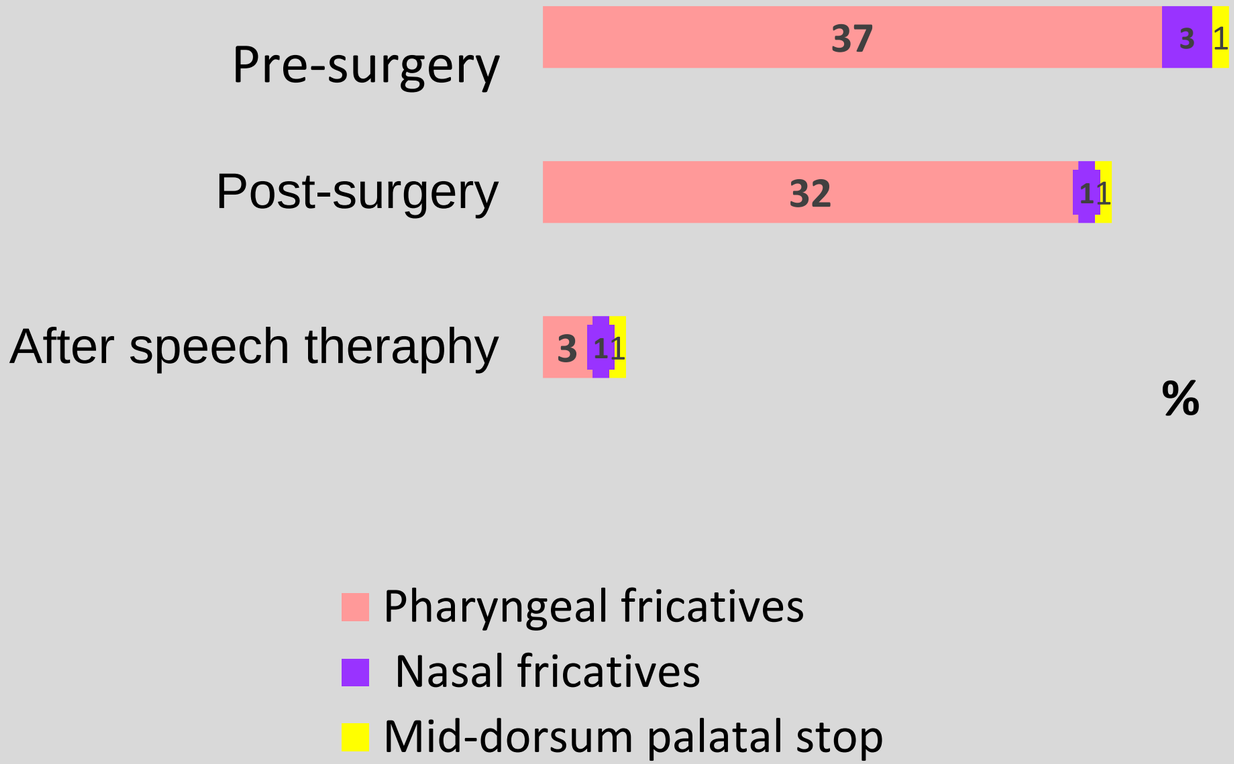


Figure 2: Compensatory errors

Results (4)

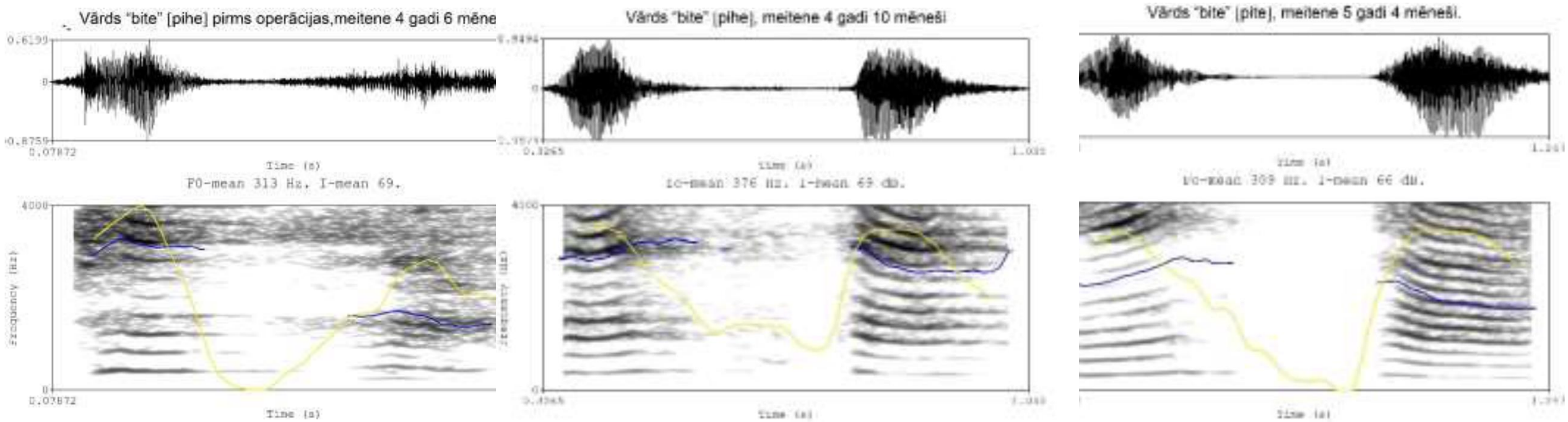


Figure 3: PRAAT Spectrgram and Oscillogram analysis of the word [bite]. Left: Pre-surgery, Middle: Post- surgery and Right: Post-Speech Therapy.

CONCLUSIONS (1)

A child’s speech intelligibility assessment depends on the listener’s experience. Unfamiliar listeners provide more objective data on the number of words understood, teachers and parents are accustomed to the child’s speech, making their evaluations more subjective. Research data confirm that, both before and after surgery, unfamiliar listeners (strangers) understood significantly fewer words than teachers.

Effective sound placement and automation are supported by a multisensory approach, in which visual, tactile, and auditory feedback help the child acquire the new place of articulation. Collaboration with parents ensures the necessary amount of practice and repetition.

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CONCLUSIONS (2)

Combined surgical and speech therapy intervention significantly improved speech intelligibility in a child with SMCP. Therapy reduced compensatory errors, increased consonant accuracy, and improved perceptual clarity, as confirmed by acoustic analysis and listener ratings. Targeted air pressure and resonance-focused exercises contributed to improved velopharingeal function.

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