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ABSTRACT BOOK

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Developing a procedure for estimating velopharyngeal closure based on cleft speech characteristics and its correspondence with the velopharyngeal orifice area

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Background: Perceptually rating velopharyngeal competence based on speech symptoms is useful in clinical practice, since it allows making inference regarding velopharyngeal function when there is no access to instrumental evaluation.

Aims: To develop a procedure in order to estimate velopharyngeal closure (VPC) based on the combination of cleft speech symptoms assessed by auditory-perceptual evaluation and its correspondence with the instrumental measurement of velopharyngeal orifice area.

Methods: This study was approved by the institutional review board. Assessments were performed on 62 patients with repaired cleft palate, aged 6 to 45 years. Velopharyngeal orifice area was measured using pressure-flow technique in order to determine VPC (adequate-borderline-inadequate). Audio-visual recording of speech samples were performed in all patients. Speech material comprised 62 stimuli of 12 sentences including 12 pressure consonants produced by Brazilian-Portuguese native speakers. The recordings were edited excluding the examiner speech in order to obtain a set of 12 sentences presented as one stimulus. Hypernasality (H), nasal air emission (NAE), nasal turbulence (NT), weak pressure consonant (WPC), active non-oral errors (AE), nasal grimacing (NG) and overall auditory rating of velopharyngeal competence (VPC-R) were assessed by three experienced speech-language pathologists, first individually. Fifteen days later the raters sat together and performed a final consensus only for the inter-rater disagreements obtained in the individual assessment. H and NG were rated using a 4-point scale, and VPC-R using a 3-point scale. A single score was attributed to the set of 12 sentences. NAE, NT, WPC and AE were rated as absent and present considering 3 consonants in each sentence (total=36 consonants). The final score for each error was defined as the percentage of the affected consonants in each sentence (affected consonant x 100/36). Correlation between the ratings of each variable and the VPC determined by pressure-flow technique was analyzed by Spearman's correlation coefficient. An exploratory model was developed to estimate the VPC. Sensitivity and specificity were calculated in order to verify the clinical applicability of the model.

Results: Significant correlations were found between the VPC and each of the variables: H ($r=0.765/p=0.00$), VPC-R ($r=0.838/p=0.00$), NG ($r=0.638/p=0.00$), NAE ($r=0.680/p=0.00$), NT ($r=-0.305/p=0.00$), WPC ($r=0.461/p=0.00$), and AE ($r=0.420/p=0.00$). Considering the high correlations with the measurement of VPC, the final scores of H, VPC-R and NG were added resulting into a single variable SOMA. The exploratory model established the following criteria based on the presence and the proportion of each symptom in each category of VPC determined by the instrumental evaluation: Adequate VPC: SOMA=0 ou 1 and, at least 2 variables=0. Borderline VPC: SOMA=2 and NAE<2 (closer to adequate); SOMA=2 and NAE≥2; SOMA=3 and NT>0; SOMA=3 and NT=0 (closer to inadequate). Inadequate VPC: SOMA≥4. Based on these criteria, data analysis showed that the procedure correctly classified the VPC in 88.7% (55/62) of the cases. Sensitivity and specificity of the exploratory model were 96.2% and 94.4%, respectively.

Summary/Conclusion: This procedure may contribute to the diagnosis of velopharyngeal dysfunction in clinical practice. The main idea is to provide the professional with a procedure that allows estimating the velopharyngeal closure based on the speech symptoms.