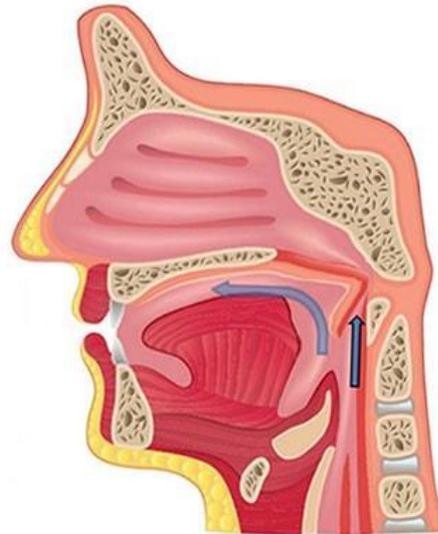


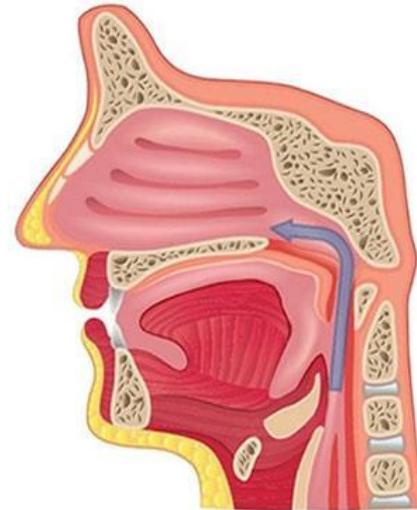
Velopharyngeal Dysfunction (VPD) and assessment



دانشگاه علوم پزشکی خدمات بهداشتی درمانی ایران



Normal Speech
(Resonates Through Mouth)



VPI
(Resonates Through Nose)

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speech

Speech is considered one of the primary outcome measures of cleft lip and palate management.

The initial diagnosis of VPD is made on perceptual speech evaluation (PSE) conducted by a **specialized SLP**.





SLP (speech & language pathologist)

A slp plays an integral role on the cleft palate team, evaluating the structure and function of the palatal structures for **speech production** purposes pre- and post-surgery, providing services related to **feeding** and **communication**, starting with **early infant intervention** (Noami, 2019).



VPD (Trost, 1981)

○ **Velopharyngeal insufficiency (structural)**

an anatomic deficiency of insufficient tissue for closure:

- Unrepaired cleft palate (overt or submucous)
- Postsurgical insufficiencies (e.g., palatal length too short post palate repair; VPI post adenoidectomy)
- Mechanical interference (e.g., excessive tonsils or adenoid, posterior pillar webbing)
- Palatopharyngeal disproportion (deep pharynx/ flattened cranial base)
- Ablative palatal lesions (e.g., cancer, traumatic injury)

○ **Velopharyngeal incompetency (Neurogenic)**

neurologic dysfunction leading to impaired motor control of the palate:

- Congenital or acquired primary motor/neuro-motor control (dysarthria)
- Motor association/motor programming (apraxia)

○ **Velopharyngeal inadequacy (mislearning)**

Faulty learning of articulation patterns:

- Phoneme-specific nasal emission (PSNE)
- Persisting postoperative nasal emission (with adequate closure ability)
- Compensatory mis-articulations
- Deafness/hearing impairment

	Velopharyngeal Insufficiency	Velopharyngeal Incompetence	Velopharyngeal Mislearning
Cause	Abnormal structure (anatomy)	Abnormal function (neurophysiology)	Abnormal articulation placement (function)
Examples of causes	Cleft palate, submucous cleft, post adenoidectomy	Any cause of dysarthria, including cerebral palsy, head trauma, stroke, etc.	Substitution of a pharyngeal fricative (which causes nasal emission) for an oral fricative
Treatment	Physical management (i.e., surgery or prosthesis if surgery is not an option)	Physical management (i.e., surgery or prosthesis if surgery is not an option)	Speech therapy only

Typical component

Comprehensive Assessment for Cleft Lip and Palate: Typical Components(ASHA)

Case History

Audiologic Assessment

Feeding and Swallowing

Perceptual Evaluation of Speech

Oral Mechanism Examination

Instrumental Evaluation of Velopharyngeal Function

Voice

Language (Spoken and Written)

Other

Process Model for Assessing Speech, Resonance, and Language in Patients With Cleft and Craniofacial Anomalies



Reprinted from Vallino-Napoli, L. (2004). Assessing communication in cleft and craniofacial disorders: A process model for the practitioner. *Perspectives on Speech Science and Orefacial Disorders*, 14, 9-16.



perceptual assessment



Perceptual speech assessment is central to the evaluation of speech outcomes associated with **cleft palate and VPD**. (Debbie Sell 2005)

Evaluation items

- Articulation (intelligibility/ consonant production)
- Nasal resonance (hyper-hyponasality/ mixed nasality/ cul de sac)
- Laryngeal resonance (Voice disorders)
- Nasal emission (audible or inaudible/ turbulent or nonturbulent/ obligatory or learned/ consistent or inconsistent)
- Facial or nasal grimace
- Others (Fluency/ Phonation/ stimulability)

Evaluation forms (conventional)

- Universal parameters
- The Cleft Audit Protocol for Speech—Augmented (CAPS-A)
- Pittsburge (VPI scale)





Orofacial- Oromotor examination



Face, Lip, Occlusion, Teeth, Tongue, Mandible, Maxilla, Fistula, Hard palate, soft palate, pharynx, Nose, scar, cleft, larynx

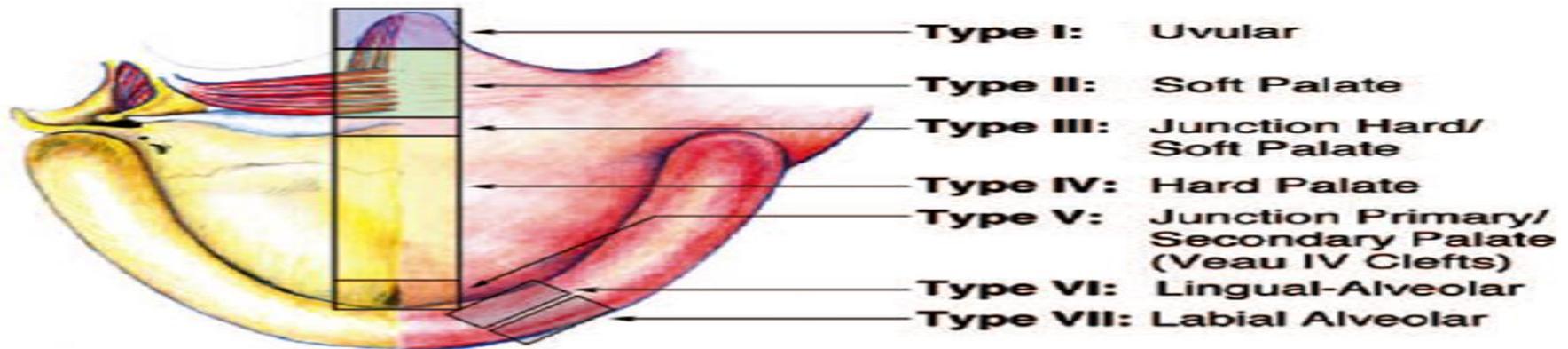


FIGURE 1 The Pittsburgh Fistula Classification System. A type I fistula is a bifid uvula. A type II fistula is in the soft palate. A type III fistula is at the junction of the soft and hard palates. A type IV fistula is in the hard palate. A type V fistula is at the incisive foramen, at the junction of the primary and secondary palates; this designation is reserved for Veau IV clefts. A type VI fistula is in the lingual-alveolar region. A type VII fistula is in the labial-alveolar region.



Instrumental assessment



- ◉ Direct

Nasopharyngoscopy

Video fluoroscopy (lateral/ frontal and base view)

Radiography

Ultrasound

MRI

- ◉ Indirect

Acoustic measurements(Nasometry/ Nasal view/ Spectography/ Accelerometric techniques)

Aerodynamic measurements(Voice function analyzer/ Pressure flow technique/ Nasal and oral airflow)

Speech therapist plays an important role in determining the necessary speech tasks during instrumental assessments and their interpretation.



○ Lateral video-fluoroscopy (a)





Video fluoroscopy (Lateral view)

- Dynamic and real-time assessment of VP function and PPW (Posterior pharyngeal wall) especially for younger patients who have no cooperation with nasopharyngoscopy assessment, and excessive mucous
- Determining the place of velar contact, velar knee, PPW (passavant ridge)
- Determining the velar length, velar thickness, palate length, pharyngeal depth, velo-adenoidal closure
- Precautions: Radiation exposure/ Interference with head rotation/need for a trained radiologist and special equipment**

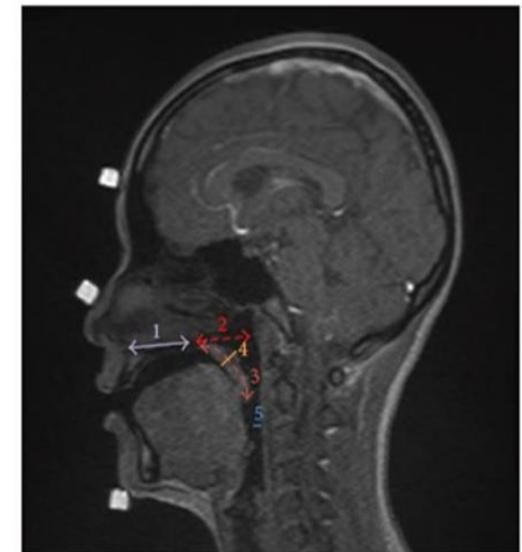
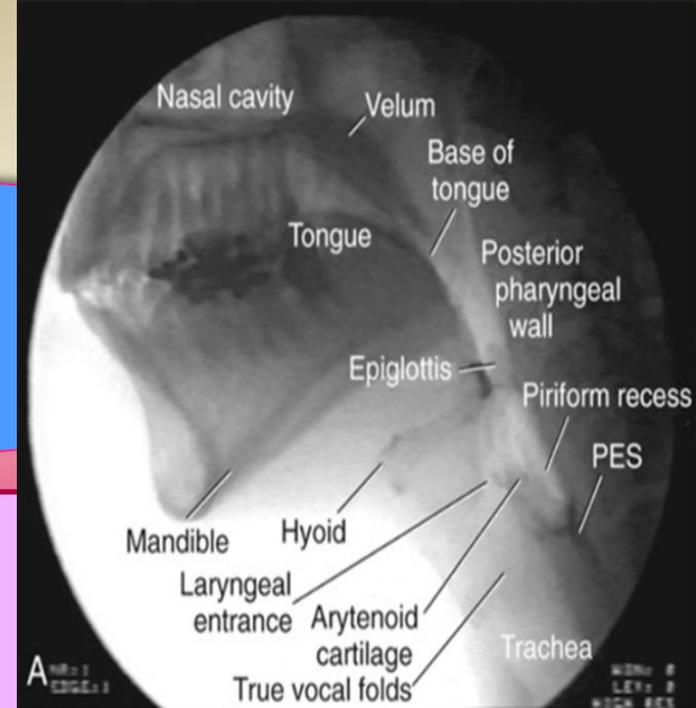


FIGURE 2: The measurement parameters: 1, hard-palate length; 2, velopharyngeal depth; 3, velar length; 4, velar thickness; 5, retroglossal space. See the text for definitions.



Important note and Case report

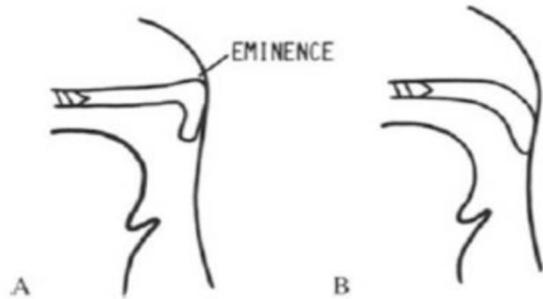


Figure 6.13. Lateral view. Comparisons of patterns of velopharyngeal closure in normal subject and a patient with repaired cleft palate. (A) Normal subject. Velum elevates to level of hard palate, distinct eminence forms, and closure occurs between vertical portion of velum and posterior pharyngeal wall. (B) In some repaired cleft-palate patients, the velum is shorter than normal, and it does not elevate to the level of the hard palate. No distinct eminence forms. The region of the velum contacting the posterior pharyngeal wall may be at a more distal position than in the normal subject.

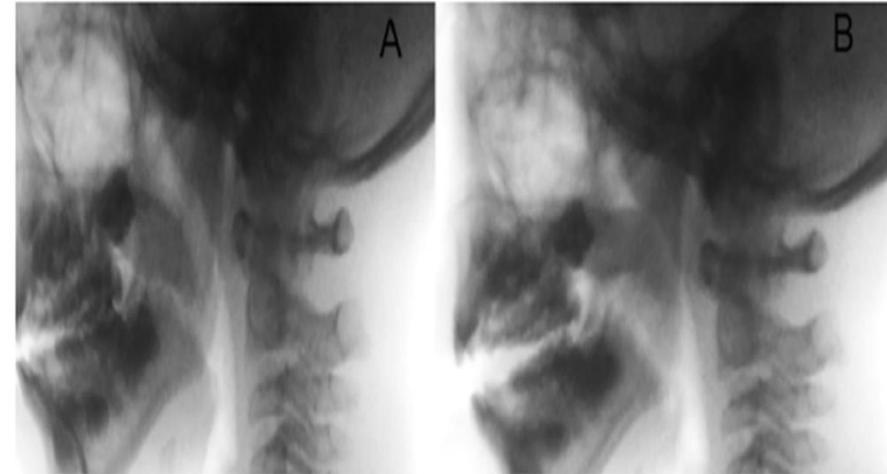


Figure 1 (A) Lateral videofluoroscopy at rest. (B) Lateral videofluoroscopy while saying the vowel /a/.

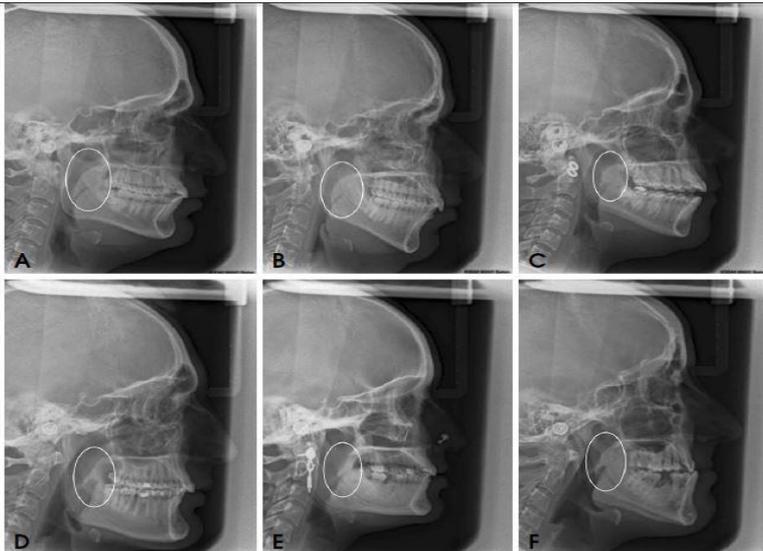


Fig. 2. Various velar morphologies are seen on lateral cephalograms. A. Type 1 "leaf-shaped" soft palate, B. Type 2 "rat-tail-shaped" soft palate, C. Type 3 "butt-like" soft palate, D. Type 4 "straight-line" soft palate, E. Type 5 "S-shaped" soft palate, and F. Type 6 "crook-shaped" soft palate.

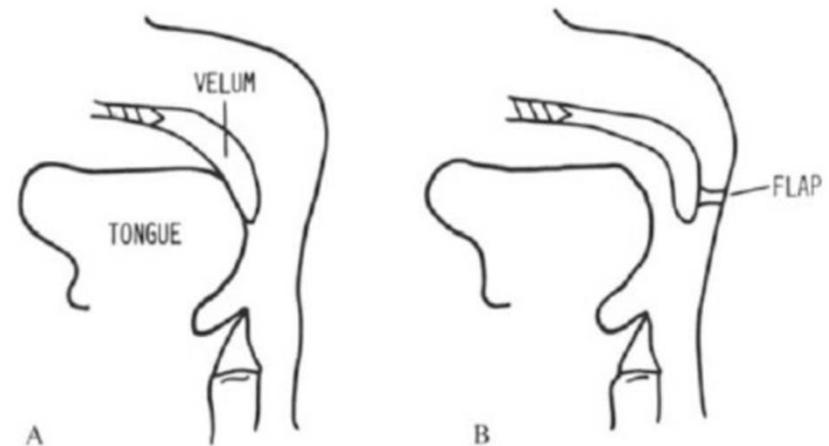
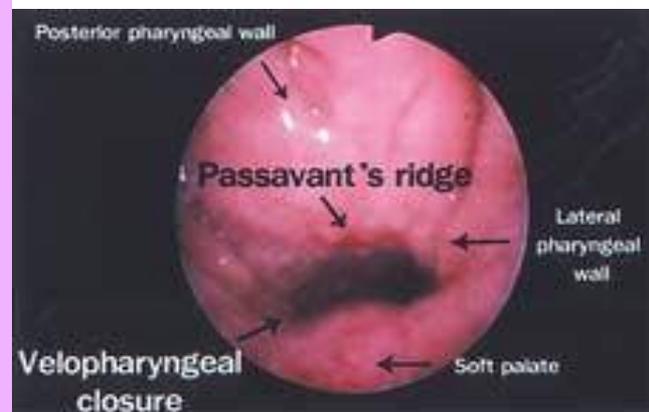


Figure 6.23. Lateral views during nasal breathing comparing velar position in patients without and with a pharyngeal flap. (A) No flap: Velum rests on dorsum of tongue. (B) Flap present: There is a gap between velum and tongue because flap restrains velar descent.



Nasopharyngoscopy or Nasoendoscopy

- a technique that allows direct visualization of VP structures and functions during speech
- Determining the degree of mobility of the LPW, PPW (passavant ridge) and velum
- Assessing the orientation of LVP muscle, fistula, adenoid, gap size and type, gap location, velo-adenoidal closure, VP closure patterns (coronal, sagittal,...), secondary procedure results (flap,...), SMCP, larynx and vocal folds





Important note

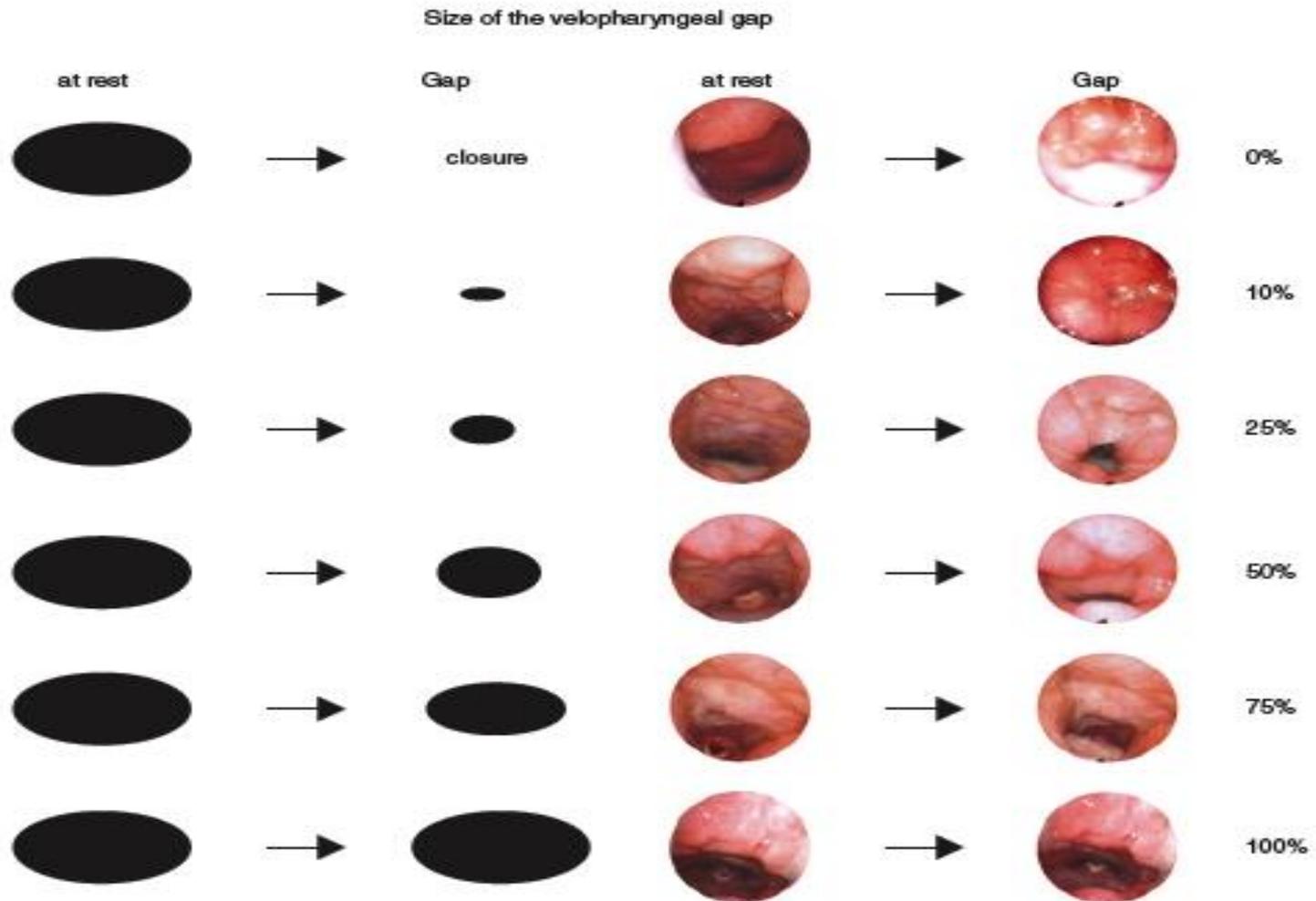
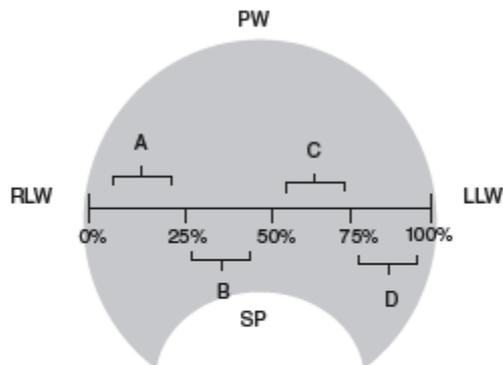
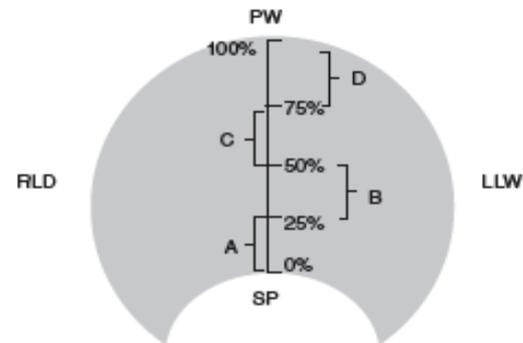


Figure 4. Reference scheme of the measurement of the velopharyngeal gap, where 0% = velopharyngeal closure; 10% = velopharyngeal gap with air bubble; 25% = small velopharyngeal gap; 50% = medium velopharyngeal gap; 75% = large velopharyngeal gap; and 100% = very large velopharyngeal gap



Caption: PW - posterior pharyngeal wall; PLD - right lateral wall; PLE - left lateral wall; SP - soft palate

Figure 3. Reference scheme of the displacement of the lateral pharyngeal wall in four quadrants. A: 0-25%; B: 26-50%; C: 51-75%; D: 76-100%. On the left wall, the measurements are reversed



Caption: PW - posterior pharyngeal wall; PLD - right lateral wall; PLE - left lateral wall; SP - soft palate

Figure 1. Reference scheme of displacement of the soft palate in four quadrants. A: 0-25%; B: 26-50%; C: 51-75%; D: 76-100%

CROFT, ET AL.: VALVING PATTERNS.

VELOPHARYNGEAL VALVING PATTERNS

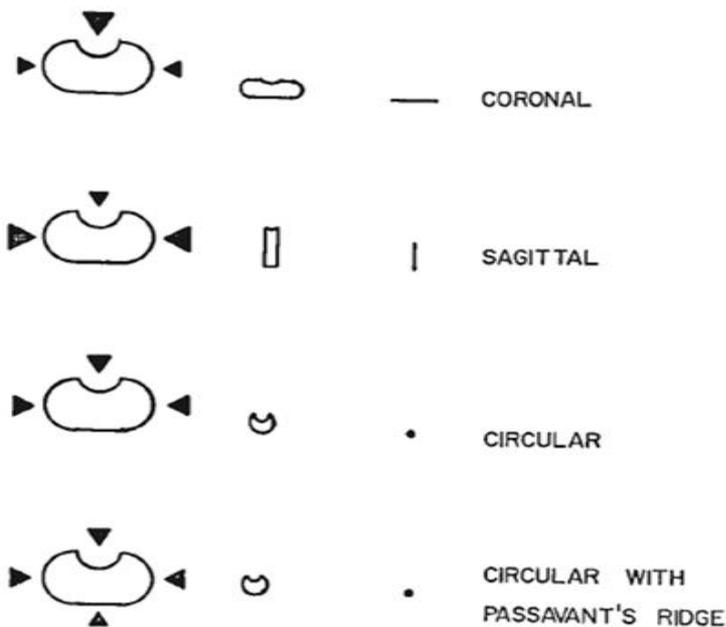
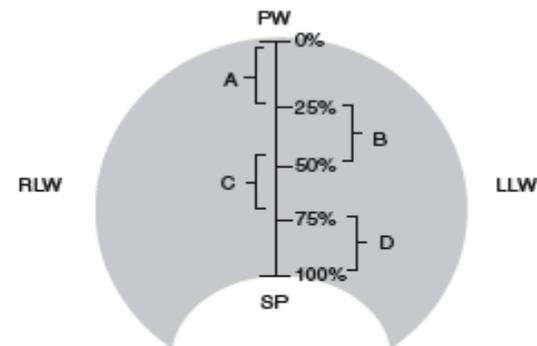


Fig. 3. Patterns of velopharyngeal valving.



Caption: PW - posterior pharyngeal wall; PLD - right lateral wall; PLE - left lateral wall; SP - soft palate

Figure 2. Reference scheme of the displacement of the posterior pharyngeal wall in four quadrants. A: 0-25%; B: 26-50%; C: 51-75%; D: 76-100%



Case report

- **18 years old**
- **CP (soft palate)**
- **1 palate surgery (17 years old)**



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