Velopharyngeal Assessment Procedures for the Thai Cleft Palate Population

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Abstract

The evaluation of velopharyngeal insufficiency and its associated effects on speech represent a complex interaction of both listener judgments of nasality and visual observation of the velopharyngeal mechanism. Although trained judgments of hypernasal speech are the most frequent index leading to the clinical decision to treat or not to treat, the clinician must also determine what kind of treatment would provide the best results, especially if surgical repair is being considered. This requires an accurate assessment of velopharyngeal insufficiency. Assessment of velopharyngeal insufficiency requires visualization of the velopharyngeal mechanism using endoscopy or radiographic analysis in order to evaluate the ability to achieve closure of the velopharyngeal port. The purpose of this article is to provide a comprehensive diagnostic procedure that integrates perceptual judgments of nasality with visual judgments of velopharyngeal insufficiency using endoscopy. Moreover, this paper provides rationales for the selection and implementation of both non speech and speech protocols to enable the clinician to accurately assess the parameters of nasality and velopharyngeal insufficiency.

Key word : Cleft Palate, Velopharyngeal Insufficiency, Hypernasality, Endoscopy, Nasality

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The evaluation of velopharyngeal insufficiency and its associated effects on speech represent a complex interaction of both listener judgments of nasality and visual observation of the velopharyngeal mechanism. Although the parameters of hypernasality and velopharyngeal insufficiency are dependent on each other, the differences between the parameters are far from trivial. Hypernasality is a perceptual parameter that requires listener judgments of speech production and the determination that nasal resonance is notably higher than normal. Although trained judgments of hypernasal speech are the most frequent index leading to the clinical decision to treat or not to treat, the clinician must also determine what kind of treatment would provide the best results, especially if surgical repair is being considered. This requires an accurate assessment of velopharyngeal insufficiency. Velopharyngeal insufficiency (VPI) refers to the inability or reduced ability to achieve closure of the velopharyngeal port when necessary. Assessment of velopharyngeal insufficiency requires visualization of the velopharyngeal mechanism using endoscopy or radiographic analysis in order to evaluate the ability to achieve closure of the velopharyngeal port using the movements of the velum, lateral pharyngeal walls, and posterior pharyngeal wall. The purpose of this article is to provide a comprehensive diagnostic procedure that integrates perceptual judgments of nasality with visual judgments of velopharyngeal insufficiency using endoscopy.

Hypernasality

Clinically, it is convenient to consider the percept of nasality to include three main areas of focus. First, the percept is associated with the notion of oral-nasal resonance imbalance. Resonance is the phenomenon whereby one body (cavity) is set into vibration by the vibration of another body. Thus, the primary vibrating body is represented by the vocal folds, and the cavities set into resonance by those vibrations are the oral and nasal chambers. When the ratio of nasal to oral resonance increases, it is expected that the listener's percept of nasality would increase. Because this resonance phenomenon occurs primarily for voiced phonemes, vowels and voiced consonants make ideal listening judgment stimuli. Second, the percept is associated with the notion of audible nasal emission of air accompanying VPI. While this aerodynamic phenomenon can be associated with voiced consonants, it is more likely to be perceived on voiceless consonants requiring high intraoral pressure. Thus, voiceless fricatives, plosives, and affricates become ideal listening judgment stimuli. Third, the percept is associated with misarticulations associated with VPI. These misarticulations primarily include glottal stops, pharyngeal fricatives, and soft articulatory contacts. It should be noted that while nasality associated with VPI may comprise elements of all three areas, dialectical or regional nasality usually manifests oral-nasal resonance imbalance only.

The clinical evaluation of nasality requires listener judgments of speech production and the determination of whether or not the perceived nasality is notably higher than normal. A variety of perceptual scales have been used to rate nasality. The most common are severity rating scales such as the "equal-appearing interval" scales described by Morris, Shelton, and McWilliams[1]. Table 1 provides two rating scales, one based on a 4 point scale and one based on a 7 point scale. The scale value of "1" represents least severe nasality (a normal amount of nasality) while the higher end points represent the most severe nasality. One advantage of such scaling allows the clinician to determine at what point along the scale the voice in question is judged to be abnormal (hypernasal).

Clearly, the clinical finding of perceived hypernasality should lead to additional visual inspection of the velopharyngeal mechanism to determine the nature of the presumed VPI. Indeed, even equivocal judgments of hypernasality require visual inspection either to confirm or reject suspected VPI. It seems equally clear, however, that the perceptual finding of oral-nasal resonance imbalance in the presence of excellent articulatory placement and adequate intraoral pressure would obviate the need for additional clinical visualization techniques.

Velopharyngeal Insufficiency

Once the patient's speech has been evaluated and hypernasality is found to be present the clinician must perform an accurate assessment of the nature of the velopharyngeal insufficiency, especially if surgical repair or other medical treatment is being considered. Evaluation of VPI requires visualization of the velopharyngeal mechanism. According

Table 1. Ratings of Hypernasality.

Four-Point, Equal-Appearing Interval Scale for Rating Hypernasality

	Hypernasality		
1	2	3	4
Normal	Mild	Moderate	Severe

Seven-Point, Equal-Appearing Interval Scale for Rating Hypernasality

Normal	Hypernasality					
1	2	3	4	5	6	7
	Mild		Moderate		Severe	

to Shprintzen[2], diagnostic procedures designed to visualize the velopharyngeal mechanism should be able to determine the following characteristics of VPI to guide subsequent treatment: 1) the size of the gap, 2) the location of the gap, 3) the shape of the gap, 4) the consistency or inconsistency of the gap, and 5) the component movements of the velum, lateral pharyngeal walls, and posterior pharyngeal wall. Although radiographic analysis has commonly been used to evaluate velopharyngeal insufficiency, one of the best methods to directly observe the velopharyngeal valve and to assess these characteristics is with the use of endoscopy.

For many years, it was assumed that the velopharyngeal valve worked the same way for all normal individuals. In the early 70s and 80s, studies showed that there was significant variability in the method that normals used to achieve closure of the velopharyngeal port. These studies (Croft, Shprintzen and Ruben[3]; Siegel-Sadewitz and Shprintzen[4]) found that there were variable degrees of movement of 1) anteroposterior movements of the velum, 2) lateral pharyngeal wall motion, and 3) posterior pharyngeal wall motion. Skolnick, McCall, and Barns [5] introduced four categories of velopharyngeal valving that may be used by the clinician to differentiate the method of velopharyngeal closure. These patterns were described as:

1. Coronal pattern.

Velopharyngeal valving is accomplished mainly by anteroposterior movements of the velum with relatively little lateral pharyngeal wall motion and no posterior pharyngeal wall motion.

2. *Sagittal pattern.*

Velopharyngeal valving is accomplished primarily by lateral pharyngeal wall movement with relatively little contribution from the velum. The lateral pharyngeal walls often move to midline and approximate each other. The posterior pharyngeal wall is not active.

3. *Circular pattern.*

There is essentially equal contribution of the velum and lateral pharyngeal walls to velopharyngeal valving, but there is no posterior pharyngeal wall movement. In this pattern, the midline bulge of the musculus uvulae becomes the target for the medial movements of the lateral pharyngeal walls.

4. *Circular with Passavant's ridge pattern.*

This pattern is essentially the same as the circular pattern (contribution of the velum and lateral pharyngeal walls to velopharyngeal valving), except

that there is also movement in the posterior pharyngeal wall (Passavant's ridge).

Witzel and Posnick(6) performed a careful study of the patterns of velopharyngeal closure on patients with cleft palate and other craniofacial syndromes where VPI was suspected based on perceptual speech assessment. Their findings provide a clinician performing endoscopy with some basic guidelines as to the types of problems found in this population. Two-thirds (67%) of the patients had typical, easily categorized defects based on the above described patterns. The most common pattern of closure that was found (for both patients with VPI and those with complete velopharyngeal closure) was the coronal pattern (68% of the typical group). Less common patterns were the circular pattern (23% of the typical group) followed by the circular with a Passavant's ridge pattern (5%), and the sagittal pattern (4%).

The remaining one-third of the patients (33%) had patterns that were considered atypical (not able to be described by the above patterns). Clinicians performing endoscopy should be aware of the types of atypical patterns that may be seen. Based on Witzel and Posnick's(6) findings, the following atypical patterns may be encountered during an endoscopic evaluation.

1. Asymmetrical valving is present (significant differences between the right and left sides).

2. A deep midline indentation of the superior surface of the velum is present. Air escapes through the midline indentation while the lateral aspects of the valve are closed.

3. A prominent bulge of the midline of the velum is present. An upward flip or protrusion of the uvula may occur with this pattern. Air escapes through the lateral aspects while there is closure of the midline region.

4. A midline indentation of the adenoid tissue is present. There may also be one or more vertical crevices of the adenoid tissue. Air escapes through the indentation(s) while there is closure of the lateral aspects of the valve.

5. A prominent midline bulge of the adenoid tissue is present. Air escapes through the lateral aspects while there is closure of the velum against the midline adenoid bulge.

When analyzing the velopharyngeal valve and determining the associated typical or atypical pattern of closure, the clinician should note the presence and location of mucous bubbling through the valve. This bubbling occurs when there is insufficient strength to achieve complete closure in a particular region.

Comprehensive Evaluation

It is the authors' belief that both the evaluation of hypernasality and velopharyngeal insufficiency should be done in one patient sitting, regardless of whether the clinician is a surgeon or speech-language pathologist. Obviously, in instances where the clinician viewing the velopharyngeal mechanism is not experienced in judging the perceptual aspects of nasality, such a judge should be employed. A note of caution must also be considered when using endoscopy or radiographic analysis. It is the authors' experience that too often clinicians tend to forget one of the basic tenets of the behavioral evaluation. That is, the underlying assumption of most behavioral protocols is that the patient is giving the best effort possible. Unfortunately, obtaining "best efforts" from the patient are often compromised by a host of factors including shyness, fear and the introduction of instrumentation. Therefore, particularly when performing endoscopy or radiographic analysis, the clinician must strive for best patient effort. Typically additional time is required to establish a good rapport with the patient, to inform them of what the procedure will be like, and to practice the stimuli that they will be required to perform during the procedure.

Test Protocol

Evaluation of Hypernasality

1. Have the patient blow the nose to clear any congestion.

Procedural Notes: It is important to eliminate the effects of mucous in the nasal cavity.

2. Evaluate nasal patency using the following procedure:

Ask the patient to breathe with the mouth closed. Listen for stridency through the nose. Place a mirror beneath the nares and observe the fogging pattern. Each pattern should be equal in diameter and about the size of a quarter. Small fogging pattern diameters may indicate poor nasal patency. Repeat the listen and look task while alternately occluding each nare.

Procedural Notes: This procedure should be done to identify any contribution of the lack of nasal patency to the percept of nasality. For example, anterior nasal obstruction could produce cul-de-sac nasality, whereas posterior nasal obstruction could produce denasality or could mask hypernasality. Posterior nasal obstruction could also be an indicant of associated eustachian tube blockage and subsequent otitis media. Furthermore, lack of nasal airway patency and concomitant mouth breathing may affect the growth of the dentofacial complex. Mouth breathing may also contribute to anterior tongue carriage, inappropriate resting tongue position and inappropriate tongue positioning for some speech sounds.

3. Nasal Emission Test. Repeat the words (See Table 2).

Procedural Notes: According to Bzoch[7], the nasal emission test has proved to be the single most valuable speech evaluation procedure for drawing an inference regarding the adequacy or inadequacy of velopharyngeal function to support normal voice and articulation. It is particularly useful for testing 2 to 4 year old subjects. The nasal emission test consists of a set of 15 two-syllable words, each containing either two unvoiced with unaspirated or two unvoiced with aspirated or two voiced bilabial plosives, /p/ or /b/. The child is simply asked to repeat the words. The clinician should listen carefully and note any audible nasal emission of air during the production of the consonants. A mirror can also be placed under the nose to evaluate nasal emission. It is important to note, however, that if the nasal emission is not audible, the lack of complete VP closure inferred by observing nasal emissions with a mirror may not be significant.

4. The Hypernasality (Oral-Nasal Resonance Imbalance) Test. Repeat the words (See Table 2).

Procedural Notes: The Hypernasality test involves 10 one-syllable words, each beginning with a /b/ and ending with a /t/. The syllabic elements in the words selected sample the vowel triangle from high-front to low-back to high-back tongue positions for vowels. Based on the early work of Moll [8,9], it is generally understood that there is a direct relationship between the degree of velopharyngeal closure and tongue height during the production of vowels. That is, high vowels are associated with greater velopharyngeal closure than low vowels. For normal subjects, therefore, less nasality is perceived on high vowels than on low vowels (Lintz and Sherman[10]). For patients presenting VPI, however, greater nasality is associated with high vowels than with low vowels (Lintz and Sherman[10]). Following Ohm's Law, sound and air flow tend to follow the path of least resistance. Thus, a velopharyngeal gap would allow greater airflow and acoustic energy to enter and resonate the nasal chamber when the tongue is high in the oral cavity (high oral impedance) than when tongue height (oral impedance) is low. A sampling of high (/u/ and /i/), and low (/a/ and /e/) vowels is, therefore, desirable.

5. Modified Tongue Anchor Procedure.

1) Tell the client to "puff up your cheeks like this." Model the behavior by puffing up your cheeks and holding air in the oral cavity.

2) Tell the client to stick out his or her tongue. Hold the anterior portion of the tongue with a gauze pad.

3) While you are holding the tongue, say "Puff up your cheeks again, like you did the first time." Gently pinch your client's nose closed.

4) Tell them to continue holding the air in the cheeks as you release the nostrils.

5) As the nostrils are released, listen and watch for nasal emission.

6) Complete a minimum of three trials to be sure the client understands the task and to verify your observations.

Procedural Notes: The Tongue Anchor Procedure was first described by Fox and Johns[11] and has been modified by the authors. Leakage of air during this task indicates an inadequate seal. Findings implying velopharyngeal closure on non speech activities should be interpreted with caution. For that reason, this procedure attempts to eliminate two common artifacts which may allow a patient with VPI to impound intraoral pressure during blowing or cheek puffing. One is the tongue-palate assist, where the back of the tongue can push or assist the velum in its posterior-superior motion toward the posterior pharyngeal wall. The other is the tongue-palate valve in which the blade of the tongue makes a palatal seal, and air is trapped within the oral cavity anterior to that seal. The tongue anchor procedure

ตารางที่ 2 การประเมินเสียงขึ้นจมูก (Hypernasality)

1. สั่งน้ำมูก (Clear congestion)				
2. ประเมินช่องจมูก (Evaluate nasal patency)				
3. การทดสอบลมรั่วทางจมูก (Nasal Emission Test) อ่านคำต่อไปตาม				
โพกผ้า	พบพี่	เผาผี	แพทย์พูด	พัดพา
ปุ๊บปิ๊บ	ปุกปุย	เป่าปี่	แปดปิ๊บ	ปากเปียก
บุบบิบ	บู้บี้	บทบาท	แบกบวบ	บ๊ายบาย
4. การทดสอบเสียงขึ้นจมูก/ความสมดุลของความก้องทางปาก – จมูก (Hypernasality/Oral – Nasal Resonance Imbalance Test) อ่านคำต่อไปนี้ตาม				
บิด	เบิ้ด	แบด	บ๊าส	บาด
บอด	บวช	โบสถ์	บูด	บุตร
5. การทดสอบการใช้ลิ้นท่าแก้มป่อง (Modified Tongue Anchor Procedure)				
6. การทดสอบพยัญชนะที่มีแรงดันลมในปากสูง (Pressure Consonant Test) อ่านคำและวลีต่อไปนี้ตาม				

ลักษณะการแปรเสียง (Manner of artionlation)	พยัญชนะต้น	แม่สะกด	วลี
เสียงระเบิด (Plosives)			
มีลมหายใจประกอบ (aspirated)			
/พ/	ผ้า	-	พ่อพับผ้า
/ท/	ถั่ว	-	ทัดทอดถั่ว
/ค/	ค้า	-	เขาค้าขายข้าว
ไม่มีลมหายใจประกอบ (unspirated)			
/ป/	เป่าปี่	ตับ	ปูเป๋ซื้อตับ
/ต/	ตา	ตัด	ตาตี๋ตัดเสื้อ
/ก/	ไก่	กุ๊ก	กุ๊กกุ๊กไก่
เสียงเสียดสี (Fricatives)			
/ฟ/	ฟุต	-	เสาไฟฟ้าสี่ฟุต
เสียงกึ่งเสียดสี (Affricate)			
มีลมหายใจประกอบ(aspirated)			
/ช/	ชุด		ชูศรีเช่าชุด
ไม่มีลมหายใจประกอบ (unspirated)			
/จ/	จุด	-	โจจู๋จี้
7. การทดสอบการนับเลข (Counting Test) นับเลขจาก 30-50			

eliminates these two possibilities. An additional modification of this procedure, particularly for children who have not developmentally acquired fricatives, is to require the production of a "Bronx cheer" or "raspberries." In this maneuver, the tongue is extruded, intraoral air pressure is impounded, and a voiceless lingua-labial "fricative" is produced.

6. "Pressure Consonants" Test. Repeat the words and phrases (See Table 2).

Procedural Notes: The above list is not an exhaustive list of all the possible sounds. It is intended to provide the clinician with stimuli to identify the presence of hypernasality. The associated words and phrases contain no nasal sounds so nor-

mal production would involve closure of the velopharyngeal valve during the productions. The pressure consonants require a high degree of intraoral air pressure. It is not surprising, therefore, that insufficient velopharyngeal closure may result in audible nasal emissions and hypernasality, particularly on the pressure consonants (Boone & McFarlane[12]; Morris, Spriestersbach & Darley[13]; Shipley[14]). The pressure consonants include the plosives, fricatives and affricates. Voiced consonants are not included in the above chart. This is because voiceless consonants require greater intraoral pressure buildup and hence greater oral air flow than voiced consonants (Isshiki and Ringel[15]; Subtelny, Worth, and Sakuda[16]). Thus, a combination of voiceless, high pressure consonants in combination with high vowels is particularly sensitive to small degrees of velopharyngeal incompetence. Additionally, oral-nasal resonance imbalance also may be revealed by listening to the vowel productions in each of the above contexts.

7. Counting Test (30 to 50).

Procedural Notes: Counting from 30 to 50 in the Thai language is particularly difficult for the patient with VPI. For example, the 30–40 sequence, /samsip/, presents an opportunity to assess rapid velopharyngeal closed/open/closed interactions because of the introduction of a nasal sound. Moreover, the 40-50 sequence, /sisip/ reveals not only voiceless fricative productions, voiceless plosive productions, and high vowel productions. The elements are taxing to the velopharyngeal mechanism and may reveal subtle insufficiencies.

Evaluation of Velopharyngeal Insufficiency

1. Have the patient blow the nose to clear nasal mucous.

Procedural Notes: Excessive mucous can adhere to the tip of the scope preventing the ability to visualize the nasal cavity.

2. Evaluate the nasal airway.

The endoscope should be passed along the floor of the nasal cavity through the inferior meatus or through the middle meatus (between the inferior and middle turbinates). While passing the scope, visualize the septum and turbinates and analyze all aspects of the nasal airway.

Procedural Notes: The clinician should evaluate both the anatomical structures and the airway while passing the scope. If any indication of a problem with nasal patency is found in the listen and look task, visualization of the nasal airway allows the clinician to determine the cause and extent of the problem.

3. Position the tip of the endoscope to achieve the best view of the velopharyngeal mechanism.

Procedural Notes: The tip of the scope should be pointed at a slightly downward angle to achieve the best view. Insertion through the middle meatus rather than through the inferior meatus may facilitate this angle.

4. Drink fruit juice from a straw.

Procedural Notes: Juice should have a few drops of green food coloring to provide a contrast from the velar and pharyngeal tissue. Determine if there is adequate closure during swallowing. If leakage occurs, determine the amount of leakage and location (does the leakage occur medially or laterally).

5. Blow out a candle / Whistle.

Procedural Notes: Put your finger up and ask the patient to pretend to blow out the candle as hard as they can. If the patient is able to whistle, have them whistle a short section of a song. Assess if velopharyngeal closure is possible or if leakage exists. If there is leakage, determine the location and amount and determine if it is audible.

6. Start a yawn.

Procedural Notes: The failure to perform this task is not diagnostically significant. However, a yawn can often produce maximal elevation of the velum and, if performed, can demonstrate a maximal response.

7. Nasal Emission Test. Repeat the words (See Table 3).

Procedural Notes: The description of this test is provided in the Evaluation of Hypernasality. Complete closure of the velopharyngeal valve should occur during the production of all of the words. Failure to achieve complete closure is evidence of velopharyngeal insufficiency.

ตารางที่ 3 การประเมินความบกพร่องของเพดานอ่อนและผนังคอ(Evaluation of Velopharyngeal Insufficiency)

1. สั่งน้ำมูก (Clear nasal mucous)
2. ประเมินช่องจมูก (Evaluation of nasal airway)
3. วางตำแหน่งของปลายกล้องให้เห็นกลไกการทำงานของเพดานอ่อนและผนังคอให้ชัดเจนที่สุด (Determine optimal tip position to view velopharyngeal mechanism)
4. ดูดน้ำผลไม้จากหลอด (Drink fruit juice from a straw)
5. เป่าเทียน /ผิวปาก (Blow out a candle / whistle)
6. หาว (Start a yawn)
7. การทดสอบลมรั่วออกทางจมูก อ่านคำต่อไปนี้ตาม โพกผ้า พบพี่ เผาผี แพทย์พูด พัดพา ปุ๊บปั๊บ ปุกปุย เป่าปี่ แปดปึ๊บ ปากเปียก บุบบิบ ปู้ปี้ บทบาท แบกบวบ บ๊ายบาย
8. วลีที่มีพยัญชนะที่มีแรงดันลมในปากสูง อ่านวลีต่อไปนี้ตาม เสียงระเบิด ((Plosieves) มีลมหายใจประกอบ (aspirated) /พ/ พ่อพับผ้า /ท/ ทัดทอดถั่ว /ค/ เขาค้าขายข้าว ไม่มีลมหายใจประกอบ (unaspirated) /ป/ ปูเป้ซื้อตับ /ต/ ตาตี๋ตัดเสื้อ /ก/ กุ๊กกุ๊กไก่ เสียงเสียดสี (Fricatives) /ฟ/ เสาไฟฟ้าสี่ฟุต /ส/ สาวสวยใส่เสื้อ เสียงกึ่งเสียดสี (Affricates) มีลมหายใจประกอบ (aspirated) /ช/ ชูตรีเช่าชุด ไม่มีลมหายใจประกอบ (unaspirated) /จ/ ใจจู๋จี๋
9. การทดสอบการปิด-เปิดช่องเพดานอ่อนและผนังคอ (Closed / Open / Closed Test) อ่านตามวลีต่อไปนี้ ไก่น้อยสามตัว พ่อเงยดูหน้าพี่ ป้านอนเล่น ดิดม่านสีน้ำตาล
10. การทดสอบการนับเลข(Counting Test) นับเลขจาก 30-50

8. Pressure Consonant phrases. Repeat the phrases (See Table 3).

Procedural Notes: Although the *Evaluation of Hypernasality* described above provides a wide array of speech stimuli, time is of the essence in the endoscopic examination. Therefore, the clinician should limit the number of speech stimuli used. The authors have provided a list of phrases containing pressure consonants where complete closure of the velopharyngeal mechanism should be seen. Special attention should be given to assessing the ability to close the velopharyngeal port for the underlined pressure consonants. However, another method that may provide more precise information for each patient is to develop an individualized list of stimuli based on the patients' performance on the Evaluation of Hypernasality. It is important to include a range of abilities by including some stimuli where the highest amount of hypernasality occurred and some stimuli where the lowest amount of hypernasality was present. Similarly, if the clinician is sufficiently familiar with the patient and is aware of particularly hypernasal sounds, words, or phrases used frequently by the patient, they should be included in the evaluation. In order to make sure that the most amount of information is gained using endoscopy, the clinician should prioritize the stimuli so that the most important stimuli will be presented early. If the patient continues to tolerate the endoscope, additional stimuli can be presented.

9. Closed/Open/Closed Test. Repeat the phrases (See Table 3).

Procedural notes: These sentences add a nasal element to the central position of a non nasal phrase in order to view the closing/opening/closing maneuvers of the port. For example, a sentence like, "Look at the nest in the tree." could be particularly revealing. The clinician should evaluate the ability to achieve closure at the beginning of the sentence, briefly open the velopharyngeal port to produce the nasal sound (nest), and then reestablish closure to finish the sentence. The nasal sounds within the phrase, where brief opening should occur, are underlined. Due to the rapid movements of the velopharyngeal valve during the production of speech, it is important to videotape the endoscopic images for all speech tasks so that the movements can be reviewed after the examination.

10. Counting Test (30 to 50).

Procedural notes: The complexity of producing this series of numbers is described in the Evaluation of Hypernasality.

Clinical Decision Making

The most common end product of an initial evaluation of VPI and associated nasality is a decision whether or not to proceed with some type of surgical management of the velopharyngeal valve. The usual alternative to surgical management is a trial course of speech therapy designed to train the velopharyngeal mechanism toward improved closure. Additionally, a post surgical evaluation serves to identify the relative success of surgical intervention and either to accept or reject the need for speech therapy designed to help the patient maximize the use of the newly created velopharyngeal port.

Although the indicants for these decisions may vary with the clinician, some basic guidelines may be helpful. First, regarding decisions from the initial evaluation, findings of consistent audible nasal emission on high pressure consonants in the presence of oral-nasal resonance imbalance is not likely to be eliminated through a velar training regimen. Second, velar training should not be initiated unless evidence of velopharyngeal closure ability is readily apparent. It should be noted in this regard that evidence of closure for the labiodental fricatives (/f/ and /v/), bilabial plosives (/p/ and /b/), and velar plosives (/k/ and /g/) is potentially suspect due to the possibility of a tongue-palatal assist during the production of these sounds. Thus, "harder" evidence would be derived from closure on tongue tip front-of-the-mouth sounds, e.g., /s/, /t/, and even the "Bronx cheer."

Regarding post surgical evaluation, findings of persistent oral-nasal resonance imbalance and audible nasal emission do not necessarily indicate a poor surgical result. Among the factors which may be associated with such persistence post surgically include: patient age, the intractability of the learned speech articulatory compensations, patient intelligence, and patient expectations. In the authors' experience, therefore, most post surgical patients will require some velar training to adjust to the new mechanism, particularly for the rapid, dynamic maneuvers that characterize conversation.

At least two special cases come to mind. First, the identification of dialectical nasality as

contrasted with clinical hypernasality due to VPI is rather straightforward in most cases. Certainly dialectical nasality is characterized by oral-nasal resonance imbalance. The concomitant findings of audible nasal emission and misarticulations typical of VPI, however, are notably absent. Second, it is not uncommon to find children who demonstrate remarkable audible nasal emission on one phoneme (e.g., /s/) in the absence of oral-nasal resonance imbalance and misarticulations typical of VPI. Usually the nasal emission clears immediately with therapy.

Finally, it is imperative that patients for whom a pre surgical trial course of velar training therapy is recommended be closely monitored. These patients must not be deprived of appropriate intervention due to overzealous therapeutic intentions beyond a reasonable expectation of realistic conversational progress.

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วิธีการประเมินการทำงานเพดานอ่อนและผนังคอสำหรับประชากรไทย

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การประเมินความบกพร่องของการทำงานของเพดานอ่อนและผลต่อผนังคอและสาเหตุที่เกี่ยวข้องกับการพูดนั้นเป็นสิ่งที่ซับซ้อนซึ่งต้องอาศัยทั้งการฟังเสียงขึ้นจมูกและการดูกลไกการทำงานของเพดานอ่อนและผนังคอด้วยตาเปล่า แม้ภาวะเสียงขึ้นจมูกจะเป็นข้อบ่งชี้ที่สำคัญที่สุดในการพิจารณาว่าต้องให้รักษาหรือไม่ก็ตาม แต่ผู้เชี่ยวชาญจะต้องพิจารณาด้วยว่าวิธีการรักษาแบบใดที่ทำให้ผลการพูดดีที่สุด โดยเฉพาะเมื่อจำเป็นต้องรักษาด้วยการผ่าตัดซ่อมเสริมเพดานอ่อนและผนังคอ ดังนั้นการประเมินความบกพร่องของการทำงานของเพดานอ่อนและผนังคอจึงควรทำอย่างถูกต้องและแม่นยำมากที่สุดเท่าที่จะทำได้ การประเมินจะต้องดูจากกลไกการทำงานของเพดานอ่อนและผนังคอโดยการวิเคราะห์จากการส่องกล้อง (endoscopy) หรือถ่ายภาพทางรังสี เพื่อที่จะดูความสามารถในการปิดช่องเพดานอ่อนและผนังคอในขณะพูด บทความนี้มีวัตถุประสงค์เพื่อเสนอวิธีการวินิจฉัยภาวะความบกพร่องของความก้องของเสียงด้วยการฟัง (perceptual jugments) ร่วมกับการดูการทำงานของเพดานอ่อนและผนังคอด้วยการส่องกล้อง (endoscopy) และมีเนื้อหาที่ครอบคลุมถึงวิธีการเลือกแบบประเมินซึ่งใช้การพูดและไม่ใช้การพูด เพื่อให้ผู้เชี่ยวชาญสามารถวัดความรุนแรงของภาวะเสียงขึ้นจมูกและความบกพร่องของเพดานอ่อนและผนังคอได้

คำสำคัญ : เพดานโหว่, ความบกพร่องของการทำงานเพดานอ่อนและผนังคอ, เสียงขึ้นจมูกมากเกินไป, การส่องกล้อง, เสียงขึ้นจมูก

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