Case-Based Learning through Videos: A Virtual Walk through Our Clinic

From
Cleft Palate and Craniofacial Anomalies: The Effects on Speech and Resonance, 3rd Edition
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Most students and professionals in speech-language pathology learn about communication disorders from reading textbooks first, and then by attending lectures. This type of learning is not only required for the degree, but is also essential in order to obtain basic and theoretical information for clinical practice.

Unfortunately, book knowledge alone does not adequately prepare the learner to evaluate and treat individuals affected by communication disorders. As such, the American Speech-Language-Hearing Association (ASHA) has observation requirements for graduation in speech-language pathology (or communication sciences and disorders) at the bachelor’s level, and practicum experience requirements for graduation at the master’s level. In addition, it is universally recognized that observing, interacting, problem-solving, and obtaining experience in real-life clinical situations is essential for individuals to be able to apply learned didactic information appropriately and effectively in clinical situations.

Although observation and practicum experiences are essential for clinical learning, there are many issues and inefficiencies when trying to obtain these experiences. First, students (and professionals wanting to obtain additional competencies) usually need to schedule the experience with an outside facility, and then travel to the location. There is a risk that the patient will cancel or be a no-show. There is also the possibility that the session is not a good one for various reasons. The experience may not be focused learning. For example, the student/observer may understand the point of the session in 5 minutes, but need to be present for the entire session, which can take an hour or more. Finally, the mentoring professional usually has back-to-back patients, and therefore, has little time to address questions or engage in discussions of the cases.

To maximize the clinical experience while minimizing the barriers for learners, the Division of Speech-Language Pathology at Cincinnati Children’s Hospital Medical Center has developed a Video Education Series (VES) of clinical cases in a variety of specialty areas for case-based learning. The cases presented in this particular series come from the Craniofacial Center and VPI Clinic. They show the following:

- Characteristics of difference resonance and speech sound disorders
- An interview with a patient regarding his personal experiences with a cleft lip and palate
- Interesting intraoral findings
- Acoustic characteristics of velopharyngeal dysfunction through nasometry
- Velopharyngeal function and dysfunction through videofluoroscopy and nasopharyngoscopy
- The results of surgery for velopharyngeal insufficiency/incompetence through nasopharyngoscopy
- Specific speech therapy techniques for this population that can also be useful for children with unrelated speech sound disorders
For each video, information is given on what should be seen and heard, and in many cases, what should be considered. This information can be viewed before or after viewing the video.

The videos are intentionally short; most are a minute-long or less. This results in more learning in less time. In fact, the learner can “observe” and analyze dozens of cases in this series in the time that it would take to observe one clinic.

Because these videos are online, more videos will be added to the site periodically. Therefore, this site will continue to be developed and enhanced over time for the benefit of students, university programs, and professionals in the field.

Acknowledgements:

Videotaping, selecting, and editing videos and then developing case histories for these videos was certainly a team effort. I would like to acknowledge and sincerely thank the following people for their hard work on this project:

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I am deeply indebted to these individuals because without their help, this project would not be completed.

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**Video Descriptions**

**Speech (SP) Videos**

(See Chapter 7)

**SP-01.** Hypernasality and velocardiofacial syndrome. Speech is characterized by hypernasality, nasalized consonants, and fronting of velars. This child has typical facial characteristics of velocardiofacial syndrome.

**SP-02.** Hypernasality and nasal emission. This child has a history of left unilateral complete cleft lip and palate. Note the missing lateral incisor and the left lateral crossbite. Articulation placement is fairly good, but oral consonants are nasalized.

**SP-03.** Hyponasality. This child has hyponasality, as noted on nasal sounds, following a placement of a pharyngeal flap 3 months previously. She is a mouth breather and has symptoms of upper airway obstruction. This should get better with time, but should be closely monitored.

**SP-04.** Cul-de-sac resonance. This child has pharyngeal cul-de-sac resonance due to a large scar band on the back of the pharynx, just below the base of the tongue. This was due to an aggressive tonsillectomy. Pharyngeal cul-de-sac resonance can be confused with hyponasality. However, it is more noticeable with oral sounds than with hyponasality.
Nasal emission. Speech is characterized by normal articulation placement, but nasal emission on oral sounds. Nasal emission is most noticeable on sibilants, particularly /s/.

Nasal emission, nasal grimace, and short utterance length. Speech is characterized by normal articulation placement, but nasal emission on oral sounds. Because of the nasal emission, this woman has to take frequent breaths during speech to replenish the airflow. This causes short utterance length.

Dysarthria and hypernasality. This girl has dysarthria with velopharyngeal incompetence secondary to a traumatic brain injury (TBI). A predominate feature of her speech is hypernasal. She also has altered rate and her voice is monotone.

Nasal emission, nasal grimace, weak consonants, short utterance length, and velopharyngeal incompetence. This girl has cerebral palsy, causing dysarthria with velopharyngeal incompetence. Because of a large velopharyngeal opening, there is significant nasal emission and loss of oral air pressure. This causes the consonants to be very weak in intensity and pressure. Notice that she takes frequent breaths while counting to compensate for the loss of air through the nose. This causes short utterance length in connected speech. There is also a nasal grimace, reflecting the effort required while trying to achieve velopharyngeal closure.

Nasal emission, weak consonants, short utterance length, and velopharyngeal incompetence. This patient has a history of myasthenia gravis, with velopharyngeal incompetence and vocal fold paralysis. Voice is breathy and there is significant nasal emission, weak oral consonants, and short utterance length. The effort required for producing speech is apparent in this sample. Her speech becomes worse with fatigue.

Nasal emission and glottal stops. There is nasal emission on voiceless phonemes. On voiced plosives, this girl co-articulates glottal stops with nasal sounds.

Nasal emission and glottal stops. This child has paresis of the left vocal fold, left side of the velum and left side of the tongue. Notice that he has difficulty with lingual phonemes.

Nasal emission and glottal stops. This is the same child as in SP-11.

Ankylosed tongue. This patient has significant limitation of lingual movement for elevation, protrusion, and lateralization due to removal of a large hemangioma. However, all lingual-alveolar sounds, including /l/, are produced without any distortion. This shows that ankyloglossia rarely affects speech production.

Nasalization of oral sounds. This child has a submucous cleft with velopharyngeal insufficiency. She primarily uses nasal sounds and some glottal stops for all oral sounds.

Compensatory articulation productions. This patient demonstrates backing of anterior sounds as a compensation for a large, midpalatal fistula. By producing sounds in the back of the mouth, he is able to make use of the air pressure before it is lost through the fistula. He also uses a pharyngeal fricative for sibilant sounds, most noticeable on /s/. (Note: He is talking about his dog going up to the mountains, and then about speech therapy.)

Dysphonia. This child has multiple congenital anomalies, including a submucous cleft and unilateral vocal fold paralysis. He has nasal emission, which is partially masked by the dysphonia. Oral consonants are nasalized.

Nasalized consonants, hypernasality, nasal emission, and nasal grimace. This child has a diagnosis of Chiari I malformation and ectodermal dysplasia.
SP-18. Amniotic bands and glottal stops. This child has severe micrognathia due to amniotic bands. She has had several mandible distractions, but is still very micrognathic due to restricted growth of the mandible. During speech, she uses glottal stops or velar sounds. This is because the tongue tip is under the palate, rather than the alveolar ridge. In addition, she is unable to achieve bilabial closure due to the jaw discrepancy.

SP-19. Apraxia of speech. This child has evidence of childhood apraxia of speech that affects velopharyngeal function. There is mild nasal emission and an occasional nasal rustle.

SP-20. Glottal stops, hypernasality, nasal emission, and BOR (branchio-oto-renal) syndrome. The mother and three of the four children in this family have BOR syndrome. All have velopharyngeal insufficiency of various degrees with the typical speech characteristics. See videos SP-21 and SP-22 of his two sisters.

SP-21. Hypernasality, nasal emission, and BOR (branchio-oto-renal) syndrome. The mother and three of the four children in this family have BOR syndrome. All have velopharyngeal insufficiency of various degrees with the typical speech characteristics. See videos SP-20 and SP-22 of her two siblings.

SP-22. Hypernasality, nasal emission, and BOR (branchio-oto-renal) syndrome. The mother and three of the four children in this family have BOR syndrome. All have velopharyngeal insufficiency of various degrees with the typical speech characteristics. See videos SP-20 and SP-21 of her two siblings.

SP-23. Phoneme-specific nasal emission. This child has phoneme-specific nasal emission, in the form of a nasal rustle, on all sibilants (/s/, /z/, /ʃ/, /ʒ/, /ʧ/, /ʤ/). This is caused by the use of a posterior nasal fricative as a substitution for the correct placement. All other pressure-sensitive sounds are produced normally with no nasal emission.

SP-24. Obligatory distortion. This girl has normal tongue position for the /s/ sound, despite an anterior crossbite with maxillary retrusion. This causes very slight distortion that will disappear with correction of the occlusion.

SP-25. Hyponasality, submucous cleft, and velocardiofacial syndrome. This boy had a submucous cleft and pharyngeal flap. He had postoperative hyponasality and upper airway obstruction at his 3-month postoperative check.

SP-26. Hyponasality, obligatory distortions, and Crouzon syndrome. This child has a diagnosis of Crouzon syndrome. He has maxillary retrusion and mid-face deficiency, which can cause a shallow pharyngeal tube and hyponasality. He also has a Class III malocclusion with anterior crossbite. This causes obligatory distortions of anterior sounds.

SP-27. Hypernasality, nasal emission, obligatory distortions, and submucous cleft. This child has an unrepaired submucous cleft that causes velopharyngeal insufficiency. He also has a Class III malocclusion with anterior crossbite. Despite the abnormal occlusion, articulation placement is normal.

SP-28. Nasal emission, dysphonia, and CHARGE syndrome. This girl has a diagnosis of CHARGE syndrome. In addition, she has right-sided facial, velar, and vocal cord paralysis. This is the cause of the nasal emission and dysphonia.

SP-29. Nasal emission, glottal stops, and nasal grimace. This child has significant velopharyngeal insufficiency. Although the velum appears intact on the oral surface, it is very short as noted by the fact that the uvula flips back during phonation.
SP-30. Hypernasality, nasalized consonants, nasal grimace, and velocardiofacial syndrome. This child has velocardiofacial syndrome with hypernasality and nasalized phonemes. Note that he uses lingual-alveolar phonemes as a substitution for other sounds.

SP-31. Nasalized consonants. This child has a diagnosis of cerebral palsy. She primarily uses a lingual-alveolar placement for velars and bilabial. There is mild velopharyngeal incompetence.

SP-32. Obligatory distortions. This child has a history Pierre Robin sequence with cleft palate. During the palate repair, the clamp caused a large hematoma, resulting in acquired macroglossia. She has had mandibular distraction, but still has upper airway obstruction, which necessitate a trach. She tends to articulate with the dorsum of the tongue.

SP-33. Nasal emission, weak consonants, and nasal grimace. This girl had five unsuccessful sphincter pharyngoplasties at another center. Despite the surgeries, she has severe velopharyngeal insufficiency.

SP-34. Palatal-dorsal productions. This girl has a history of bilateral cleft lip and palate. She uses the dorsum or the back of the tongue for lingual-alveolar sounds. This is a compensation for anterior crowding of the tongue due to an anterior crossbite. There is mild hyponasality when she says “um.”

SP-35. Nasal emission and compensatory productions. This girl had amniotic band syndrome, resulting in severe micrognathia. She uses lingual-alveolar placement for bilabials and has backing of velars. She also has nasal emission due to velar dysplasia.

SP-36. Apraxia, hypernasality, and velocardiofacial syndrome. This child was born with bilateral cleft lip and palate and also has a diagnosis of velocardiofacial syndrome. She has hypernasality and nasal emission that is barely audible. The motor issues of apraxia are particularly noticeable on the word “money,” which should be easy to produce if velopharyngeal insufficiency was the only issue.

SP-37. Nasal emission and nasal rustle. This child had a submucous cleft and had had an adenoidectomy. The nasal rustle is due to bubbling of secretions in the velopharyngeal valve.

SP-38. Compensatory productions, hypernasality, and nasal emission. This young man has a history of bilateral cleft lip and palate. He has severe Class III malocclusion with anterior open bite. As a result, the tongue is anterior to its natural position under the alveolar ridge. He compensates by using palatal-dorsal productions for lingual-alveolar and sibilant sounds.

SP-39. Hypernasality and nasal emission. This child has a history of unilateral cleft lip and palate. He has hypernasality, nasal emission, omitted consonants, and placement errors. See SP-40 for the postoperative video.

SP-40. Palatal-dorsal production. This is the postoperative video of the child seen in SP-39. He underwent a pharyngeal flap and as a result, he no longer has hypernasality. Also, consonants have normal pressure and intensity due to a lack of nasal emission. He now needs speech therapy for correction of the palatal-dorsal productions for lingual-alveolar sounds and to learn to produce sibilant sounds.

SP-41. Nasal rustle and dysphonia. This child has a diagnosis of Kabuki syndrome. She has a wet vocal quality. She has a phoneme-specific nasal rustle on /s/ and /z/ due to abnormal production. However, she also has an inconsistent nasal rustle on other sounds due to a small velopharyngeal opening.
SP-42. Apert syndrome. Note the mid-face and maxillary retrusion, and also the anterior open bite. This child uses a palatal-dorsal production for bilabials and velars.

SP-43. Hypernasality, nasal emission, nasalized consonants, nasal grimace, compensatory productions. This child uses lingual clicks as a compensatory production for velars.

SP-44. Nasal emission, obligatory distortions. This child had a bilateral cleft lip and palate. He has a Class III malocclusion, causing obligatory distortions. He also has velopharyngeal insufficiency, resulting in audible nasal emission. Note that he needs to take frequent breaths to replenish lost airflow due to nasal emission.

SP-45. Apraxia. This child has childhood apraxia of speech with inconsistent placement errors and poor pitch control. He often produces nasal sounds inappropriately, making the quality of his speech seem hypernasal. He also inconsistently voices for voiceless sounds. Because this is a disorder of motor planning, he requires speech therapy rather than surgical intervention.

SP-46. Nasalized consonants and hypernasality. This child has velopharyngeal insufficiency secondary to an occult submucous cleft palate. She uses /h/ for /s/ inconsistently and nasalizes consonants. Her postoperative video is SP47.

SP-47. Postoperative video. This is the same child as seen in SP-46. She now has normal resonance, and normal pressure for oral sounds. She has a slight, inconsistent nasal rustle. (Note the /p/ sound in “Pick up the pie.”) This should be monitored over time. She needs speech therapy, particularly to improve the production of sibilant phonemes.

SP-48. Phoneme-specific nasal emission. This girl has loud nasal emission on /s/ and /z/ due to pharyngeal articulation. She also has slight nasal emission on other phonemes. This girl has a diagnosis of horizontal gaze palsy. Also, note the left-sided facial paralysis when she blinks. See video SP-49 of her speech after speech therapy.

SP-49. Post speech therapy. This is the same girl as seen in video SP-48. As a result of a pharyngeal flap, and a short period of speech therapy, she now is producing the /s/ and /z/ sounds orally, although there is a slight lateralization of these sounds. The left-sided facial palsy is particularly apparent in this video.

SP-50. Nasal emission and nasal rustle. This child has a history of unilateral cleft lip and palate with anterior crossbite. He has nasal emission and an inconsistent nasal rustle. See SP-59 for the postoperative video.

SP-51. Postoperative video. This child is the same child as in video SP-58. As a result of a pharyngeal flap, he no longer has nasal emission and has much better pressure on oral consonants.

SP-52. Hypernasality, nasalized consonants, nasal emission, and nasal grimace. This child has a history of bilateral cleft lip and palate. He has occasional fronting of sounds. Note that the premaxilla (under the top lip) is a little protrusive. See SP-53 for the postoperative video.

SP-53. Postoperative video. This is the same child as in SP-52, but after a pharyngeal flap. There is now normal resonance and no nasal emission. The nasal passage shows no postoperative hyponasality.

SP-54. Nasalized consonants, nasal emission, and nasal grimace. This child has a diagnosis of Aase syndrome, a rare disorder that involves anemia, certain joint and skeletal deformities, and cleft palate. She has no ear canal on the right. She has a moderately-severe conductive hearing loss and wears a BAHA (bone-anchored hearing aid). See SP 55 for a postoperative video.
SP-55. Postoperative video. This is the same child as in video SP-54, but just after placement of a pharyngeal flap. Note that she now has normal resonance and no nasal emission. Consonants are more precise because she now has normal air pressure for production.

SP-56. Dysarthria, hypernasality, nasal emission, weak consonants, short utterance length, and nasal grimace. This child has cerebral palsy with dysarthria. He has severe velopharyngeal incompetence, which is a common characteristic of dysarthria. The pre-operative videofluoroscopy can be found at VF-06. Following a pharyngeal flap surgery, this child has improved resonance, increased air pressure for consonants, and better utterance length. As a result, the clarity of speech is significantly improved. In addition, the effort with speech is greatly reduced, as evidenced by the disappearance of the nasal grimace.

SP-57. Nasal emission. This young man has a history of cleft lip and palate. He had normal resonance until he underwent a Le Fort I maxillary advancement. As a result of the procedure, he developed velopharyngeal insufficiency with hypernasality and nasal emission. He also has fronting of sibilants. See video Psych-01 for an interview with this young man regarding his experiences. This was done following a pharyngeal flap.

SP-58. Nasal emission. This young man had hypernasality after an adenoidectomy. He had a pharyngeal flap at the age of 16 years at another center. The flap was too narrow and as a result, he had mild nasal emission. See video SG-11 for the nasopharyngoscopy of this flap. This young man’s speech was a particular concern to him because he was majoring in musical theater and was having difficulty singing. See SP-59 and SP-60 for the postoperative videos. Note that he also has difficulty with /r/ and /ɚ/. Therefore, speech therapy was recommended.

SP-59. Hyponasality. This is the same person as in video SP-58. This was only three weeks after a pharyngeal flap revision surgery. He had significant postoperative swelling, causing hyponasality and upper airway obstruction.

SP-60. Hyponasality. This is the second postoperative video of the patient noted in SP-58 and SP-59. This video was taken about 4 months postoperatively. He has better oral pressure for consonants and is able to sing more effectively as a result of the pharyngeal flap. However, he still has mild hyponasality, which will be monitored. If this persists, the lateral ports of the flap will be widened.

SP-61. Hypernasality, nasal emission, nasal grimace, glottal stops, and velocardo-facial syndrome. This child uses /h/ and backing as compensatory productions. The parents did not want surgery at the time. See video SP-62 for a video which was taken a little more than a year later, and SP 63 for a postoperative video.

SP-62. Hypernasality, nasal emission, glottal stops, and velocardo-facial syndrome. This is the same child as seen in SP-61. She is now producing bilabial phonemes as a result of speech therapy. However, she still compensates with glottal stops and the use of /h/. Notice the inspiration on the final /s/. See SP-63 for the postoperative video.

SP-63. Postoperative video and velocardo-facial syndrome. This is the same child as noted in SP-61 and SP-62, but following a pharyngeal flap. She now has normal oral resonance and no nasal emission. She is able to produce oral sounds, but still occasionally produces the /h/ as a substitution for oral sounds.
SP-64. Nasalized consonants, glottal stops, nasal emission, and hypernasality. This child has a history of unilateral cleft lip and palate. He has velopharyngeal insufficiency. He uses /h/ and n/s as compensatory productions. See video SP-65 for the postoperative video.

SP-65. Postoperative video. Following placement of a pharyngeal flap, resonance is essentially normal, with the exception of high vowels. He is now able to produce oral sounds with good pressure, but uses these inconsistently. He will need speech therapy to make the best of the flap. See video SP-64 for the preoperative video.

SP-66. Phoneme-specific nasal emission (PSNE). This child has PSNE on /t/ (but not on /d/) and inconsistently on sibilants (/s/, /ʃ/, /ʧ/, /ʤ/). There is no nasal emission on bilabial or velar plosives. See NP-43 for the effect of these errors on the velopharyngeal valve, as seen through nasopharyngoscopy.

SP-67. Phoneme-specific nasal emission (PSNE) and nasal emission. There is PSNE on sibilants due to faulty placement, but also a nasal rustle and inconsistent hypernasality (note the /b/ in the word “book”) due to mild velopharyngeal insufficiency.

SP-68. Nasal emission and nasal grimace. This child acquired velopharyngeal insufficiency after an adenoidectomy. When this happens, speech therapy is not appropriate. Instead, physical management is required.

SP-69. Hypernasality, nasalized consonants, glottal stops, apraxia, and CHARGE syndrome. This child has CHARGE syndrome with velopharyngeal insufficiency. See video SP-70 for the postoperative video.

SP-70. Postoperative video, apraxia, and CHARGE syndrome. This is the child from video SP-69. He has had a pharyngeal flap. He has much better resonance and better oral pressure. He is now stimulable for production of oral sounds.

Magnetic Resonance Imaging (MRI)
(See Chapter 8)

MRI-01. Severe glossoptosis. This MRI (magnetic resonance imaging) study shows a tongue base that is very close to the pharyngeal wall during breathing.

Psychosocial (Psych) Aspects
(See Chapter 10)

Psych-01. Patient interview. This young man describes his feelings and experiences as a person born with cleft lip and palate.

Evaluation (EV) Videos
(See Chapter 11)

EV-01. Speech evaluation procedures. To get the child talking, it often helps to ask either/or questions first. Once the child is talking, the examiner can have the child repeat syllables and structured sentences.

EV-02. Counseling parents about normal velopharyngeal function and velopharyngeal insufficiency.
EV-03. Use of the cul-de-sac (nose-pincho test). If there is a shift in resonance on oral sounds when the nose is closed, which suggests a velopharyngeal opening. In this case, the child has normal resonance on the low vowel /a/, but hypernasality on the high vowel /i/. Because this is phoneme-specific, therapy using auditory feedback should be tried before considering surgical intervention, despite his history of cleft palate.

EV-04. Use of the straw for evaluation. The straw (or a tube) is a great tool for testing velopharyngeal function. Notice that the nasal emission is not very audible when the child is talking, although the speech is a little distorted. Using the straw, the nasal emission can be heard clearly. Notice that there is very little nasal emission on k/g in comparison to other sounds. This indicates that there is a symptomatic fistula (which was found in the area of the incisive foramen). Nasopharyngoscopy confirmed mild velopharyngeal insufficiency as well. If the fistula is repaired without surgery for the VPI, the VPI will be more symptomatic due to the increase in air pressure under the velopharyngeal valve.

EV-05. Use of tokens in the evaluation. To get the child to imitate speech sounds and syllables during the evaluation, tokens are often very helpful. The examiner holds the token up to the side of his/her mouth to direct the child’s attention to the examiner’s face. Once the child is watching, the examiner produces the speech segment for imitation. This child has evidence of childhood apraxia of speech in that she has difficulty combining two different syllables, despite the ability to produce the syllables individually.

Oral (OR) Examination Videos
(See Chapter 12)

OR-01. Submucous cleft. Note the “V” shape during phonation. The uvula is square with a line in the middle. This finding is common with a submucous cleft. Having the child produce /æ/ (as in “hat”) rather than /a/ (as in “father”) usually makes the back of the tongue go down. At the same time, the child can then stick out his tongue. This provides a better view of the velum, uvula, and tonsils.

OR-02. Fistula, tongue flap. The tongue flap only partially closes the fistula.

OR-03. Submucous cleft. The uvula is square at the tip and has a faint line in the middle. This is a common finding with submucous cleft. The tonsils are also enlarged.

OR-04. Submucous cleft. Note the line in the uvula and the defect in the velum and hard palate.

OR-05. Hemartoma. This child is status post removal of a hemartoma (a benign tumor) of the right side of the velum and pharynx. This was causing airway obstruction and difficulty swallowing. The remaining defect caused velopharyngeal insufficiency on the right side.

OR-06. Short velum. There is virtually no bend in the velum and therefore, little or no contact surface against the posterior pharyngeal wall.

OR-07. Torus palatinus. A torus palatinus is a normal finding and can be very slight or very prominent. When prominent, it can interfere with speech. In this person’s case, the torus palatinus does not affect speech.

OR-08. Incomplete cleft/ submucous cleft. The uvula and posterior border of the velum are cleft. A submucous cleft is apparent through the rest of the velum and part of the hard palate.
Nasometry (NM) Videos
(See Chapter 14)

NM-01. Nasometry preparation procedure. This video shows a way to prepare a young child to wear the Nasometer Headset. Some children do best with this device, while other children do better with the Hand-Held Separator.

NM-02. Demonstration of SNAP Test administration. The pictures can be displayed directly on the screen, or in a printed format.

The following are nasometry tests on various patients. The passage (or speech sample) is indicated and the patient’s mean nasalance score is noted. The mean (M) and standard deviation (SD) of the normative group for each passage are noted in the tables for comparison.

Case A: This child has normal speech and resonance. Nasalance (which measures resonance) comes from vowel sounds and voiced consonants. Voiceless consonants should be at baseline or 0. Note that the screen shots show how to determine the individual’s mean nasalance for the passage.

<table>
<thead>
<tr>
<th>Video</th>
<th>Passage</th>
<th>Score</th>
<th>Norms</th>
</tr>
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<tbody>
<tr>
<td>NM-03</td>
<td>Bilabial Plosives</td>
<td>12</td>
<td>M = 11; SD = 5</td>
</tr>
<tr>
<td>NM-04</td>
<td>Lingual-Alveolar Plosives</td>
<td>11</td>
<td>M = 11; SD = 5</td>
</tr>
<tr>
<td>NM-05</td>
<td>Velar Plosives</td>
<td>12</td>
<td>M = 13; SD = 6</td>
</tr>
<tr>
<td>NM-06</td>
<td>Sibilant Fricatives</td>
<td>14</td>
<td>M = 12; SD = 15</td>
</tr>
<tr>
<td>NM-07</td>
<td>Nasals</td>
<td>54</td>
<td>M = 54; SD = 9</td>
</tr>
</tbody>
</table>

Case B: This child also has normal speech and resonance. The high vowel /i/ is usually about 10 percentage points higher than the low vowel /a/. (See Syllable Repetition and Prolonged Sounds Subtests of the SNAP Test).

<table>
<thead>
<tr>
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<th>Norms</th>
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</thead>
<tbody>
<tr>
<td>NM-08</td>
<td>Prolonged /a/</td>
<td>9</td>
<td>M = 6; SD = 3</td>
</tr>
<tr>
<td>NM-09</td>
<td>Prolonged /i/</td>
<td>20</td>
<td>M = 19; SD = 9</td>
</tr>
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Case C: This patient is status post tonsillectomy and adenoidectomy. He demonstrates a small velopharyngeal gap, causing a nasal rustle on pressure-sensitive phonemes.

<table>
<thead>
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<th>Video</th>
<th>Passage</th>
<th>Score</th>
<th>Norms</th>
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<tbody>
<tr>
<td>NM-10</td>
<td>Bilabial Plosives</td>
<td>39</td>
<td>M = 11; SD = 5</td>
</tr>
<tr>
<td>NM-11</td>
<td>Lingual-Alveolar Plosives</td>
<td>60</td>
<td>M = 11; SD = 5</td>
</tr>
<tr>
<td>NM-12</td>
<td>Velar Plosives</td>
<td>61</td>
<td>M = 13; SD = 6</td>
</tr>
<tr>
<td>NM-13</td>
<td>Sibilant Fricatives</td>
<td>60</td>
<td>M = 12; SD = 15</td>
</tr>
</tbody>
</table>

Case D: This child has a submucous cleft and small velopharyngeal opening, causing a nasal rustle. The nasalance score is higher on the sibilants sounds, which require higher pressure.

<table>
<thead>
<tr>
<th>Video</th>
<th>Passage</th>
<th>Score</th>
<th>Norms</th>
</tr>
</thead>
<tbody>
<tr>
<td>NM-14</td>
<td>Bobby--Bilabial Plosives (with nasals)</td>
<td>21</td>
<td>M = 16; SD = 5</td>
</tr>
<tr>
<td>NM-15</td>
<td>Suzy--Sibilant Fricatives (without nasals)</td>
<td>40</td>
<td>M = 10; SD = 4</td>
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</tbody>
</table>
Case E: This child has a history of cleft palate. Speech is characterized by nasal emission, hypernasality, and glottal stops.

<table>
<thead>
<tr>
<th>Video</th>
<th>Passage</th>
<th>Score</th>
<th>Norms</th>
</tr>
</thead>
<tbody>
<tr>
<td>NM-16</td>
<td>Zoo</td>
<td>60</td>
<td>M = 16; SD = 5</td>
</tr>
</tbody>
</table>

Case F: This patient has severe nasal emission secondary to a submucous cleft palate. Note that the prolonged production of /s/, which is a voiceless consonant, should result in a 0 nasalance score. The score of 93 suggests a large velopharyngeal opening, causing significant nasal emission. Note that the nasalance values for the /si/ syllables are higher than for the /sa/ syllables, as would be expected.

<table>
<thead>
<tr>
<th>Videos</th>
<th>Passage</th>
<th>Score</th>
<th>Norms</th>
</tr>
</thead>
<tbody>
<tr>
<td>NM-17</td>
<td>Prolonged /s/</td>
<td>93</td>
<td>M = 0; SD = 0</td>
</tr>
<tr>
<td>NM-18</td>
<td>pa, pa, pa ...</td>
<td>60</td>
<td>M = 7; SD = 5</td>
</tr>
<tr>
<td>NM-19</td>
<td>si, si, si...</td>
<td>91</td>
<td>M = 17; SD = 8</td>
</tr>
</tbody>
</table>

Case G: This child has significant nasal emission secondary to a history of cleft palate.

<table>
<thead>
<tr>
<th>Video</th>
<th>Passage</th>
<th>Score</th>
<th>Norms</th>
</tr>
</thead>
<tbody>
<tr>
<td>NM-20</td>
<td>Sibilant Fricatives</td>
<td>68</td>
<td>M = 12; SD = 5</td>
</tr>
</tbody>
</table>

Case H: This patient has a history of cleft palate and velopharyngeal insufficiency. She had a pharyngeal flap. She now has hyponasality (in addition to upper airway obstruction and sleep apnea), suggesting that the lateral ports on either side of the pharyngeal flap are not open enough for breathing and nasal sound production. In addition, there is a nasal rustle, which suggests that there is not complete closure of one or both ports during production of pressure-sensitive consonants. The nasalance score would probably be lower if it weren’t for the nasal rustle.

<table>
<thead>
<tr>
<th>Video</th>
<th>Passage</th>
<th>Score</th>
<th>Norms</th>
</tr>
</thead>
<tbody>
<tr>
<td>NM-21</td>
<td>Nasals</td>
<td>32</td>
<td>M = 54; SD = 9</td>
</tr>
</tbody>
</table>

Case I: This child has cul-de-sac resonance and hyponasality due to a scar band in the posterior pharynx wall. This band blocks sound energy from traveling superiorly into the oral and nasal cavities.

<table>
<thead>
<tr>
<th>Video</th>
<th>Passage</th>
<th>Score</th>
<th>Norms</th>
</tr>
</thead>
<tbody>
<tr>
<td>NM-22</td>
<td>Nasals</td>
<td>43</td>
<td>M = 54; SD = 9</td>
</tr>
</tbody>
</table>

The following are individual nasometry videos with their nasalance scores:

<table>
<thead>
<tr>
<th>Video</th>
<th>Passage</th>
<th>Score</th>
<th>Norms</th>
</tr>
</thead>
<tbody>
<tr>
<td>NM-23</td>
<td>Sibilant Fricatives</td>
<td>48</td>
<td>M =12; SD = 15</td>
</tr>
<tr>
<td>NM-24</td>
<td>Velar Plosives</td>
<td>33</td>
<td>M =13; SD = 6</td>
</tr>
<tr>
<td>NM-25</td>
<td>Bilabial Plosives</td>
<td>75</td>
<td>M = 11; SD = 5</td>
</tr>
<tr>
<td>NM-26</td>
<td>Sibilant Fricatives</td>
<td>16</td>
<td>M =12; SD = 15</td>
</tr>
<tr>
<td>NM-27</td>
<td>Sibilant Fricatives</td>
<td>53</td>
<td>M =12; SD = 15</td>
</tr>
<tr>
<td>NM-28</td>
<td>Sibilant Fricatives</td>
<td>66</td>
<td>M =12; SD = 15</td>
</tr>
<tr>
<td>NM-29</td>
<td>Sibilant Fricatives</td>
<td>45</td>
<td>M =12; SD = 15</td>
</tr>
<tr>
<td>NM-30</td>
<td>Lingual-alveolars</td>
<td>47</td>
<td>M = 11; SD = 5</td>
</tr>
<tr>
<td>NM-31</td>
<td>Bilabial Plosives</td>
<td>74</td>
<td>$M = 11; SD = 5$</td>
</tr>
<tr>
<td>--------</td>
<td>-------------------</td>
<td>----</td>
<td>----------------</td>
</tr>
<tr>
<td>NM-32</td>
<td>Sibilant Fricatives</td>
<td>75</td>
<td>$M = 12; SD = 15$</td>
</tr>
<tr>
<td>NM-33</td>
<td>Velar Plosives</td>
<td>60</td>
<td>$M = 54; SD = 9$</td>
</tr>
<tr>
<td>NM-34</td>
<td>Velar Plosives</td>
<td>64</td>
<td>$M = 13; SD = 6$</td>
</tr>
<tr>
<td>NM-35</td>
<td>Sibilant Fricatives</td>
<td>65</td>
<td>$M = 12; SD = 15$</td>
</tr>
<tr>
<td>NM-36</td>
<td>Lingual-alveolars</td>
<td>58</td>
<td>$M = 11; SD = 5$</td>
</tr>
<tr>
<td>NM-37</td>
<td>Bilabial Plosives</td>
<td>36</td>
<td>$M = 11; SD = 5$</td>
</tr>
<tr>
<td>NM-38</td>
<td>Bilabial Plosives</td>
<td>31</td>
<td>$M = 11; SD = 5$</td>
</tr>
<tr>
<td>NM-39</td>
<td>Sibilant Fricatives</td>
<td>85</td>
<td>$M = 12; SD = 15$</td>
</tr>
<tr>
<td>NM-40</td>
<td>Bilabial Plosives</td>
<td>19</td>
<td>$M = 11; SD = 5$</td>
</tr>
<tr>
<td>NM-41</td>
<td>Nasals</td>
<td>37</td>
<td>$M = 54; SD = 9$</td>
</tr>
<tr>
<td>NM-42</td>
<td>Velar Plosives</td>
<td>47</td>
<td>$M = 13; SD = 6$</td>
</tr>
<tr>
<td>NM-43</td>
<td>Velar Plosives</td>
<td>64</td>
<td>$M = 11; SD = 5$</td>
</tr>
<tr>
<td>NM-44</td>
<td>Bilabial Plosives</td>
<td>44</td>
<td>$M = 11; SD = 5$</td>
</tr>
<tr>
<td>NM-45</td>
<td>Sibilant Fricatives</td>
<td>47</td>
<td>$M = 12; SD = 15$</td>
</tr>
<tr>
<td>NM-46</td>
<td>Bilabial Plosives</td>
<td>64</td>
<td>$M = 11; SD = 5$</td>
</tr>
<tr>
<td>NM-47</td>
<td>Sibilant Fricatives</td>
<td>47</td>
<td>$M = 12; SD = 15$</td>
</tr>
<tr>
<td>NM-48</td>
<td>Velar Plosives</td>
<td>47</td>
<td>$M = 13; SD = 6$</td>
</tr>
<tr>
<td>NM-49</td>
<td>Bilabial Plosives</td>
<td>15</td>
<td>$M = 11; SD = 5$</td>
</tr>
<tr>
<td>NM-50</td>
<td>Nasals</td>
<td>11</td>
<td>$M = 54; SD = 9$</td>
</tr>
<tr>
<td>NM-51</td>
<td>Sibilant Fricatives</td>
<td>36</td>
<td>$M = 12; SD = 15$</td>
</tr>
</tbody>
</table>

**Videofluoroscopy (VF) Videos**  
(See Chapter 16)

Notes:

- On the AP and base views, “right” always refers to the patient’s right. Because the AP and base views are done as if we are facing the patient, the patient’s right is on the left side of the screen, and the patient’s left is on the right side of the screen.
- There is almost always velopharyngeal closure during swallowing, despite VPI with speech. This is due to a neurophysiological difference in closure, and also the assistance of the tongue with swallowing.

VF-01. Normal velopharyngeal closure. The lateral and anterior-posterior (AP) view of normal velopharyngeal closure is shown through videofluoroscopy. On the lateral view, the velum has good “knee action” and elevates to the level of the hard palate. There is firm contact of the velum against the posterior pharyngeal wall. On the AP view, the lateral walls can be seen (although not well) because they are coated with barium. On the oral level, the lateral walls appear to barely move. When the view is raised to the nasal level however, the lateral walls appear to come together against the septum (although in reality, they are well behind the septum).

VF-02. Lateral, anterior-posterior (AP), and base views of a patient with a nasal rustle. The coating of barium allows visualization of the lateral pharyngeal walls on the AP and Base views. Although this study looks like there is normal closure, there is a small velopharyngeal opening that cannot be seen through videofluoroscopy. This is
causing the nasal rustle that is heard periodically throughout the sample. The nasopharyngoscopy of this same patient can be seen in Video NP-07.

VF-03. Lateral view of a patient with nasal emission. A narrow velopharyngeal opening can barely be seen with this study. In the case of a narrow gap, it will appear to disappear if the head is slightly rotated. Also, if there is touch closure anywhere along the plane, it will appear as if there is complete closure.

VF-04. Lateral view of a patient with velopharyngeal incompetence. Note the occasional appearance of a Passavant’s ridge as a projection on the posterior pharyngeal wall, at the level of the base of the tongue. Speech is characterized by hypernasality and nasalization of plosives, and barely audible nasal emission.

VF-05. Lateral, anterior-posterior (AP), and base views of a patient with a large velopharyngeal opening. On the lateral view, the velum appears to be normal in length. However, there is poor elevation during speech, suggesting velopharyngeal incompetence. Note that occasionally, the back of the tongue pushes the velum backward to compensate. There is also poor movement of the lateral pharyngeal walls, as noted on the AP and base views. This child compensates by using glottal stops for pressure-sensitive phonemes.

VF-06. Lateral, anterior-posterior (AP), and base views of a patient with severe velopharyngeal incompetence. This patient has dysarthria (and therefore, velopharyngeal incompetence) as a result of cerebral palsy. SP 56 shows the pre- and postoperative speech samples.

VF-07. Lateral view of a patient with severe apraxia. Notice the inconsistent velar movement and how the velum elevates but often drops down before the end of the word.

VF-08. Lateral, anterior-posterior (AP), and base views of a patient with a pharyngeal flap. On the lateral view, the flap is seen as a shadow at the level of the base of the tongue that pulls the velum posteriorly. On the AP view, the flap and lateral ports are best seen when the patient swallows, causing compression of the barium in the lateral ports. On the base view, the flap and ports are outlined with the barium. A pharyngeal flap can be very difficult to see through videofluoroscopy unless there is a good coating of barium. This pharyngeal flap is too low for much benefit.

### Nasopharyngoscopy (NP) Videos
(See Chapter 17)

Notes:
- On all nasopharyngoscopy videos, “right” always refers to the patient’s right. Because the nasopharyngoscopy view is as if we are facing the patient, the patient’s right is on the left side of the screen, and the patient’s left is on the right side of the screen.
- There is almost always velopharyngeal closure during swallowing, despite VPI with speech. This is due to a neurophysiological difference in closure, and also the assistance of the tongue with swallowing.

NP-01. Normal velopharyngeal closure. Compare this view with what is seen through videofluoroscopy in Video VF-01 of the same speaker (this author). Nasopharyngoscopy shows complete velopharyngeal closure during production of oral sounds. The bulge of the musculus uvulae muscle can be seen on the nasal...
surface of the velum during contraction. Notice that there is no bubbling of secretions during speech (which would indicate a small leak of air pressure).

NP-02. Small velopharyngeal opening. There is an inconsistent, pinhole-size opening just to the right of (the patient’s) midline. This can be noted by an occasional bubble in that area. In connected speech, this type of opening may be more pronounced and more consistent.

NP-03. Occult submucous cleft. This submucous cleft was not detected on the oral surface of the velum. However, on the nasal surface, there is a notch in the posterior border of the velum. During speech, there is a small, central velopharyngeal gap. The epiglottis can be seen at the beginning of the segment and the right tonsil (patient’s right, left on the screen) can be seen protruding in the oropharynx.

NP-04. Submucous cleft. There is a notch in posterior border of velum. The epiglottis can be seen before she starts to speak. With speech, there is a small, midline opening. There is bubbling of secretions, causing the nasal rustle. This video illustrates the fact that frequently, children will cry at the start of the study. However, they usually calm down once the scope is in so that that a good study can be obtained.

NP-05. Submucous cleft. The musculus uvulae muscle is hypoplastic and the defect can be noted on the posterior border of the velum and all the way down the back of the uvula. A very low Passavant’s ridge can be observed. Note that there was initially poor cooperation and therefore, true velopharyngeal function could not be determined. Once she stopped crying, better velopharyngeal function is noted. Despite that, she has a small velopharyngeal opening in the area of the submucous cleft defect. An inconsistent nasal rustle occurs due to bubbling of secretions.

NP-06. Small gap. There is a small gap on the right of the adenoid pad. This results in nasal emission, particularly a nasal rustle due to the bubbling of secretions.

NP-07. Small gap. There is a small, midline gap, resulting in nasal emission and a nasal rustle due to the bubbling. This child’s videofluoroscopic study, which did not show the opening, can be seen on Video VFO 02.

NP-08. Small opening at the midline. This results in nasal emission.

NP-09. Small to medium-sized gap. There is a coronal shape opening with nasal emission. Occasionally, there is midline closure with small lateral gaps. When this occurs, the gap size is smaller, but the distortion is louder due to a nasal rustle.

NP-10. Lateral gap. This patient has very low velopharyngeal closure. There is a gap on the right. A Passavant’s ridge can be noted.

NP-11. Lateral gaps. There is velar contact against the adenoid, but a lateral gap on both sides, resulting in a “bowtie” pattern.

NP-12. Central gap. This patient achieves closure against adenoid tissue, but closure is not maintained. There is nasal emission as a result.

NP-13. Small gap on the right side of midline. Note that the size is inconsistent. Closure can vary with the speech sample, the length of an utterance, and with effort. Despite the fact that complete closure sometimes occurs on individual phonemes, this cannot be maintained.

NP-14. Small lateral gaps. There is a small gap on the left and occasionally on the right. There is touch closure in the midline.
NP-15. Lateral gaps. There is touch closure against a small adenoid pad. There are large gaps on each side of the midline, resulting in a “bowtie” pattern. There is nasal emission and hypernasality.

NP-16. Irregular adenoids. A notch in middle of adenoid prevents a tight seal. In this case, the problem is the adenoid, not the velum. Therefore, a conservative adenoidectomy to smooth out the surface could be considered, or treatment.

NP-17. Large palatal fistula and coronal velopharyngeal opening. This is the same patient as in Video 13-02. There is a large palatal fistula that is viewed on the nasal surface of the hard palate through nasopharyngoscopy. During the production of the /s/ sound, the tongue elevates as a compensatory strategy to close the fistula. During the production of the /ʃ/ however, the tongue is in normal position, but there is obligatory distortion due to the nasal emission. In addition to the fistula, there is velopharyngeal insufficiency (short velum) resulting in a medium-sized coronal opening. Both the fistula and the velopharyngeal opening contribute to the nasal emission and hypernasality.

NP-18. Large opening. Note the projection of adenoid tissue and the Passavant’s ridge below the velum.

NP-19. Large coronal opening. Closure is close to being complete with swallowing, due to the assistance of the tongue. Speech is hypernasal and oral consonants are nasalized.

NP-20. Large opening. There is a submucous cleft, characterized by a slight defect on the nasal surface of the velum. Note the epiglottis and small adenoid pad. This child occasionally uses glottal stops.

NP-21. Large opening. This patient has a large opening, just to the left of center. Note the Passavant’s ridge and the tonsil on the patient’s right side. Speech is characterized by hypernasality, nasal emission, and weak consonants.

NP-22. Large opening. This patient has a large velopharyngeal opening, but a very shallow pharynx due to a history of Treacher Collins syndrome. This makes surgical correction very difficult due to the risk of airway obstruction.

NP-23. Medialized carotid artery, as sometimes occurs with velocardiofacial syndrome. This patient has a small velopharyngeal gap on the right of midline. The right carotid artery is medialized and can be seen pulsating on the pharyngeal wall. Note the epiglottis.

NP-24. Medialized carotid artery, as sometimes occurs with velocardiofacial syndrome. There is a coronal gap with nasal emission, which can be seen by its effect on the secretions. The gap is largest in the left side corner. Note the adenoid pad, and the epiglottis at the end of the segment. Pulsation of the right carotid artery can be seen on the pharyngeal wall when this child is not speaking.

NP-25. Velopharyngeal incompetence. This patient has a history of head trauma. He has a consistent opening throughout the port. There is significant nasal emission, so he takes breaths more frequently than normal to replenish the airflow.

NP-26. Velopharyngeal incompetence. This patient has a diagnosis of myasthenia gravis. Velar elevation is poor, resulting in low closure in midline that is not very firm. Lateral wall movement is also inadequate. There is nasal emission and consonants are weak as a result.

NP-27. Velopharyngeal incompetence. This patient has cerebral palsy and a very large velopharyngeal opening during speech, despite a prominent adenoid pad. As a result,
she has severe nasal emission and takes frequent breaths in an utterance. This is the same patient as can be seen on Video SP 08.

NP-28. Normal closure. Note how the velum moves, but stays up during each speech segment. This video is to be compared with Video NP- 29 (apraxia of speech).

NP-29. Apraxia of speech. This child has a normal velum. During speech, she is able to achieve closure, but cannot coordinate anterior or posterior (velopharyngeal) articulation. As a result, the velum often drops down inappropriately. This causes inconsistent hypernasality and substitution of nasal sounds for oral sounds. Note that this child also substitutes voiced for voiceless sounds inconsistently.

NP-30. Inconsistent closure. There is a small, persistent velopharyngeal opening just to the right of the adenoid pad. This causes bubbling of secretions. There is also a larger, inconsistent gap on vowels, the /r/ sound, and some consonants. He is stimulable for much better closure with shorter speech segments, although there is still a small opening on the right side. This suggests the possibility of both a functional cause (due to misarticulation) and structural cause, resulting in the right-sided opening. Speech therapy to correct placement was recommended first, with possible surgical intervention later, if needed.

NP-31. Phoneme-specific nasal emission (PSNE). There child has normal closure for the production of almost all speech phonemes. Note the excellent lateral pharyngeal wall movement. During production of /s/ however, the velopharyngeal valve opens. This is due to velopharyngeal mislearning. See how this is corrected in Video ST 12.

NP-32. Phoneme-specific hypernasality. This child has fairly normal velopharyngeal closure on most sounds. However, with the high vowel /i/ (as in “eat”), the velum drops down, causing hypernasality.

NP-33. Stress velopharyngeal incompetence. This patient has stress incompetence when playing the trumpet. This patient has normal speech and normal velopharyngeal function, except during and after playing the trumpet. In this video, there is firm closure when he begins to play. With continued playing however, velar fatigue occurs. This causes a small velopharyngeal opening, which is first seen as bubbling. The small velopharyngeal opening persists, thus affecting speech for a short time after he finishes playing.

NP-34. Stress velopharyngeal incompetence. This patient has stress incompetence when playing the clarinet. The leak is apparent through the bubbling of secretions and is very audible.

NP-35. Vocal cords. Normal vocal cords are seen through nasopharyngoscopy.

NP-36. Vocal nodules. Large bilateral vocal fold nodules at the anterior one-third point of the vocal cords.

NP-37. Silastic tube in the pharynx. This patient had a sphincter pharyngoplasty over 10 years ago. The surgeon left a Silastic tube in the pharynx. The patient had significant hypernasality and nasal emission. He also complained of coughing and irritation and has difficulty sleeping.

NP-38. Incomplete cleft of the velum. The incomplete cleft of the velum on the nasal surface is obvious at rest. Despite this defect, this patient has much better velopharyngeal closure during speech than would be expected, partly due to the adenoid tissue. A small, inconsistent velopharyngeal opening can be seen, which is causing a nasal
rustle. With adenoid atrophy, this opening would be expected to get worse. The
parents elected to proceed with a palatoplasty.

NP-39. Large velopharyngeal opening. Both tonsils can be seen in the airway. This child has
velocardiofacial syndrome, a short velum, and apraxia of speech. Note the voice /b/
for the voiceless /p/.

NP-40. Small velopharyngeal opening. There is a small, persistent velopharyngeal opening
just to the right of the adenoid pad. This causes bubbling of secretions. There is
inconsistent closure through the rest of the port with an increase in the size of the
opening with connected speech.

NP-41. “Bowtie” closure. There is midline closure against a prominent adenoid pad, but
small openings on each side.

NP-42. Narrow, coronal gap. There is irregularity of adenoid tissue on the pharyngeal wall.
The narrow opening causes slight bubbling of secretions.

NP-43. Phoneme-specific nasal emission. There is complete velopharyngeal closure on
bilabial and velar plosives. However, abnormal placement causes the velopharyngeal
valve to be open during the production of the following sounds: /t/, /s/, /ʃ/, /ʧ/, /ʤ/.
The /d/ sound is produced normally. Notice that at the end of the clip, instead of
imitating the /sɑ, sɑ, sɑ/ and /si, si, si/ syllables, he substituted an /f/ for /s/. Because
he used the /f/ sound, there is complete closure on these syllables. See SP-66 for the
speech video of this child.

NP-44. Submucous cleft. The abnormality is apparent on the nasal surface of the velum.

NP-45. Vocal nodules. Large, bilateral vocal nodules are seen through stroboscopy.

NP-46. Vocal cords. The vocal cords appear unremarkable, despite the pitch breaks noted in
connected speech. There is bubbling of secretions due to a small velopharyngeal
opening, which is largest on the left side.

NP-47. Submucous cleft. There is irregularity on the posterior border of the velum, resulting
in a moderate size opening. This child has several types of compensatory
productions, including lip pops and tongue clicks for plosives, and a nasal sniff for
final /s/.

NP-48. Very large velopharyngeal opening. Closure occurs during swallowing as the result a
different neurophysiologic process and also the tongue assist. Note the tonsils in the
pharynx at the end of the video.

NP-49. Inconsistent touch closure. There is inconsistent touch closure of the velum against
the adenoid tissue. This study is not optimal because the child was crying a little.
However, it does show a normal velum and incomplete or tenuous velopharyngeal
closure, particularly on the left side. This is at least partly due to adenoid irregularity.

NP-50. Very large velopharyngeal opening. There is also evidence of a submucous cleft on
the nasal surface of the velum. This child primarily uses nasal phonemes for oral
sounds.

NP-51. Short velum. The uvula flips up into the pharynx during speech, which sometimes
occurs when the velum is very short.

NP-52. Very large velopharyngeal opening. The nasal surface of the velum is concave,
suggesting hypoplastic musculus uvulae muscles. Note the epiglottis.

NP-53. Large velopharyngeal opening. The velum is very short and there is little lateral
pharyngeal wall movement. Lateral wall movement can change with placement of a
pharyngeal flap, which provides a surface against which to close.
NP-54. Small velopharyngeal opening. This opening causes bubbling of secretions and thus, a nasal rustle.

NP-55. Small velopharyngeal opening. There is bubbling of secretions just to the right of the adenoid pad. This is perceived as a nasal rustle.

NP-56. Normal velopharyngeal closure.

NP-57. Short velum, tonsils. This child has a short velum and maximum closure is very low. The tonsils can be noted in the oropharynx. He could benefit from a pharyngeal flap, but a tonsillectomy would need to be done first to avoid obstruction of the ports postoperatively.

**Surgery (SG) Videos**
(See Chapter 18)

- Using nasopharyngoscopy, the effect of surgery for VPI is shown through the videos in this section. As a reminder, on all nasopharyngoscopy videos, “right” always refers to the patient’s right. Because the nasopharyngoscopy view is as if we are facing the patient, the patient’s right is on the left side of the screen, and the patient’s left is on the right side of the screen.
- The first video shows a pharyngeal flap that is functioning as intended. This type of video is rare because we typically do not perform a nasopharyngoscopy exam on a child whose postoperative speech evaluation reveals normal resonance and normal velopharyngeal function.
- The remaining videos illustrate what happens when the surgical procedure is not totally effective. There may be residual VPI due to a port or ports that do not completely close. On the other hand, there may be over-correction of the opening, causing airway obstruction. The nasopharyngoscopy exam is done to determine the source of the postoperative issues. Once this is identified, either a flap revision or port revision can usually be done to correct the problem.

*[Our surgeons would want me to point out that many of these postoperative cases came from other centers for a second opinion and then revision.]*

SG-01. Pharyngeal flap. This pharyngeal flap is of appropriate width and in good vertical position in the pharynx. The lateral ports are wide open during nasal breathing and the production of nasal sounds. During oral speech production, the ports close completely. There is no bubbling to suggest even a small, pinhole-size opening.

SG-02. Pharyngeal flap. The pharyngeal flap is in good vertical position in the nasopharynx and is a good width. However, the lateral ports do not close completely during speech, leaving small openings on both sides.

SG-03. Pharyngeal flap. The pharyngeal flap is in good position in nasopharynx. However, both lateral ports are stenosed. Although the velopharyngeal insufficiency was corrected, speech is now characterized by hyponasality. In addition, there is upper airway obstruction and sleep apnea.

SG-04. Pharyngeal flap. The pharyngeal flap is in good position in the nasopharynx and is a good width. Both ports open normally for nasal sounds and nasal breathing. However, the left port has a leak during the production of oral sounds.
SG-05. Pharyngeal flap. The flap is very narrow and is skewed to the right. The left port is very large.

SG-06. Pharyngeal flap. This pharyngeal flap is very low in the nasopharynx and is well below the area of normal velopharyngeal closure. A Passavant’s ridge is actually noted above the level of the pharyngeal flap. (Remember that a Passavant’s ridge typically occurs below the level of velopharyngeal closure.) The flap is also narrow and torn on the patient’s right side.

SG-07. Pharyngeal flap. This pharyngeal flap is low in the nasopharynx, as can be appreciated when comparing its vertical position with the position of velar elevation. It is also a little narrow. There is a small velopharyngeal opening of the right port during speech.

SG-08. Sphincter pharyngoplasty. This child has a bilateral sphincter pharyngoplasty, which appears as a shelf-like structure on the pharyngeal wall. The sphincter can be seen clearly on the right side, and closure appears complete on that side. The sphincter is not noted on the left side, where there is still a leak.

SG-09. Pharyngeal flap. This pharyngeal flap is too low because it is below the point of maximum velar elevation. There is a leak in the left port. However, this is difficult to see due to the copious secretions. Sometimes, secretions can be cleared by asking the patient to sniff hard. At other times, it is necessary to suction the secretions in order to obtain a better view of the velopharyngeal valve.

SG-10. Pharyngeal flap. The pharyngeal flap is in midline and an appropriate width. However, there is a persistent opening in the right port. The left port has a small, pinhole-size opening.

SG-11. Pharyngeal flap. This pharyngeal flap is very narrow and has a very large lateral port on the left. See Video SP-58 for the speech sample. Videos SP-59 and SP-60 shows post flap revision videos.

SG-12. Pharyngeal flap. There is a leak in the right port and a much smaller leak in the left port. Small leaks are often identified by bubbling.

SG-13. Sphincter pharyngoplasty. The sphincter is the shelf-like structure on the pharyngeal wall. It is static and located well below the area of attempted velopharyngeal closure. Closure is still inadequate with small gaps across the coronal plan. The bubbling causes the nasal rustle.

SG-14. Pharyngeal flap. There is a small leak in the right port. This causes bubbling of secretions, which is heard as a nasal rustle. The left port closures completely during speech, but does not open adequately for production of nasal sounds or for nasal breathing.

SG-15. Pharyngeal flap. There is a very large opening of the left lateral port during speech. The right lateral port seems to close normally. Note the nasal sniff on the final /s/ in 66.

SG-16. Sphincter pharyngoplasty. This patient had velopharyngeal insufficiency after an adenoidectomy. She then had five unsuccessful sphincter pharyngoplasties between the ages of 5 to 7 years. She came to our clinic at the age of 18 years. This video shows a very large velopharyngeal gap and a sphincter that is unable to fill this very large opening. Note the tongue base at the end of the video. This patient needs a pharyngeal flap.
Sphincter pharyngoplasty. This patient had velopharyngeal insufficiency secondary to cleft palate. A sphincter pharyngoplasty was done. See the shelf-like structure on the pharyngeal wall. There is still a very large, midline gap. Note the movement of the base of the tongue during speech.

Speech Therapy (ST) Videos
(See Chapter 21)

ST-01. Use of a listening tube for feedback of nasal emission.
ST-02. Producing /p/ through a straw. This gives auditory feedback when there is oral air pressure.
ST-03. Producing /s/ through a straw. This gives auditory feedback when there is oral air pressure.
ST-04. Producing /s/ through a straw. This gives auditory feedback when there is oral air pressure. Note that the teeth are not needed for production of sibilants sounds because these sounds are produced between the tongue tip and alveolar ridge.
ST-05. Use of an “air paddle” to increase oral pressure.
ST-06. Occluding the child’s nostrils to help her learn to redirect the airflow so that it is oral.
ST-07. Use of the yawn technique to eliminate the nasal sound (in this case it is a palatal-dorsal nasal) for /l/.
ST-08. Use of the /tsss/ technique to change the pharyngeal production of /s/, which causes phoneme-specific nasal emission, to the correct oral production with no nasal emission.
ST-09. Use of /tssss/ technique to change nasal production of /s/ with nasal emission to an oral production with no nasal emission.
ST-10. Working on the transition from /s/ to the vowel. By inserting an /h/ between the consonant and vowel, this prevents nasal emission that often occurs during the transition from the consonant to the vowel in the initial stages of therapy.
ST-11. This patient demonstrates phoneme-specific nasal emission (in the form of a nasal rustle) on all sibilant sounds (/l/, /z/, /ʃ/, /ʒ/, /ʧ/, /ʤ/) due to the use of a posterior nasal fricative. This is the result of velopharyngeal mislearning. He is very stimulable for correct production however, with the /tssss/ technique. This is the same patient as seen in Video SP-23.
ST-12. Use of /tssss/ technique. The results of this technique on velopharyngeal function can be seen through nasopharyngoscopy.
ST-13. Use of a tongue blade and the /ŋ/ to work on velar plosives.
ST-14. Therapy for distortion of /ə/.
ST-15. Use of tokens in therapy. Note that the token is held up to the side of the speech-language pathologist’s mouth when the cue is given. This directs the child’s visual attention. The token is placed by the SLP directly in the plastic bottle following a reasonable attempt at imitation. The child is able to hear the token go in the bottle and see the token, but cannot get her hands in the bottle to play with the tokens.