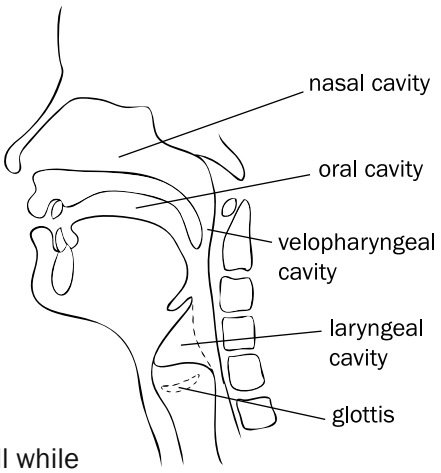
CHAPTER 1

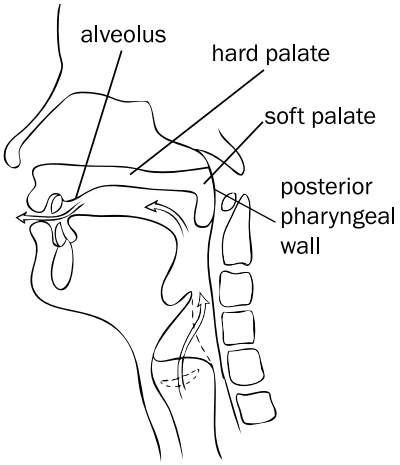
Anatomy and Physiology

Understanding the anatomy and physiology of the vocal tract, and the velopharyngeal (VP) mechanism (soft palate and pharyngeal walls) in particular, is critical for effective speech therapy intervention. To establish appropriate goals for therapy it is necessary to discriminate learned or compensatory errors of speech (CES) from those resulting from anatomical defects (obligatory errors). The material that follows is a brief overview of anatomy and physiology.*



vocal tract

The **VP mechanism** directs sound energy that begins as vocal fold vibration and travels either into the oral cavity or the nasal cavity. For normal VP closure during production of all oral consonants and vowels, the soft palate elevates and firmly contacts the posterior pharyngeal wall while the lateral pharyngeal walls constrict medially. This action closes the area between the nose and the mouth, allowing for the buildup of pressure needed for normal vocal volume and consonant strength on high-pressure oral consonants (/p, b, t, d, k, g, θ, v, f, s, z, ʃ, ʧ, ʤ/ and tense vowels /ɪ, u/). Similar contact occurs during VP closure for low-pressure oral consonants (/w, l, j, h, r/) and low lax vowels (/æ, a/), but the movement is not as intense or firm as with high-pressure consonants and tense vowels. VP closure also occurs for nonspeech activities (swallowing, blowing, whistling), but the contact and timing of contact are different from the VP closure for speech production.



VP closure

Terminology

Resonance is sound vibration and energy in the oral cavity, pharynx, and nasal cavity (Kummer & Lee, 1996). It is influenced by the size, surface, and shape of these structures (Witzel, 1995).

Resonance is judged as balanced/normal when sound vibration is heard in the oral cavity and pharynx, primarily during vowel and vocalic consonant production. Normal/balanced resonance is dependent on normal VP closure (Kummer & Lee, 1996).

*There are many texts available if more information on anatomy and physiology is needed (Losee & Kirschner, 2009; Kummer, 2007; Peterson-Falzone, Trost-Cardamone, Karnell, & Hardin-Jones, 2006; Golding-Kushner, 2001; Peterson-Falzone, Hardin-Jones, & Karnell, 2001; Shprintzen & Bardach, 1995; McWilliams, Morris, & Shelton, 1990).

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CHAPTER 3

Best Practices

Children with craniofacial conditions, including cleft lip/palate, present with a variety of problem areas and require complicated decision-making for the SLP.

- What are the areas that need immediate intervention?
- Are the speech errors compensatory, obligatory, or developmental?
- What strategies are most effective?
- What can and cannot be changed through behavioral speech therapy?

By applying proven techniques, SLPs can become more efficient, effective, and goal-oriented in treating craniofacial speech problems. Evidenced-based practices (EBP) used in the assessment and therapy sections of this book are the result of descriptive case studies combined with years of experience. The treatment strategies outlined in this book have been advocated and used by highly-regarded craniofacial SLPs, including Golding-Kushner, Kummer, Peterson-Falzone, Trost-Cardamone, D'Antonio, Grames, O'Gara, Watterson, Lewis, Karnell, and Riski.

The Source for Cleft Palate and Craniofacial Speech Disorders focuses on the behavioral or learning components of craniofacial/cleft palate speech errors—an area that SLPs can champion using the following recommended approaches.

Behavior Modification Approach

A behavior modification approach can help change a learned error. The ABC approach (antecedent, behavior, and consequence) (Martin & Pear, 2007) asks the following questions:

A. What comes directly before the behavior?
B. What does the speech behavior sound and look like?
C. What comes directly after the behavior?

Establish antecedents, behaviors, and consequences based on a hierarchy of difficulty. For example, an antecedent might be to provide a model at the word level for the child to imitate. If he imitates (behavior) successfully, give immediate reinforcement (consequence). After four to six trials, move up the hierarchy by changing one of the ABC components. You might delay the imitation (behavior) using deferred imitation (antecedent) or change the reinforcement (consequence). Until the child is quite skilled at the structured sentence level or beyond, change only one ABC component at a time.

Here is another example of the ABC approach. Keep the behavior (answering in a sentence) and the verbal reinforcement (good tongue and air out of the mouth) the same, but change the antecedent. For example, after the child successfully imitates the sentence (I have a

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Phrase/Sentence/Conversation Levels

(phrase and sentence list on page 113; pictures/scenes on pages 55-60 of the CD)

1. Practice initial /f/ words in phrases, sentences, and then conversation.

Use this same hierarchy to eliminate nasal or pharyngeal fricatives for /f/ in the final and medial word positions. Emphasize oral airflow combined with appropriate labiodental placement. Begin work in the medial position by adding suffixes to correctly produced final /f/ words. Progress from low-pressure consonants (leafy, loafer, laughing) to high-pressure consonants (puffy, tougher, coughing). Advance to words with correctly produced non-target phonemes (before, awful, muffin).

▸ Initial /f/ to /s/ Strategy

Use this strategy to eliminate nasal or pharyngeal fricatives only if the child can accurately and easily produce /f/ in all word positions at the sentence level.

Isolation Level

1. Model a prolonged /f/ sound (ffff).
2. Have the child imitate a prolonged /f/ followed by /s/ sound. (Fffsss. With the air moving, I touch my lip and teeth together and then raise my tongue to the roof of my mouth. I make the air come out of my mouth the whole time. Feel the air. Now you do it. Let me feel the air.)
3. Repeat the activity using nasal occlusion, if needed, to simulate intraoral pressure. Gradually release while emphasizing oral airflow combined with appropriate transition from labiodental to alveolar placement.

Syllable Level

1. Stimulate a variety of initial /f/ syllables with prolonged airflow, progressing from high to low vowels (fffsssee, fffsssoo, fffssso, fffsssah).
2. Gradually shorten and eventually eliminate the facilitator (/f/) and prolonged airflow (fffsssee → see).

Word Level (word list on page 110; pictures/scenes on pages 39-44 of the CD)

1. Introduce CV words with objects and pictures as appropriate. Here are some examples.

Target	Question
see	What do you do with your eyes?
Sue	What is a girl's name?
sew	What do you do with a needle and thread?

2. Practice the initial /s/ sound in other words, controlling the phonetic context for success.

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▸ Final Nasal Words, Phrases, and Sentences

Example words, phrases, and sentences to practice final nasal consonants are listed below.

Final /m/ Words

hum	team
home	gum
ham	comb
Pam	farm
dime	Sam
Tom	gym

Final /m/ Phrases and Sentences

hum here	chew gum	I will go hear Tom.
you hum	your comb	Is that your team?
your home	your farm	I like to chew gum.
her home	where Sam	Here is your comb.
where ham	here gym	We went to their farm.
cut ham	I hear you hum.	Where do you see Sam?
where Pam	We go to your home.	I have gym with you.
her dime	They will have ham.	They have gym with Sam.
hear Tom	We call her Pam.	Pam will comb your hair.
your team	Do you have a dime?	Sam and Tom went to the farm.

Final /n/ Words

on	Dan
hen	ten
horn	gown
one	cane
bone	van
pen	sun

Final /n/ Phrases and Sentences

on where	where Dan	The dog will chase the bone.
on TV	all ten	Here is your pen.
hear hen	her gown	Dan caught the football.
where hen	big cane	They will have ten.
his horn	their van	The pretty gown got all wet.
big horn	bright sun	He has a sturdy cane.
one boy	It is on TV.	His dad drives a van.
one way	Their hen lays eggs.	They have one hen.
your bone	He plays the horn.	Dan bought a van.
have pen	I will have one.	He will play his horn at ten on TV.

Final /ŋ/ Words

hang	tongue
long	gong
young	king
wing	sing
ring	swing
bang	thing

Final /ŋ/ Phrases and Sentences

hang up	hear gong	Young is the opposite of old.
hang out	here king	I like to eat the turkey wing.
long hair	I sing	Do you see her big ring?
all long	swing her	The firecracker goes bang.
young boy	here thing	Where is the big gong?
who young	Hang up your coat.	I see the parade king.
your wing	We will hang the picture.	I love to swing high.
her ring	Jay has really long hair.	What do you call that thing?
hear bang	Let's take the long way.	A giraffe has a long tongue.
your tongue	That boy is very young.	The king has a big ring.

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