Swallowing Strategies

1) POSTURAL CHANGES:

a) Chin Tuck:
   i) Used For:
      (1) Delayed onset pharyngeal swallow
      (2) Reduced base of tongue retraction to posterior pharyngeal wall approximation
      (3) Decreased airway protection
      (4) Aspiration DURING the swallow
   ii) Instructions:
      (1) Bring chin to chest
   iii) Rationale:
      (1) Pushes base of tongue towards pharyngeal wall
      (2) Expands vallecular recesses
      (3) Narrows the entrance to the laryngeal vestibule by moving the epiglottis posteriorly

b) Head Turn (to weak side):
   i) Used For:
      (1) Unilateral pharyngeal weakness
      (2) Unilateral laryngeal weakness
      (3) Cricopharyngeal dysfunction
   ii) Instructions:
      (1) Turn your head to the side as though you are looking over your shoulder
   iii) Rationale:
      (1) Blocks bolus from traveling down weak side by twisting the pharynx
      (2) Applies pressure to the vocal fold to increase approximation
      (3) Reduces resting pressure on the cricopharynx by pulling the larynx away from the posterior pharyngeal wall (increasing the space)

c) Head Tilt (to stronger side):
   i) Used For:
      (1) Unilateral oral weakness
      (2) Unilateral pharyngeal weakness
   ii) Instructions:
      (1) Tilt your head like you are trying to touch your ear to your shoulder
   iii) Rationale:
      (1) Directs bolus to stronger side of oral/pharyngeal cavities

d) Head Back:
   i) Used For:
      (1) Oral transit dysfunction
   ii) How To:
      (1) Tilt your head back like you are looking up
   iii) Rationale:
      (1) Gravity helps clear the oral cavity
e) Chin Tuck w/ Head Turn:
   i) Used For:
      (1) Reduced airway closure
   ii) How To:
      (1) Bring chin to chest while simultaneously rotating head to the weaker side
   iii) Rationale:
      (1) Increases epiglottic deflection to narrow the entrance to the laryngeal vestibule
      (2) Increases vocal fold approximation by applying extrinsic pressure

2) SWALLOW MANEUVERS:
   *not appropriate for patients with cognitive deficits*
   a) Supraglottic Swallow:
      i) Used For:
         (1) Reduced airway protection (at the vocal fold level)
         (2) Aspiration DURING the swallow
      ii) Instructions:
         (1) Inhale deeply first, then hold your breath
         (2) Continue to hold your breath and swallow
         (3) Immediately after you swallow (before you inhale) cough then immediately swallow again (before you inhale)
      iii) Rationale:
         (1) Voluntarily holding your breath closes the vocal folds (during and before the swallow)
   b) Super-Supraglottic Swallow:
      i) Used For:
         (1) Reduced airway closure (at the laryngeal vestibule level)
         (2) Aspiration BEFORE and DURING the swallow
      ii) Instructions:
         (1) Take a breath and hold it tightly while bearing down
         (2) Continue to hold your breath and bear down as you swallow
         (3) Immediately after you swallow (before you inhale) cough then immediately swallow hard again (before you inhale)
      iii) Rationale:
         (1) Effortful breath hold causes the arytenoids to tilt forward which closes the laryngeal vestibule entrance before and during the swallow
   c) Mendelsohn Maneuver:
      i) Used For:
         (1) Decreased range/duration hyolaryngeal elevation
         (2) Decreased range/duration cricopharyngeal opening
         (3) Decreased pharyngeal swallow coordination
      ii) Instructions:
         * Let the patient first feel the elevation, then tell them: Dry swallow a few times and pay attention to the movement in your neck as you swallow, feel it lift?
         (1) Now swallow, and when you feel your adam’s apple lift, don’t let it drop
         (2) Hold at the peak of your swallow (when you feel your adam’s apple lifted) for several seconds before finishing the swallow
      iii) Rationale:
         (1) Increased laryngeal movement stretches/opens the CP
         (2) Prolonging hyolaryngeal elevation keeps the CP open longer
   d) Effortful Swallow:
i) **Used For:**
   1. Residue in valleculae
   2. Reduced BOT retraction to the posterior pharyngeal wall

ii) **Instructions:**
   1. Squeeze all the swallowing muscles hard when you swallow

iii) **Rationale:**
   1. Increased effort increases the posterior movement of the base of tongue

3) **BEHAVIORAL STRATEGIES:**
   a) **Liquid Wash:**
      i) **Used For:**
         1. Residue after the swallow (oral, vallecular, pharyngeal wall, pyriform sinus)
      ii) **Instructions:**
         1. Alternate bites of solids/semi-solids with sips of thin/thick liquids

b) **Larger Bolus:**
   i) **Used For:**
      1. Delay triggering pharyngeal swallow
   ii) **Rationale:**
      1. A larger bolus enhances the sensory input in some patients

c) **Multiple Swallows/Bolus:**
   i) **Used For:**
      1. Significant oropharyngeal residue
   ii) **Instructions:**
      1. Swallow 2-3 times with each bite/sip
   iii) **Rationale:**
      1. Decrease risk for aspiration by clearing residue before additional bolus is attempted

Rehabilitative Swallowing Exercises
Head and Neck Radiation Therapy Patients

Radiation to the head and neck can lead to long-term swallowing problems called dysphagia. Patients with dysphagia have a hard time swallowing food, liquid or saliva. Swallowing problems can occur during treatment, or may develop or continue long after radiation treatment has ended.

These exercises may help improve swallowing function. Your speech pathologist will show you how to do these exercises. If you have any questions about these exercises, please ask your speech pathologist.

Strap Muscle Exercises

The strap muscles in the neck move the voice box up and out of the way to keep food and liquid from entering the lungs when you swallow. These exercises are designed to increase flexibility and strength.

Do the Shaker exercise (parts 1 and 2) 3 times each day for six to eight weeks.

1. Shaker Exercise (Part 1)
   - Lie down on your back on the bed or floor. Do not use a pillow because your shoulders must be flat against the surface.
   - Keep your shoulders flat against the bed or floor, and lift up your head, bringing your chin down to your chest (until you can see your toes).
   - Keep your head lifted for 60 seconds, and then lower your head and rest for 60 seconds.
   - Repeat these steps three times.

2. Shaker Exercise (Part 2)
   - Lie down on your back on the bed or floor. Do not use a pillow because your shoulders must be flat against the surface.
   - Keep your shoulders flat against the bed or floor, and lift up your head, bringing your chin down to your chest. Then immediately lower your head.
   - Repeat these steps 30 times.

Do five to 10 sets of the remaining exercises below each day for ______ months.

3. Mendelsohn Exercise
   - Put your fingers over the bulge at the front of your throat. This is sometimes called the Adam’s apple in men. Swallow, and feel the Adam’s apple lift and lower while you swallow.
• Now, swallow and hold the Adam’s apple up for at least three seconds by squeezing your throat muscles.
• Repeat this exercise five times.

4. Stretch Exercise
• Tilt your head back, and open your mouth.
• Stick out your jaw forward, and then push your jaw upward toward your nose. You should feel a stretch along the front of your neck.
• Hold this position for five seconds.
• Repeat this exercise five times.

Airway Protection Exercises

As you swallow, it is important for the voice box to close tightly to keep food or liquid from entering the lungs. These exercises are designed to help the voice box close during swallowing.

5. Supraglottic Swallow
• Hold your breath tightly. Now, swallow twice, release your breath with a sharp cough, and swallow again.
• Repeat this exercise five times.

6. Pitch Glides
• Sing “ee” starting in a low tone and then slowly raise your tone to your highest pitch. Hold pitch for 10 to 20 seconds.
• Repeat this exercise five times.

Base of Tongue Exercises

The base of tongue is the “pump” that pushes food through the throat and into the food pipe (esophagus). These exercises are designed to strengthen the base of the tongue.

7. Masako Exercise
• Stick out your tongue and hold it between your lips or teeth and try to swallow.
• Repeat this exercise five times.

8. Effortful Swallow
• Swallow as hard as you can with food or saliva. Push as hard as you can with the tongue against the roof of your mouth while you swallow.
• Repeat this exercise five times.

9. Gargle
• Pull your tongue back during a gargle and hold for one second.
• Repeat this exercise five times.
XRT Swallowing Exercise References


5. Huckabee ML, Steele CM. An analysis of lingual contribution to submental surface electromyographic measures and pharyngeal pressure during effortful swallow. *Archives of physical medicine and rehabilitation* 2006;87:1067-1072.


Important Brain Regions for Swallowing

Cortical and subcortical regions:

<table>
<thead>
<tr>
<th>Left Hemisphere</th>
<th>Right Hemisphere</th>
<th>Subcortex</th>
<th>Cerebellum</th>
</tr>
</thead>
<tbody>
<tr>
<td>➤ Swallow apraxia</td>
<td>➤ Increased duration of oral phase</td>
<td>➤ Mild delay in pharyngeal trigger</td>
<td>➤ Uncoordinated swallow</td>
</tr>
<tr>
<td>➤ Pharyngeal swallow may be motorically normal</td>
<td>➤ Greater delay in pharyngeal trigger</td>
<td>➤ Impairment in timing of pharyngeal component</td>
<td>➤ Poor bolus control</td>
</tr>
<tr>
<td></td>
<td>➤ Pharyngeal dysmotility</td>
<td></td>
<td>➤ Impaired sequencing/timing</td>
</tr>
</tbody>
</table>

Brainstem regions:

<table>
<thead>
<tr>
<th>Pons</th>
<th>Medulla</th>
</tr>
</thead>
<tbody>
<tr>
<td>➤ Delayed pharyngeal swallow</td>
<td>➤ Absent pharyngeal swallow</td>
</tr>
<tr>
<td>➤ Reduced hyolaryngeal excursion with cricopharyngeal dysfunction</td>
<td>➤ Reduced hyolaryngeal excursion</td>
</tr>
<tr>
<td></td>
<td>➤ Unilateral vocal fold paresis/paralysis</td>
</tr>
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</table>
Cranial nerves:

<table>
<thead>
<tr>
<th>CRANIAL NERVE</th>
<th>MOTOR/SENSORY</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>I  OLFACTORY</td>
<td>Sensory</td>
<td>• Smell</td>
</tr>
<tr>
<td>II OPTIC</td>
<td>Sensory</td>
<td>• Vision</td>
</tr>
<tr>
<td>III OCULOMOTOR</td>
<td>Motor</td>
<td>• Movement of eyeball, pupil and upper eyelid (All eye muscles except lateral rectus and superior oblique muscles)</td>
</tr>
<tr>
<td>IV TROCHLEAR</td>
<td>Motor</td>
<td>• Eye movement (contralateral, superior oblique)</td>
</tr>
<tr>
<td>V TRIGEMINAL</td>
<td>Motor</td>
<td>• Movement of muscles for mastication</td>
</tr>
<tr>
<td></td>
<td>Sensory</td>
<td>• Tactile facial sensation</td>
</tr>
<tr>
<td>VI ABDUCENS</td>
<td>Motor</td>
<td>• Opens eyes. (ipsilateral lateral rectus)</td>
</tr>
<tr>
<td>VII FACIAL</td>
<td>Motor</td>
<td>• Movement of facial muscles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Extrinsic and intrinsic ear muscles, stapedius muscle</td>
</tr>
<tr>
<td></td>
<td>Sensory</td>
<td>• Taste (anterior 2/3 of tongue)</td>
</tr>
<tr>
<td>VIII ACOUSTIC</td>
<td>Sensory</td>
<td>• Hearing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Equilibrium and orientation of head in space</td>
</tr>
<tr>
<td>IX GLOSSOPHARYNGEAL</td>
<td>Motor</td>
<td>• Elevation of palate, movement of pharynx and larynx</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Contributes to swallowing by controlling the stylopharyngeus muscle</td>
</tr>
<tr>
<td></td>
<td>Sensory</td>
<td>• General sensation from palate, posterior 1/3 of tongue and oropharynx</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Taste from posterior 1/3 of tongue and oral pharynx</td>
</tr>
<tr>
<td>X VAGUS</td>
<td>Motor</td>
<td>• Muscles of soft palate, pharynx and larynx</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Base of tongue (palatoglossus muscle only)</td>
</tr>
<tr>
<td></td>
<td>Sensory</td>
<td>• Sensation from pharynx and larynx</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Taste in the epiglottis and pharynx</td>
</tr>
<tr>
<td>XI ACCESSORY</td>
<td>Motor</td>
<td>• Movement of head and shoulders</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Movement of palate, pharynx and larynx</td>
</tr>
<tr>
<td>XII HYPOGLOSSAL</td>
<td>Motor</td>
<td>• All of the intrinsic muscles of the tongue</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• All of the extrinsic muscles of the tongue except the palatoglossus</td>
</tr>
</tbody>
</table>
### Cranial nerve impairments & speech/swallowing:

<table>
<thead>
<tr>
<th>CRANIAL NERVE</th>
<th>DISORDERED PHYSIOLOGY</th>
<th>SWALLOWING SYMPTOMS</th>
<th>SPEECH SYMPTOMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN V</td>
<td>• ↓ jaw movement</td>
<td>• ↓ mastication</td>
<td>• Unilateral: insignificant</td>
</tr>
<tr>
<td></td>
<td>• ↓ face, mouth &amp; jaw sensation</td>
<td>• ↓ oral containment</td>
<td>• Bilateral: severely ↓ articulatory precision</td>
</tr>
<tr>
<td>CN VII</td>
<td>• ↓ facial movement &amp; sensation</td>
<td>• Residue in the lateral sulci</td>
<td>• Mild distortion of b, p, f, v,</td>
</tr>
<tr>
<td></td>
<td>• ↑ salivation</td>
<td>• Drooling</td>
<td></td>
</tr>
<tr>
<td>CN VIII</td>
<td>• ↓ hearing</td>
<td>N/A</td>
<td>• Distortion of resonance</td>
</tr>
<tr>
<td></td>
<td>• ↓ balance</td>
<td></td>
<td>• ↓ articulatory precision of all sounds over time</td>
</tr>
<tr>
<td>CN IX</td>
<td>• Delayed pharyngeal trigger</td>
<td>• Aspiration before &amp; during the swallow</td>
<td>• Hypernasality</td>
</tr>
<tr>
<td></td>
<td>• ↓ velopharyngeal closure</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• ↓ laryngeal elevation</td>
<td></td>
<td></td>
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<tr>
<td>CN X</td>
<td>• ↓ palatal, pharyngeal, laryngeal excursion</td>
<td>• Stasis/residue in the valleculae, posterior pharyngeal wall &amp; pyriform sinuses</td>
<td>• Hypernasality</td>
</tr>
<tr>
<td></td>
<td>• ↓ true vocal cord abduction and/or adduction</td>
<td>• Aspiration during or after the swallow</td>
<td>• Breathiness &amp; hoarseness</td>
</tr>
<tr>
<td></td>
<td>• ↓ pharyngeal sensation</td>
<td>• Inability to cough</td>
<td>• ↓ pitch range</td>
</tr>
<tr>
<td>CN XII</td>
<td>• ↓ lingual range of motion &amp; strength</td>
<td>• ↓ bolus consolidation</td>
<td>• Imprecise articulation of l, t, d, s, z, sh, ch, k, g,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ↓ anterior to posterior movement of the bolus</td>
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