Palatal Lift Prosthesis for Velopharyngeal Impairment (VPI)

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Any failure of the velopharyngeal mechanism to open or close normally for speech production.

- This can occur as a result of a number disorders, including dysarthria.
Prosthetic Rehabilitation of VPI: Palatal Lift (Sell, Mars & Worrell, 2006; Esposito, Mistumoto & Shanks, 2000)

- The palatal lift:
  - It is a rigid acrylic appliance created by a prosthodontist
  - It consists of a retainer that covers hard palate and fastens to maxillary teeth
  - A lift portion that extends along the oral surface of the soft palate:
    ▪ Lifts soft palate posteriorly and superiorly
      ▪ Improves resonance by displacing soft palate to normal elevation level.
      ▪ Decreases palatopharyngeal port: eliminate hypernasality and nasal emission during oral consonant sounds.

- Interdisciplinary team
  - Speech-language therapist, orthodontist, prosthodontist, maxillofacial technician, endoscopist
Palatal Lift
(Sell et al., 2006)
Fig. 2 Flaccid soft palate with palatal lift in place that displaces velum superiorly to eliminate hypernasality and nasal emission during production of air-to-oral consonant sounds. (Eposito et al., 2000)
Diagnosis and Intervention Procedures

Examination & medical history of speech problems
(Speech and Language Therapist, Surgeon)

Baseline detailed perceptual assessment, nasometry, nasendoscopy & videofluoroscopy
(Speech and Language Therapist)

Multidisciplinary discussions of investigations
(Speech and Language Therapist, Surgeon, Dental Specialist)

Surgery recommended ± therapy

Prosthetics Treatment

Indicators
1. No soft palate or large anatomical deft
2. Medical contra-indications for surgery
3. Previously failed surgery
4. Evaluation of velopharynx - diagnostic trial
5. To facilitate treatment of glottal/pharyngeal articulation on temporary basis

Prosthetics treatment selected and completed

Outcome evaluations gathered; perceptual assessment, nasometry, nasendoscopy & sometimes videofluoroscopy, followed by multidisciplinary discussion
(Speech and Language Therapist, Surgeon, Dental Specialist, Maxillofacial Tech.)

Convert to surgery
Discontinue prosthetics
Continue prosthetics ± therapy

Figure 3. Flowchart of the sequence of investigations and the decision-making process.
Who is a good candidate for palatal lift? (Yorkston et al, 2001; Sell et al., 2006)

- Most commonly used with patients with flaccid dysarthria
  - Stable/slow rate of disease progression
  - Intact cognition, memory, judgment, swallowing, and manual dexterity
    - However, this is rare: don’t get burnt!!! Use your clinical judgment!!!!

- Advocated for use with patients with a long soft palate
  - Immobile on phonation
  - Neurological conditions

- Timing of intervention is different for patients with stable dysarthria versus progressive.
### Table 3. Characteristics of better and poorer candidates for palatal lift fitting in progressive dysarthria.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Better Candidates</th>
<th>Poorer Candidates</th>
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<tr>
<td>Neurophysiology of the soft palate</td>
<td>Flaccidity</td>
<td>Severe Spasticity</td>
</tr>
<tr>
<td>Rate of neurologic change</td>
<td>Slow</td>
<td>Rapid</td>
</tr>
<tr>
<td>Respiratory/phonatory function</td>
<td>Adequate</td>
<td>Poor</td>
</tr>
<tr>
<td>Articulation</td>
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<tr>
<td>Change in plosion/resonance with occlusion</td>
<td>Present</td>
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<tr>
<td>Difference between intelligibility of pressure and other consonants</td>
<td>Pressure consonants much less intelligible than others</td>
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<tr>
<td>Able to inhibit gag</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Swallowing &amp; saliva management</td>
<td>Adequate</td>
<td>Reduced</td>
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<tr>
<td>Dentition</td>
<td>Adequate</td>
<td>Poor</td>
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<tr>
<td>Cognition/Memory/Judgment</td>
<td>Intact</td>
<td>Reduced</td>
</tr>
<tr>
<td>Manual Dexterity</td>
<td>Able to insert and remove lift</td>
<td>Unable to insert or remove lift</td>
</tr>
<tr>
<td>Patient goals for speech</td>
<td>Maintenance of functional speech is important to the speaker</td>
<td>Decreased function is acceptable</td>
</tr>
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# Candidates for Palatal Lift: Flaccid vs. Spastic Dysarthria (stable/recovering)

## Table 4. Characteristics of better and poorer candidates for palatal lift fitting in stable or recovering dysarthria.

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<td>Cognition/Memory/Judgment</td>
<td>WNL or mild to moderate impairment</td>
<td>Less than LOCF V</td>
</tr>
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<td>Manual Dexterity</td>
<td>Able to insert and remove lift improved speech is critical</td>
<td>Unable to insert or remove lift Decreased function is acceptable</td>
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Risks and Complications

(Yorkston et al, 2001)

- Risks
  - Minor
    - Tooth movement
    - Injury to soft tissue
- Complications:
  - Intolerance: initial discomfort
  - Increased gag
  - Prosthesis retention
- Negative Speech related changes:
  - Increased swallowing issues and hyper-salivation
  - Difficulty with articulation
    - due to increased tone and laryngeal/pharyngeal musculature in individuals with severe spasiticity.
  - Patients lack of acceptance of device and unrealistic expectations
Positive Outcomes
(Yorkston et al, 2001)

- Improved articulation
- Improved intelligibility
- Decreased hypernasality
- More efficient use of respiratory support for speech

  - Most positive outcomes reported in
    - cases of flaccid dysarthria
    - good pharyngeal wall movement
    - individuals who wear lifts longer and more consistently
      - Note: palatal lift intervention has been successful in individuals with a spastic palate despite the difficulty.
Case Study: Use of a palatal lift in flaccid dysarthria (Fager, Green, Nip & Hakel, 2006)

- **Purpose:** Examine the effects of a palatal lift prosthesis on articulation for a teenager with VPI due to a brainstem tumor.
- **Questions:**
  1. Does articulatory performance change with palatal lift intervention?
  2. If so, will this intervention normalize articulatory performance towards that of a normal speaker?
Background: Experimental Participant

- At 12 years received surgery to remove a brainstem glioma
- Sustained neurological damage
- Flaccid dysarthria characterized by severe hypernasality and imprecise articulation
  - severely reduced speech intelligibility: 5%
- 13 years: fitted for palatal lift and participated in extensive rehab targeting articulatory precision for several years
- At the time of the study: 17 year old with flaccid dysarthria
  - The Sentence Intelligibility Test demonstrated:
    - 97% intelligible with the palatal lift
    - 85% without the lift
Method & Results

- Method: Researchers compared articulation performance of the test subject to 7 control subjects who were 16 year old neurologically intact speakers.
  - Using speech samples and kinematic analysis in two conditions: with and without the palatal lift.
- Results
  - Articulatory performance of the test subject improved in response to palatal lift intervention.
  - Compensatory responses diminished and articulatory movements became normalized.
Case Series: Use of Palatal Lift and Palatal Augmentation with ALS patients. (Esposito et al., 2001)

- **Purpose:** To investigate efficacy of palatal lift/combination lift and augmentation prosthesis in a number of patients with ALS.
  - This intervention has not been used routinely in this type of patient.
- **Palatal Augmentation:**
  - Implemented to improve articulation by lowering soft palate
    - Improve production of lingual consonant sounds
- **Since patients with ALS present with hypernasality and imprecise articulation:**
  - Both types of prosthesis used.
Fig. 3. Maxillary framework designed to support palatal lift and palatal augmentation components with same prosthesis.
25 patients with ALS
- Age of onset 38-83 yrs.
- 15/25 treated only with palatal lift
- 10/25 treated with combination

Methods:
- Phone/office interviews
- Evaluations
- Chart reviews

Example of questions asked:
- “Did it help?” --- nasality, volume, effort, clarity of speech
- “How much did it improve speech/communication?”
## Results

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<th>Count</th>
<th>Percentage</th>
<th>Description</th>
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<tr>
<td>21/25</td>
<td>84%</td>
<td>Demonstrated reduction in hypernasality</td>
</tr>
<tr>
<td>19/25</td>
<td>76%</td>
<td>Successfully wore the prosthesis</td>
</tr>
<tr>
<td>Of these 19, 17/19 (89.4%)</td>
<td></td>
<td>Had personal or family interviews, thought there was improvement in speech, was easier to speak and worth the effort</td>
</tr>
<tr>
<td>17/17</td>
<td>100%</td>
<td>Wore the prosthesis most of the day</td>
</tr>
<tr>
<td>10/17</td>
<td>59%</td>
<td>Used the prosthesis during eating</td>
</tr>
<tr>
<td>12/25</td>
<td>48%</td>
<td>Evaluated by speech-language pathologist after treatment</td>
</tr>
<tr>
<td>10/25</td>
<td>40%</td>
<td>Progressed to addition of palatal augmentation</td>
</tr>
<tr>
<td>6/10</td>
<td>60%</td>
<td>Thought they benefited from the palatal augmentation</td>
</tr>
</tbody>
</table>
“Because dysarthria is a heterogeneous disorder, a single intervention or type of intervention cannot be expected to be effective for all speakers with dysarthria...Making general statements about the appropriateness of the palatal lift fitting in dysarthria is difficult...In fact, palatal lifts are fitted only in the minority of speakers with dysarthria, specifically those with a particular candidacy profile. In the majority of speakers with dysarthria, velopharyngeal impairment is part of a complex pattern of subsystem involvement and affects many aspects of speech production.”

(Yorkston et al., 2001, p.31-32)

Continued research in the efficacy of palatal lift prosthesis within a number of patient populations with neurological involvement is warranted.
References


