The Use of Palatal Augmentation Prosthetics for Therapeutic Gains in the Treatment of Adult Speech

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Outline

• Define the Prosthesis
• Patient Population
• Multidisciplinary Team
• SLP Assessment
• Spectrographic Analysis
• Therapeutic Potential
• Case Study
Palatal Augmentation Prostheses

- Reshaping of the hard palate to improve tongue to hard palate contact
- Improve speech and swallowing
Palatal Prosthetics

- Obturators
- Palatal lowering
- Palatal lifts
Multidisciplinary Team

Surgeon

Prosthodontist

SLP
Patient Population

- Oral Cancer
- Neurogenic
- Trauma
- Motivation
- Adequately healed
Potential Problems

- Weight/bulk
- Swallowing changes
- Frequent modifications
- Gagging
- Trismus
SLP Assessment

- Oral Mech
- Perceptual
- IOPI
- Spectrogram
- VFSS
- Ultrasound
- Nasometry
- Endoscopic
- EPG
Perceptual Assessment

- Intelligibility
- Acceptability
- Articulation
- Resonance
- Vowels
Objective Measures

Kay Pentax Nasometer

IOPI Northwest
Objective Measures

Complete Speech EPG
Place of Articulation

[p]  [b]
[t]  [d]
[tʂ]  [dʐ]
[k]  [g]
[f]  [v]
[θ]  [ɹ]
[s]  [z]
[ʃ]  [ʒ]
[m]
[n]
[n]
[ŋ]
Vowels

• Tongue shape, height, fronting, lip rounding
• Carries acoustics of the vocal tract
Formants

• Concentrations of sound energy in discrete frequency locations determined by the dimensions of the vocal tract
• F1 & F2 critical to vowel differentiation
• Large impact on listener perception
• F2 influenced by shape and position of tongue
Prosthetics & Formants

- Leonard & Gillis 1990
- F2 increased on all vowels across all subjects
- Greatest increase Bilateral extensive (total gloss)
- Improved articulation & intelligibility
Robbins et al 1987: Immediate improved artic 4.5 points 4-6 weeks post – 3.4 points

Wheeler et al 1980: All subjects improved Avg: 12.5% improvement

Carvalho-Teles et al 2008: F1 and F2 improved for Some vowels; Portuguese

Cantor et al 1969: Greatest improvement with Severely restricted lingual Movements; velars
Limitations

- Marunick & Tselios 2004
- 9/130 articles had objective measures of speech or swallowing with PAP
- 36/42 improved swallowing
- 32/37 improved speech
- Limited standardized assessment
Is It Therapeutic?

- Sensory change
- Proprioceptive
- Strength
- ROM
Therapeutic Modality?

- Cleft Palate Literature 1940-1970’s
- Gibbons/Bloomer 1958; Lang 1951; Hardy 1969; Blakely 1964, 1969
  Gonzalez/Aronson ‘70; Marshall/Jones ’71; Lawshe ’71; Kipfmueller 1972; Holly 1973; Posnick ’77; Pregoraro-Kook 1995

- Speech bulb reduction therapy
- Primarily increased lateral wall movement
- Is it better than surgery?
<table>
<thead>
<tr>
<th>Time</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 days</td>
<td>All distorted</td>
</tr>
<tr>
<td></td>
<td>• 2/7 never normal</td>
</tr>
<tr>
<td></td>
<td>• Prosthesis inc awareness of deficits</td>
</tr>
<tr>
<td></td>
<td>• Deficits inc awareness of prosthesis</td>
</tr>
<tr>
<td>2 weeks</td>
<td>• Same deficits as initial</td>
</tr>
<tr>
<td></td>
<td>• 15mins same as adapted state</td>
</tr>
<tr>
<td></td>
<td>• Perceived deficit, didn’t know why</td>
</tr>
<tr>
<td></td>
<td>• Unaware of jaw adjustments</td>
</tr>
<tr>
<td>1 Month</td>
<td>Readapted after 15mins</td>
</tr>
</tbody>
</table>

Adaptation

Hamlet et al 1978
Future Directions

• Standardized assessment
• EPG
• Spectrographic analysis
• Ultrasound
• Therapeutic use of prosthetics
• Long term effects
Take Away

- Multidisciplinary team
- Objective assessment
- Consider therapeutic utility
- Biofeedback
- Mindful of proprioception and sensation
Case Study

- 37 yof
- Ependymoma 10/2003
- Posterior Fossa hemorrhage
- Deficits:
  - Dysarthric
  - Short term memory deficits
  - Dysphagia
  - Unilateral vocal fold paralysis
Case Study

Left lateral tongue wknw
Fasciculation; atrophy
Left palate wknw
Hypernasal
Pitch instability
MPD 15secs
Case Study

- Boot Camp
- 2x/week 7/2010-8/31/2010
- PAP 8/31
- Improved artic – 9/14; spectrogram
- Introduced “Talk Tools”
Prosthesis
Questions???

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Thank You
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