THE USE OF ULTRASOUND IN THE TREATMENT OF SPEECH SOUND DISORDERS ASSOCIATED WITH CLEFT PALATE

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Background
• Phonetic transcriptions are deemed gold standard in the assessment of Cleft Palate speech [1].
• There is a risk of compensatory articulations being unidentified, with possible misdiagnosis and subsequent inappropriate intervention.
• Ultrasound Tongue Imaging (UTI) has been used to explore cleft type characteristics [2, 3.4].
• UTI could also be used in biofeedback therapy.
• Articulatory animation (AAs) apps [5], available on iPads [6], are becoming increasingly popular but their effectiveness as therapy tools remains to be tested.

Research Questions
1. Does UTI confirm, supplement or contradict phonetic transcription?
2. Will the children’s speech improve post-therapy with Articulatory Animations (AAs) and UTI?

Method
• Single-subject multiple-baseline design
• Two male participants (aged 9:2 and 6:3)

Timeline of Assessment and Therapy

Week 1 Week 2 Week 3-10 Week 11 Week 16 Weeks 17-23 Week 24 + 3 Months
Baseline 1 Baseline 2 Therapy with AAs Mid 1 Mid 2 Therapy with UTI Post 1 Post 2

Andrew
• Male, aged 9:2
• Submucous Cleft Palate
• Backing /n/ → [ŋ] at referral
• Possible double articulations
• Treated /n/

Andrew DEAP Phonology Subtest

Craig
• Male, aged 6:3
• Submucous Cleft Palate
• Backing /k/ → [?] and fronting /g/ → [d] or [n] at referral
• Possible double articulations
• Treated /k/ q /u/

Craig DEAP Phonology Subtest

Results
Dynamic Tongue Movement
WF /n/ “nine” Post-Therapy

Andrew Untreated /n/ Wordlist

Craig Untreated Velars Wordlist

Discussion
• UTI data supplemented the phonetic transcriptions of audio recordings.
• UTI additionally showed covert contrasts such as double articulations.
• UTI was also useful for analysing dynamic tongue movements.
• Lip data provided additional information, such as lingualblads, interdentals, double articulations and silent articulations.
• There was improvement of both DEAP and untreated-wordlist scores after therapy using AA followed by UTI.
• Reasons for more improvement with AAs than UTI could include:
  • AAs were trialled first.
  • More context for passive articulators with AAs (e.g. hard/soft palate)
  • More familiar and relevant to children, with use at home and classrooms
  • UTI images difficult to interpret.
  • Although more improvement was made with AAs, both children said they preferred UTI.

Conclusion
• Andrew made overall progress with both AAs and UTI combined.
• Craig made overall progress, more so in the first block of therapy with AAs.
• In conclusion, both techniques offer promise; however further trials are required.

References

Timeline of Assessment and Therapy

UTI /k/ (tongue tip to the left)