

Efficacy of Using an Oral-Motor Approach to Remediate Distorted /r/

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Abstract

Oral-motor program implemented with 9 yr. male client diagnosed with mild hypotonia. Articulation errors /r/, /l/, "sh" and "th" persisted after 2 years of "traditional" speech therapy. Client exhibited mild posterior oral hyposensitivity, imprecise lingual movements, weak jaw, and incoordination of breathing-speaking. Diadochokinetic rate 3 times slower than average. Oral-motor exercises (Rosenfeld-Johnson, 2001) incorporating hierarchy of horns, bite blocks, straws, and lip exercises were completed in 30 sessions. Re-eval @ session #30: 50% increase in diadochokinetic rate, accurate production of initial /l/, "sh," "th" in words, and stimulability for /r/, "er" and final /l/. Spontaneous speech 90%+ accurate following 60 additional sessions. Improvement attributed to oral-motor program.

Introduction

- Using oral-motor exercises to improve speech production is controversial. Advocates such as Boshart (1998), Rosenfeld-Johnson (2001), and Bathel (2006) claim oral-motor exercises improve speech production by increasing strength, endurance and precision of the underlying muscles and systems -- respiration, phonation, and articulation.
- However, empirical studies that support using a muscle-based approach to improve speech production are lacking. This investigation is an attempt to help fill that need. Current research contradicts the notion that oral-motor exercises should be used to improve speech production in children with articulation and phonological disorders (Clark, 2003; Forrest, 2002).
- The conflict may be the result of a misunderstanding regarding articulation and phonological disorders. Children who possess phonological disorders typically possess intact oral-sensory motor systems and benefit from an approach which focuses on remediating patterns of sound errors rather than on individual phonemes (Hodson & Paden, 1991).
- In contrast, articulation involves the actual movements of the articulators during speech production and is motor-based. The underlying assumption of the traditional articulation approach is that clients possess normal oral structure and function (Gilbert & Swiney, 2007).
- Clients who cannot learn to produce their phoneme errors or who make little progress in therapy may require an oral-sensory-motor assessment and treatment approach to diagnose and remediate any underlying oral cavity muscle weakness and/or sensory deficits before progress can be achieved.
- It is essential to determine whether clients' oral structure, sensation, and function are normal before proceeding with a traditional articulation approach.

The Problem

- At present no research study has reported the outcome of using oral-motor exercise hierarchies with a client who exhibits a motor-based speech disorder to improve articulation skills.
- Clients are usually treated with one particular type of therapeutic approach, making it impossible to compare how they might have progressed given a traditional approach vs. an oral-motor approach.
- The current case study is unique in that the client (who did not possess normal oral sensation and function) initially received a traditional approach for 2 years, which was followed by an oral-sensory-motor approach for 2 additional years at the same clinic.
- Results of the two approaches were compared in this controlled investigation.

RESEARCH QUESTION

"What is the efficacy of using an oral-motor approach with a client who exhibits an oral-sensory-motor based articulation disorder?"

Participant

- Male, aged 7 to 11 yrs. Exhibited average intelligence.
- Attended 2nd-4th grade in a private elementary school -- no speech services offered.
- Received speech therapy for 4 years at the CSUEB University Clinic.
- Age 7: Initial speech evaluation results:
- Errors: "th," "sh," / k, g, l, r/ all positions.
- Enrolled in **traditional speech therapy** for 2 years at CSUEB Clinic.
- Age 9: Received oral-sensory-motor evaluation due to limited speech improvement -- and Occupational Therapy (OT) evaluation secondary to poor handwriting skills.
- Diagnosed with mild hypotonia in upper torso.
- Did not qualify for OT services.

Speech Re-evaluation: Year 2

- Re-evaluation following receipt of 2 years of **traditional** speech therapy (80 sessions):
- Persistent errors of voiceless "th," "sh," /l/ and /r/
- Production of initial /l/ and "sh" in words with 75% accuracy
- Not stimulable for consonantal /r/, vocalic /r/, or final /l/
- Excessive lip rounding and lip protrusion during production of distorted vocalic /r/.
- Difficulty coordinating speaking and breathing – at times spoke on inhalation.
- Diadochokinetic syllable rate 3-4 times slower than average (Fletcher, 1978).
- papapa: 15 sec (4.0 = avg) for 20 repetitions
- tatata: 11 sec (4.1 = avg) for 20 repetitions
- kakaka: 15 sec (4.6 = avg) for 20 repetitions
- pataka: 25 sec (7.7 = avg) for 10 repetitions

Initial Oral-Sensory-Motor Evaluation: Age 9

- Client exhibited the following:
- Mild hyposensitivity in posterior oral cavity and tongue
- Absent gag reflex
- Imprecise, jerky, uncoordinated lingual movements
- Lateral jaw jutting
- Limited mouth opening
- Diagnosis of mild hypotonia was consistent with OT findings of upper body hypotonia.

Oral-Motor Exercises: 30 Sessions

- Sara Rosenfeld-Johnson's tools and hierarchy of exercises (2001) were followed due to findings of decreased oral-motor-sensory functioning, consisting of:
- **Bite Block Hierarchy** to improve jaw stability
- **Horn Blowing Hierarchy** to improve respiration
- **Straw Drinking Hierarchy** to strengthen posterior tongue
- **Lip Press with pennies** to strengthen mentalis muscle for production of vocalic /r/
- **Vibration and Flavorings** (mint extract and sour powder) to improve posterior oral cavity sensation applied to dorsum and posterior lateral margins of tongue. Instructions given for *back of tongue side spread* for production of vocalic /r/ and final /l/.
- SLP re-evaluated progress weekly and adjusted criteria on hierarchy
- Oral-Motor Exercises completed in 30 sessions (5 months) of speech therapy (2 x wk/60 min).
- Client practiced exercises at home daily with parent assistance
- Client continued production work with phonemes "sh" and initial /l/.

Bite Block Hierarchy

- Twin set of 6 plastic bite blocks
- Corresponds to height of mouth opening for all speech sounds -- positions #2-7
- Client bites and holds plastic block for 15 seconds *given isometric pull* by SLP or parent.
- Six sizes and 4 positions:
- single block held with right molars

- single block held with left molars
- twin blocks held bilaterally
- single block held crosswise
- Initially client held twin bite blocks #5 for 8 seconds.
- Client completed remainder of hierarchy in 6 weeks, holding bite block #7 crosswise for 15 sec. given isometric pull.

Horn Blowing Hierarchy

- Horn hierarchy consists of 14 horns progressing from very easy to very difficult to blow.
- Criterion: 25 repetitions, sustain sound from 1-3 seconds depending on level of difficulty.
- Initially client blew horn #9 for 2 seconds, 4 times.
- At end of 30th session (5 months) client blew final horn #14 fifteen times, sustaining each blow 3 seconds.
- He did not meet criterion of 25 repetitions by end of 2nd quarter of therapy (30 sessions).
- Client continued blowing final horn #14 for home program over the summer for 3 months, increasing number of blows to 25.
- Re-eval 31st session – client met criteria for blowing final horn #14.
- Horn blowing hierarchy completed.

Straw Drinking Hierarchy

- There are 8 straws in the hierarchy--from an easy straight straw to a long twisted, connector straw.
- Clients drink thin liquids through each straw for about one week before progressing to the next level straw.
- Client was initially placed on straw #4.
- He held ¼" between his lips and sucked appropriately.
- No lip block was needed.
- Client progressed to the final straw #8 on his 15th session (2 months).
- Straw #8 recommended to strengthen posterior tongue to aid in the production of /r/.
- Client continued using this straw at home periodically for two more months.

Lip Press with Pennies

- Exercise consists of a tongue depressor weighted with pennies taped to each end.
- Depressor held between protruded lips (not teeth!) for 25 seconds, 3 consecutive times.
- Pennies added as client met criteria of 8 pennies bilaterally = 16 total.
- Initially, client only able to hold 2 pennies on each end for 12 sec., one time.
- Re-eval 30th session – Client held 8 pennies bilaterally, for 25 seconds, 3 consecutive times.
- Criterion met.

Re-evaluation following Oral-Motor Hierarchies

Improvement made in the following areas:

- Diadochokinetic rate improved by 50%
- Client produced 30/96 words correct (31%) on R-Screening Probe (Boshart, 1998).
- Client able to produce at least one word containing /r/ in initial position, r-clusters, vocalic /r/, and r-colored vowels, "ar" and "or."
- Initial /r/ in words with back vowels = 80% accurate.
- Phonemes /l/, "sh" and "th" were accurate in spontaneous speech.

Production Training: 60 Sessions

- Production work for /r/ and final /l/ initiated after all exercise hierarchies were completed.
- Client progressed quickly with initial /r/ -- production work completed in 15 sessions with 95% accuracy in spontaneous speech.
- Medial position with r-colored vowels progression: *ar, or, air, ear.*
- Vocalic /r/ addressed last as client had most difficulty with this form of /r/.
- Client progressed from retroflexed /r/ in isolation to production of 2-syllable words with "er" said separately, then blended into the target word.
- Ear training was incorporated into production work because client had difficulty hearing when his production of "er" was correctly produced.
- Final Phase: Client made up sentences and monitored his own productions.

Treatment Comparison:

- **Traditional Approach**

- Phonemes remediated: /k/, /g/, and /l/, initial position. "th" and "sh" 75% accurate in words
- Client unable to produce final /l/, or /r/ in any context.
- Difficulty with lingual coordination
- Mild difficulty with respiration/phonation –
- Often spoke on inhalation
- Appeared to be disfluent at beginning of utterances.

- **Oral-Motor Approach**

- Following oral-motor exercises client stimulable for final /l/ and /r/, all positions.
- Initial /l/ and "sh" 95% + accuracy in conversation by end of exercise program.
- Coordination in respiration/phonation improved. Client spoke on exhalation only.
- Significant increase in diadochokinetic rate due to improved lingual coordination.
- Phonemes /l/ and /r/ all positions 90% + accuracy in spontaneous speech in 45 sessions.

Conclusion

- Client received 2 treatments that were compared—traditional artic vs. oral-motor approach.
- Client made improvement in remediating earlier developing phonemes using traditional approach, but underlying oral-sensory-motor deficits prohibited him from remediating later-developing phonemes that required back of tongue side-spread (tongue anchors on the upper molars).
- Additional problems in respiration/phonation and lingual coordination hindered client's progress.
- Oral-motor exercises helped to improve awareness, coordination, endurance and precision of the underlying muscles and systems that were deficient -- respiration, phonation, articulation – but did not *replace* traditional speech production tasks.
- Once underlying systems were normalized, client quickly progressed in therapy using a traditional articulation approach, incorporating ear training to monitor his own productions.
- Progress for /r/ and final /l/ attributed solely to oral-motor exercises as production tasks for these phonemes did not begin until completion of exercise hierarchies.
- In conclusion, using oral-motor exercises with this client appears to be justified.

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