

**Efficacy of Using an Oral-Motor Approach to Remediate Distorted /r/
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**ASHA Annual Convention, Boston, MA
November 17, 2007**

Abstract

Oral-motor program implemented with 9 yr. male client diagnosed with mild hypotonia. Articulation errors /r/, //, "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 //, "sh," "th" in words, and stimulability for /r/, "er" and final //. 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,” // and /r/

- Production of initial // and “sh” in words with 75% accuracy
- Not stimulable for consonantal /r/, vocalic /r/, or final //
- 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 //.

- 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 //.

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 //, “sh” and “th” were accurate in spontaneous speech.

Production Training: 60 Sessions

Production work for /r/ and final // 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 stimulative 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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