Review Article

Orofacial myofunctional therapy: Historical and philosophical considerations

Marvin L. Hanson (*University of Utah*)

Suggested Citation

Hanson, M. L. (1988). Orofacial myofunctional therapy: Historical and philosophical considerations. *International Journal of Orofacial Myology*, 14(1), 3-10.

DOI: <https://doi.org/10.52010/ijom.1988.14.1.3>

This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](#).

The views expressed in this article are those of the authors and do not necessarily reflect the policies or positions of the International Association of Orofacial Myology (IAOM). Identification of specific products, programs, or equipment does not constitute or imply endorsement by the authors or the IAOM. The journal in which this article appears is hosted on [Digital Commons](#), an Elsevier platform.

OROFACIAL MYOFUNCTIONAL THERAPY: HISTORICAL AND PHILOSOPHICAL CONSIDERATIONS

Marvin L. Hanson, Ph.D.

*Professor and Chair, Department of Communication Disorders
University of Utah, Salt Lake City, Utah*

The collaboration of an orthodontist, speech-language pathologists, and orofacial myologists in the compilation of this special issue of the *IJOM* is a significant happening. It is symbolic of the recent history of multidisciplinary assessment and treatment of a group of disorders known collectively as "tongue thrust." Such collaborations may be surprising and possibly disappointing to a group of dentists and speech pathologists who met over a decade ago and developed a statement questioning the validity of the concept that the tongue affects the teeth. Despite the subsequent endorsements of that skepticism by three powerful professional organizations (the American Speech-Language-Hearing Association, the American Dental Association, and the American Association of Orthodontists) all of which published position papers upholding the "Joint Statement" of that 1974 committee, therapy for what came to be known as abnormal orofacial patterns of behavior persisted in most parts of the country under the rubric "myofunctional therapy."

A major purpose of this publication is to evaluate the legitimacy of the field of myofunctional therapy in light of research before and after 1974. A second purpose is to describe the scope of present evaluative and therapeutic procedures. A third is to make recommendations concerning future directions for research and clinical activities.

HISTORICAL NOTES

Treatment -- The Beginnings

Sixty-eight years ago (1918) Rogers, an orthodontist, looked to corrective exercises for developing tonicity in facial muscles to aid in proper eruption of the teeth. One orthodontist who heeded Rogers' call was Lischer, who 6 years previously (1912) had published an orthodontic book that did not mention muscle retraining, but who now incorporated a number of Rogers' exercises into a program he called "myofunctional therapy." The name myofunctional therapy continues to be widely used.

Rogers called orofacial muscles "living orthodontic appliances." Although he used mechanical treatment procedures in his practice, he cited cases in which myofunctional therapy alone corrected malocclusions. His exercises made use of a number of ingenious devices, including bite plates, rubber exercise straps and a metal orbicularis oris exerciser. His program was widely known among orthodontists.

Rogers was not particularly interested in swallowing. In 1937, the Truesdells applied Rogers' theories regarding the impact of muscle behavior on teeth to the pro-

cess of swallowing. They observed that many people with severe malocclusions appeared to have great difficulty in swallowing. They contended that the voluntary (oral) stage of swallowing contributed importantly to dental health and could be altered with training. The Truesdells described three abnormal patterns: (1) Using the tongue to gather saliva from the vestibule or from the floor of the mouth. (2) Keeping the teeth slightly apart during swallowing, transferring excessive strain to muscles of the lips and cheeks to create suction for swallowing. (3) Keeping the tongue rigid, with the tip behind the upper incisors the dorsum away from the palate and the sides against the side teeth. They then formulated a treatment program, one important objective of which was to train the patient to bite down while swallowing.

In 1946, Rix, a British orthodontist, published a series of articles describing a condition characterized by proclinate upper incisors and a high, narrow palatal arch, resulting from what he termed the "teeth apart swallow." He attributed the manner of swallowing to a delay in muscular maturation.

Six years later, Klein (1952) published a long list of conclusions from personal observations. Four of them are: (1) Living bone is extremely susceptible to the guidance and influence of pressures. (2) Abnormal pressure habits can change alveolar bone and regulate teeth in that bone. (3) During the transition from deciduous to permanent teeth much damage can take place. Abnormal pressure habits should be avoided during this time period. (4) The orthodontist and the patient can experience no possible detrimental effects by eliminating abnormal pressure habits. It is logical to eliminate everything that nullifies the plan of orthodontic treatment and everything that is a potential factor in causing treated orthodontic cases to relapse.

It was this concern over dental relapse following orthodontic treatment that stirred the interest of Straub, considered by most students to be the father of modern orofacial muscle therapy procedures. In 1960 this orthodontist published the first of a series of three articles on malfunction of the tongue and began teaching therapists to retrain orofacial muscles. The exercises he devised and promulgated form the basis for most treatments employed today. His theory, however, that bottle feeding was responsible for most tongue thrusting was later challenged and repudiated by research (Hanson and Cohen, 1973). His many presentations and workshops aroused the attention of speech pathologists and orthodontists throughout Europe and the United

States.

Two speech pathologists trained by Straub in the late 1950's, were Richard Barrett and William Zickefoose. Both men trained other therapists rather prolifically. Those they trained trained others, until, by the 1970's, referrals by orthodontists and other dental specialists to individuals referred to as "oral myofunctional therapists" were quite common; common, but not universal.

The "Joint Statement"

As training spread throughout the United States, requirements for entrance into individually-run training programs were lightened or eliminated, and many people without adequate backgrounds in science and in human behavior began practicing after only 3 or 4 days of exposure to the field of tongue thrust. Their therapy was usually doomed to failure, and the resulting antipathy of referring dentists precipitated the "1974 Tempest," the statement of the Joint Committee on Dentistry and Speech Pathology and Audiology. The document discouraged training of oral myofunctional therapists and encouraged more research in the area of tongue thrust.

The shadow cast on the treatment of tongue thrust by the Statement resulted in an arrest, if not reversal, of the proliferation of training programs. In addition there was a marked diminution of research activity on the topic. It became nearly impossible to acquire any kind of grant support to study any topic associated with tongue thrust. Accordingly, most research that was accomplished subsequent to 1974 was undertaken by individuals without federal financial backing. In contrast, more research had been carried out during the prior decade when there was no official statement decreeing that research was needed.

The Recovery

Barrett, Zickefoose, Hanson, and others, seeing a need for a concerted effort toward research productivity and improvement of diagnostic and therapeutic techniques, stimulated the formation of a professional association in 1972. The organization eventually acquired the name "International Association of Orofacial Myology." Soon after its inception, the organization began publishing the *International Journal of Orofacial Myology*, presently in its fourteenth year of publication.

OUTLINE OF THE HISTORY OF RESEARCH

Oral Behaviors and Oral-Facial Form:

Selected Research With Human Subjects

In 1946, Rix studied 93 subjects, ages 7 to 12 years; 35 percent who swallowed with teeth together had malocclusions, and 81 percent who swallowed with teeth apart had malocclusions.

In 1954, Ray and Santos reported on 32 subjects, with mean age of 38.6 years, all with periodontal disease. All subjects exhibited a tongue thrust swallow pattern.

In 1961, Rogers reported on 55 of 56 subjects (98.2 percent) with an open bite malocclusion who swallowed "abnormally," whereas 63 of 79 (79.7 percent) with a deep anterior overbite swallowed "abnormally."

In 1962, Werlich catalogued 640 children into three

groups, with mean ages of 6 years-6 months, 11 years-5 months, and 17 years-4 months; total prevalence of tongue thrust was 30.4 percent. Tongue thrust was found in 50.7 percent of those with a Class II, Division 1 malocclusion.

In 1973, Hanson and Cohen observed 178 children for 4 years. The retention of a tongue thrust through the age of 8 years was positively associated with a narrow palatal arch and an anterior overjet.

In 1979, Freeland studied 30 children with a mean age of 9 years. Oral-facial muscle behavior was stable in subjects with normal occlusion, whereas it was highly variable in subjects with Class II and Class III malocclusions.

In 1979, Lowe and Johnston studied 24 adults. Enhanced genioglossus muscle activity was found in subjects with anterior open bite. In 1980, Lowe studied the same 24 subjects again. He found strong interdependence between tongue and jaw muscle activity and facial morphology types.

In 1980, Dworkin and Culatta studied the relationships among maximum protrusive tongue strength, open bite and articulation in 141 children. They found no significant differences among groups in maximum tongue strength.

In 1980, Lamberton et al. compared 32 Asian dental students having bimaxillary protrusion, mean age 22 years, with 43 of their peers with normal occlusion. Of 32 with malocclusions, 15 were habitual mouth breathers, whereas none of the subjects with normal occlusion exhibited mouth breathing. Variant lip and tongue habits occurred more frequently in the malocclusion group.

In 1981, Larsson and Konnerman studied finger-sucking and anterior open-bite relationships in 9 to 13 year-old children. They found the crown length of incisors in the fingersucking group to be greater than that of the control children. They postulated that the anterior open bites seen were due to inhibited vertical growth of the anterior part of the alveolar processes.

In 1982, Modeer et al. reported on data from 588 four-year-old children; forty-eight percent had some sort of sucking habit. Those children who persisted with sucking habits had a significant occurrence of unilateral crossbite.

In 1983, Bresolin et al. documented 45 subjects, ages 6 to 12 years. Thirty were "chronic allergic mouth breathers," whereas 15 exhibited a nasal mode of respiration. They found significant cephalometric differences between the groups. In mouth breathers, there was greater upper anterior facial height, total anterior facial height, gonial angles, palatal height, overjet and posterior crossbite.

Selected Laboratory Animal Research

In 1965, Negri and Croce performed total glossectomies on ten rats. Three months after surgery, the diameters of both jaws in experimental rats were smaller than those of ten control rats.

In 1973, Harvold et al. inserted acrylic bite blocks over the posterior palates of five rhesus monkeys. The ex-

perimental animals developed anterior open bites during the 9 months of study, along with changes in the width of the dental arch.

In 1981, Harvold et al. induced nasal obstruction in 21 rhesus monkeys. The monkeys adapted variably, exhibiting an open-mouth posture, a protruding tongue and gradually, some type of malocclusion. There was increased orofacial muscle activity. Usually, the mandibular arch narrowed and the length of the maxillary arch decreased. An anterior crossbite developed.

In 1982, Miller et al. induced oral respiration in rhesus monkeys. There was an observed increase in activity in the mandibular depressor muscles, the muscles that protrude or alter the shape of the tongue, and in the muscles that raise the upper lip.

Summary of Research on Humans and Laboratory Animals

The selected articles just reviewed are in large measure the product of clinicians' observations and questions regarding possible relationships between oral form and functions, especially those of the tongue. Some of the terminology used in these investigations reflect the difficulties in quantification that have hampered universal acceptance of published results, such as "mouth breathing," "tongue thrust" and "abnormal swallow." The common thread in these studies is a correlation between either functional characteristics and dentofacial change or induced dentofacial change leading to orofacial functional adaptations.

Although these studies do not lead to cause-effect conclusions, a pattern of interactions emerges as follows: (1) There is a strong co-occurrence of malocclusion and mouth breathing and of malocclusion and tongue thrust. (2) There are indications of a relationship between periodontal disease and tongue thrust. (3) There appears to be a relationship between orofacial morphology and tongue thrust in some patients. (4) There is no consistent relationship between maximum tongue strength and malocclusion. (5) There is an observed relationship between sucking habits and open bite and crossbite.

Tongue Thrust Incidence and Maturation

Several studies have been reported to identify the incidence of tongue thrust in the general population as well as the prevalence at various ages. A lack of universal acceptance of a definition for tongue thrust hampers an objective comparison of these studies.

In 1958, Leech found tongue thrust to occur in 43 percent of children 2 to 13 years old. In 1961, Tulley found a 2.7 percent incidence of tongue thrust. In 1963, Bell and Hale found 80 percent in 5 and 6 year-old children.

Three independent studies reported tongue thrust incidence by age groups (Fletcher et al., 1961; Werlich et al.; 1962 Hanson and Andrianopoulos, 1982). Table 1 shows the results and differences of the three studies. The three studies agree on the decrease in prevalence through mixed dentition; however, Hanson and Andrianopoulos found an increase in the 17 to 18 year range.

TABLE 1
Comparison of Incidence Figures
for Three Studies

	6 to 7 years	11 to 12 years	17 to 18 years
Hanson and Andrianopoulos	51.7%	39.9%	41.4%
Werlich	37.3%	27.6%	26.4%
Fletcher et al.	51.3%	(not available) 38.5% at 8 years	21.0%

Effectiveness of Therapy for Tongue Thrust

Some clinical research has been reported that addresses the question as to whether treatment for orofacial myofunctional behavior variations actually works. The determination of effectiveness of a behavioral therapy poses a number of technical problems, mostly related to control of variables and definition of terms. Studies of tongue thrust therapy suffer appropriately from such criticism. Nonetheless, the following clinical reports attempt to document, with varying levels of control, several aspects of treatment of oral behaviors.

Robson (1963) reported on 666 subjects who received tongue thrust therapy: 520 retained a corrected swallow pattern when seen from 6 months to 31 months following therapy.

Barrett and von Dedenroth (1967) found that all 25 patients treated by hypnotherapy for tongue thrust retained corrected patterns 1 to 3 years after therapy.

Stansell's (1969) 54 subjects with malocclusion were divided into three groups of 18 each. One group received speech therapy, another received swallowing therapy, and a third group received neither therapy. Speech training alone was accompanied by decreased overjets. Tongue thrust therapy was thought to prevent an increase in overjet, whereas the overjets of untreated patients increased in several cases.

Subtelny (1970) studied five subjects with "abnormal swallows," three of whom exhibited tongue thrust. He found therapy to be ineffective in correcting the disorder.

Christofferson (1970) reviewed 25 subjects post tongue thrust therapy at least 5 years. Ninety-two percent swallowed correctly on voluntary swallows, and 84 percent on off-guard swallows.

Case (1975) studied 40 children with tongue thrust, 20 received therapy. Before-and-after palatograms showed consistently discernable differences between swallow patterns of treated and untreated groups.

Overstake (1975), using surface electromyography (EMG), studied the strap muscles of the neck on 12 normal swallowers, 12 tongue thrusters, and six corrected tongue thrusters. The EMG patterns of corrected thrusters matched closely those of normal swallowers.

He summarized that there was a significant difference between EMG patterns of these two groups and those of tongue thrusters.

Toronto (1975) recalled 50 treated cases several years post-treatment. Two subjects (4 percent) protruded the tongue on swallows, 12 (24 percent) contacted the lingual surfaces of anterior teeth during swallows and 36 (72 percent) swallowed normally.

Cooper (1977) found both oral myofunctional therapy and cribs to be effective in correcting tongue thrust. In two experimental groups, anterior dental overjet decreased. In control groups (no treatment), overjet increased.

Christensen and Hanson (1981) studied ten six-year-old children, all with lips and tongue thrusts. Five received speech therapy plus tongue thrust therapy, and five received articulation therapy alone. Children in both groups made equal progress on /s/ remediation. Those who received tongue thrust therapy also corrected the tongue thrust. Tongue thrust persisted in children who did not receive oral myofunctional therapy.

Ohno et al. (1981) presented 12 cases as evidence that therapy for tongue thrust is effective in assisting orthodontic tooth movement.

Young and Vogel (1983) reported a single-subject study that reinforced the use of cueing and positive reinforcement as procedures for establishing proper tongue resting posture in a 21 year-old college student.

Summary

Ten of eleven studies in the literature regarding the effectiveness of tongue thrust therapy found it to be effective. Several of the studies employed an "ex post facto" analysis. This is a weak design, but is often necessitated because utilization of a control-experimental group design would require unjustifiable withholding of treatment from one of two groups. Research that assesses swallowing behaviors years after the completion of therapy assumes that the referral source and the clinician were both competent examiners for tongue thrust and were both honest. Some readers may not be willing to concede these assumptions as accurate. Six of the 11 studies, though, employed control procedures. It is evident that the preponderance of current clinical research strongly supports the effectiveness of therapy for tongue thrust. The single study reporting negative results (Subtelny, 1970) involved five subjects, only three of whom were described as tongue thrusters.

Orthodontic Relapse and Therapy for Tongue Thrust

Relapse following orthodontic treatment was the principal concern motivating Straub (1960) and other pioneers to investigate the role of orofacial muscles in dental occlusion. It is likely that most orthodontic patients stop visiting their orthodontist soon after the retainers are removed. Orthodontists seldom have the opportunity to know what happens to corrected occlusion in their patients several years after treatment.

In 1981, Uhde evaluated 72 patients a minimum of 12 years after orthodontic treatment to determine the relationship of post-treatment stability to the type of original

malocclusion and to the use of extraction or nonextraction orthodontic therapy. Uhde found that only 49.2 percent of the subjects had "acceptable occlusion." Occlusion tended to return to pretreatment values. Specifically, relapse occurred in the following conditions: Abnormal anteroposterior molar relationship, overjet, overbite, maxillary and mandibular arch widths and crowding. Uhde found relapse to be unrelated to either type of malocclusion or type of treatment.

In 1987, Andrianopoulos and Hanson investigated relationships between tongue thrust and retention of orthodontically treated malocclusion. Due to the special relevance of this study to this article, it will be reported in considerable detail. Three hypotheses were tested: (1) Orthodontic treatment alone, without therapy for tongue thrust, will eliminate tongue thrust in Class II patients. (2) Patients who receive therapy for tongue thrust before the initiation of orthodontic treatment will retain correct tongue habits after the completion of orthodontic treatment. (3) Patients who receive therapy for tongue thrust will have less orthodontic relapse than those who received no therapy for tongue thrust.

Subjects

Subjects were randomly selected in the experimental group from patient files at the University of Utah. Ages ranged from 16 years to 29 years-10 months, with a mean age of 22 years-6 months. The mean number of years since braces were removed was 7.4. All subjects had been diagnosed by their orthodontists as having Class II, Division I malocclusions before orthodontic treatment. All had completed therapy for tongue thrust. Six males and 11 females constituted this group.

Subjects for the control group were selected at random from files of cooperating orthodontists in Salt Lake City. The presence or absence of tongue thrust before or after orthodontic treatment was not a factor in the selection of subjects. None had been referred for tongue thrust therapy. There were 11 males and 6 females. All had worn braces and retainers and had not worn an upper arch retainer for at least 1 year. The mean number of years since the removal of braces was 7.8. Ages ranged from 17 years-7 months; 29 years-9 months; with a mean age of 22 years-4 months. Other comparative data on the two groups are presented in Table 2 (p. 7).

Procedures

Orthodontic records of each subject were examined for type of malocclusion, duration of orthodontic treatment, and speech and oral habit treatment received by the subjects. Preorthodontic and postorthodontic treatment models were obtained from orthodontists for each of the 34 subjects. Preorthodontic and postorthodontic treatment cephalograms were obtained for those 28 subjects on whom they were available.

Measures of overjet in millimeters were taken from each of the three sets of models for each subject: preorthodontic treatment, postorthodontic treatment, and current. A percent of relapse of overjet was calculated as follows:

$$\frac{c - b}{a - b} \times 100$$

where **a** is preorthodontic overjet, **b** is immediate postorthodontic overjet, and **c** is present overjet.

Case history information was obtained for each subject. Each patient was examined by three experienced speech-language pathologists, all of whom had several years of experience in the treatment of orofacial myofunctional disorders. The judges were unaware of which subjects belonged to the experimental or control groups. Tongue thrust was defined as occurring when "during swallowing, the tongue contacts more than one-half the lingual surface of any of the incisors or cuspids."

Variables studied were: Pretreatment overjet, post-treatment overjet, current overjet, presence or absence of tongue thrust, type of habitual breathing (predominantly mouth, predominantly nose, both nose and mouth), therapy or no therapy for tongue thrust and type of Class II malocclusion.

TABLE 2
Orthodontic Treatment Data*

Data	Therapy Group	Non-Therapy Group
1. Mean years since braces removed	7.4 years	7.8 years
2. Range: years since braces removed	1-½ to 13 years	1 to 10 years
3. Mean time in braces	24.0 months	28.0 months
4. Range: time in braces	18 to 48 months	8 to 54 months
5. Mean time in upper retainer	22.9 months	31.6 months
6. Range: time in upper retainer	6 to 84 months	12 to 96 months

*From Andrianopoulos and Hanson study (1987)

Results

Three experimental subjects (17.6 percent) and 12 control subjects (70.6 percent) were found to be tongue thrusting. Mean relapse in overjet since removal of braces was 0.56 mm for the experimental group and 1.94 mm for the control subjects. The relationship between receiving tongue thrust therapy and amount of relapse was statistically significant ($r = 0.432$, $t = -2.708$, $p < 0.02$). Subjects who received therapy experienced less occlusal relapse than those who did not.

The combination of the two variables, tongue thrust therapy and current tongue thrust was significantly related to amount of relapse (multiple $r = 0.44$, $F [2,33] = 3.73$, $p < 0.04$).

The signs of the coefficients in the regression equa-

tion supported the hypothesis that having undergone tongue thrust therapy without current tongue thrust resulted in a smaller amount of orthodontic relapse than not having tongue thrust therapy and currently exhibiting tongue thrusting.

Mouth breathers were found to have greater relapse (mean, 3.0 mm) than those who breathed principally through their noses (mean, 0.12 mm) when all 34 subjects were combined into one group. These data were determined by subjective (nonphysiological) assessments.

Subjects who had received therapy were found to be less likely to have tongue thrust than those who had not (Fisher exact test probability = 0.0049, two-tailed).

Analysis of available preorthodontic treatment cephalograms (28 subjects) indicated that 12 (34 percent) of the subjects exhibited Class II, Division I malocclusions with protruding maxillae. Five (18 percent) were classified as marginal cases (Class II profile, but neither an obvious protruding maxilla nor a retruding mandible was evident). The consulting orthodontist (Robert Mason) questions the Class II designation given by referring orthodontists regarding the remaining five subjects. Subtypes of Class II were found to be randomly distributed between the two groups of subjects.

With respect to the three hypotheses:

1. Orthodontic treatment alone was found not to eliminate tongue thrust. Twelve (71 percent) of 17 subjects who had received orthodontic treatment for Class II, Division I malocclusions, and no therapy for tongue thrust, were found to be tongue thrusting following the completion of orthodontic treatment. Of 17 subjects who received therapy for tongue thrust, only three (18 percent) were tongue thrusting after orthodontic treatment. The hypothesis is rejected.

2. Only 3 of 17 subjects who had received therapy for tongue thrust were thrusting following orthodontic treatment. Hypothesis 2 is accepted.

3. Hypothesis 3 is accepted. Statistically significant differences in relapse were found between orthodontically treated subjects who had received therapy and subjects who had not received therapy, favoring the "had received therapy" group.

The results of this research, viewed alongside the body of research linking dental occlusion with orofacial functional patterns, and viewed also with selected research demonstrating therapy for tongue thrust to be effective, should stimulate renewed interest in clinical and research activities in treatment methodology.

PHILOSOPHICAL CONSIDERATIONS

Neither research findings nor clinical experience has a corner on useful information. Some recommendations concerning orofacial muscle variations seem warranted, based on a survey of knowledge derived from both types of sources. Ten of these recommendations are:

1. Apply what is known from research on anatomy, physiology and human behavior to the evaluation and treatment of orofacial muscle disorders. The following principles surface: (a) Since tooth movement seems to be best mitigated by light, constant pressures, therapy

plans should emphasize retraining of rest-postures of tongue and lips. (b) The greater the dominance of nose over mouth breathing, the easier it should be to maintain proper resting postures. Whatever can be done to facilitate nose breathing should be done. Careful measurement of breathing mode using airflow instrumentation is requisite to accurate description of breathing patterns. (c) Spontaneous modification of tongue and lip patterns after the age of 8 years is, at most, unlikely and at least unpredictable. Tongue and lip patterns that appear to be adversely affecting occlusion should be treated before, during, or shortly after orthodontic treatment. (d) Research has shown that tongue and lip muscles can be strengthened, but no research has demonstrated that such strengthening is a necessary part of muscle retraining for speech, for establishment of normal resting postures or for modification of vegetative patterns. Conversely, research has shown that therapy with minimal, or no, strengthening exercises is effective in changing tongue and lip patterns and in reducing orthodontic relapse. The focus of therapy should be on modifying muscle patterns, rather than on increasing muscle strength. (e) In most patients, retraining should include a diminution of activity of the genioglossus muscle and an increase of activity of all other tongue muscles (intrinsic and extrinsic). (f) Whatever can be done therapeutically or surgically to facilitate effortless lip closure should be carried out as early as possible.

2. Apply knowledge gleaned from clinical experience when evaluating and treating orofacial disorders. (a) Orofacial muscle patterns in resting, vegetative and speech activities are interrelated. A modification of one set of patterns may affect, in all likelihood, other related patterns. On the other hand, ignoring the retraining of one set of patterns, that is, resting or vegetative could preclude success in modification of the other sets. Attend to whatever patterns and sets of patterns that constitute any and all relevant behaviors. (b) Apply relevant principles of effective speech therapy to the treatment of orofacial disorders. Individualize treatment, rather than follow strictly any standard program; do not shorten nor lengthen training inappropriately; keep adequate records; secure the help of other professionals and of parents and family members in planning and carrying out treatment. (c) Participate in continuing education, especially that which emphasizes a multidisciplinary approach to diagnosis and treatment planning.

3. Make objectives behavioral, rather than anatomical. Do not attempt nor profess to be a mover of teeth.

4. Recognize the cosmetic benefits of orofacial myofunctional therapy. People whose lips are comfortably together at rest, and whose tongues are forward only when they say the "th" sound, have a much more pleasant appearance than those with the lips habitually apart and the tongue habitually forward.

5. Look beyond the oral cavity for factors contributing to malocclusions and harmful orofacial muscle patterns. Saboya (1985) attributes about 60 percent of "atypical swallowing" to irregularities of the axis vertebra. She notes that patients who incline the head habitually forward and downward demonstrate a tendency toward a

Class III occlusion, whereas those who keep the head fixed more toward the back tend toward Class II. Her approach to the evaluation of orofacial myofunctional disorders includes a study of the static and dynamic axes. She frequently undertakes appropriate physical therapy before the initiation of therapy for tongue thrust.

6. Make no claims for beneficial outcomes of therapy that cannot objectively be demonstrated.

7. Be aware of the impact, both positive and negative, of words in oral and written communication. Some examples follow.

Habit. Some people think of a habit as an acquired pattern only: Webster's (1957) fourth listed definition: "A thing done often and hence, usually done easily. An act that is acquired and has become automatic." The fifth definition listed by Webster was: "A tendency to perform a certain action or behavior in a certain way; usual way of doing." The fifth definition does not stipulate that a habit has to be acquired. Persons who think of a habit only as an acquired pattern may respond negatively when they hear of orofacial muscle patterns referred to as "habits." Less offensive to such people is use of the more neutral term "patterns." Webster's sixth definition of *pattern* is a "definite direction, tendency, or characteristic; as behavior patterns."

Imbalance. "Balance" is defined as "a state of equilibrium or equality of two things in weight, force, quantity, etc." "Imbalance is a lack of balance, as in proportion, force, functioning, etc." Some authorities object to the term "orofacial muscle imbalance," contending that "muscle imbalance" is a nebulous, meaningless term. They point to the inequality of lip and tongue pressures in individuals with normal dental occlusion as evidence that "balance" is not a normal condition. Until evidence describing normal and abnormal relationships of lip, cheek and tongue pressures to dental occlusion is available, this term is best avoided.

Tongue thrust. This term is similar to the word "therapy," as used in reference to the activity of speech-language pathologists. Its meaning is apparent and it is widely used, but it does not describe accurately or completely what it intends to describe. Much more descriptive and precise is "orofacial muscle pattern disorders," but that does not trip lightly off the tongue. Nevertheless, when speaking to professionals, it is better to use the more exact term, or at least "orofacial myofunctional disorders." Lay people will probably continue to use the shorter term. It is advisable to correct patients' misconceptions that may arise from use of the term "tongue thrust" during their first visit to your office.

8. Be alert to the potential role of the orofacial myologist in the treatment of other disorders involving dysfunction of the muscles of the lips, tongue and velum. Pierce (1983) proposes that the training and experience of speech pathologists and orofacial myologists equip them uniquely to treat patients with dysphagia, apraxia and dysarthria.

Apraxia and dysarthria are difficulties with motor aspects of speech. Muscles either do not contract appropriately in response to commands from the cerebrum, or their movements are lacking speed or strength.

Speech-language pathologists with added training and experience in orofacial myofunctional disorders should be the therapist-of-choice for working with patients experiencing these disorders.

SUMMARY

Beginning in the late 1950s, speech-language pathologists were enlisted by orthodontists to retrain orofacial muscles to behave properly when they thought that their work was being thwarted by patients' overzealous tongues and incompetent lips. As is usually the case, clinical experimentation outpaced research productivity. Eventually, dentists and speech-language pathologists began doubting the validity and effectiveness of therapy for tongue thrust. Their skepticism was probably due in large part to inadequate training offered to the rapidly multiplying number of orofacial myofunctional therapists, many of whom tried to apply "cookbook" therapy procedures to patients demonstrating a complexity of behaviors. Research efforts diminished following the publication in 1974 of the official Statement of the Joint Committee on Speech Pathology-Audiology and Dentistry, which recommended the discontinuation of training of orofacial myofunctional therapists and the initiation of better research to investigate the legitimacy of the treatment.

A review of selected relevant research, preceding and following the Joint Statement publication, has been presented in this article. Much of the research reported to date suffers from inadequate controls, but reveals a substantial amount of support for the validity of the concepts and treatments for the host of behaviors referred to as "tongue thrust."

The effect of the Statement was to polarize attitudes towards the therapy. In areas of the United States where therapists were working effectively, referring dentists had

ample clinical evidence of the value of treatment to their patients. In other areas where skepticism abounded or where therapists were not obtaining satisfactory results with patients, dentists stopped referring and therapy ground to a halt.

Despite severe criticism and skepticism expressed about myofunctional therapy in some publications, many dentists and other clinicians remained enthusiastic about the clinical benefits of myofunctional-type treatment for selected patients. An organization evolved from this sustained enthusiasm, which is now known as the International Association of Orofacial Myology. This interdisciplinary organization holds yearly meetings, semiannual clinical treatment conferences, supports a journal and has a certification process including on-site inspection. The growing membership in this organization includes university professors in speech pathology and a variety of dental specialists.

Whether myofunctional therapy is, or will be, a field of specialization or an interest area subsumed within a profession such as dentistry or speech pathology remains to be seen. At present, there appears to be insufficient attention focused on orofacial myofunctional variations and oral posturing in the training of speech-language clinician.

The challenges ahead include fuller scientific descriptions of the variety of behaviors seen by many clinicians to be detrimental to normal dental occlusion. Also, more objective criteria are needed for selection of those patients who may reasonably benefit from myofunctional treatment. Diagnostic methods need to be evaluated and refined in more detail, and principles and procedures of therapy are in need of more study and quantification.

The information reviewed in this article, and presented in the articles to follow, is intended to encourage the reader to move ahead responsibly in increasing clinical and research interest in orofacial myofunctional-type variations.

REFERENCES

- American Speech and Hearing Association and American Association of Dental Schools, Joint Committee on Dentistry and Speech Pathology-Audiology (1975). *American Speech and Hearing Association*, 17(5): 331-337.
- Andrianopoulos, M.V., and Hanson, M.L. (1987). Tongue thrust and the stability of overjet correction. *Angle Orthodontist*, 57(2): 121-135.
- Barrett, R.H., and von Dedenroth, T.E.A. (1967). Problems of deglutition. *American Journal Clinical Hypnosis*, 9: 161.
- Bell, D., and Hale, A. (1963). Observation of tongue thrust in preschool children. *Journal of Speech and Hearing Disorders*, 28: 195.
- Bresolin, D., Shapiro, P.A., Shapiro, G.G., Chapko, M.K., and Dassel, S. (1983). Mouth breathing in allergic children: Its relationship to dentofacial development. *American Journal of Orthodontics*, 83: 334-340.
- Case, J.L. (1975). Palatography and myofunctional therapy. *International Journal of Oral Myology*, 1, 65-71.
- Christofferson, S. (1970). The permanency of deglutition changes. Unpublished thesis, University of Utah, Salt Lake City.
- Christensen, M., and Hanson, M. (1981). An investigation of the efficacy of oral myofunctional therapy as a precursor to articulation therapy for pre-first grade children. *Journal of Speech and Hearing Disorders*, 46: 160-167.
- Cooper, J.S. (1977). A comparison of myofunctional therapy and crib appliance effects with a maturational guidance control group. *American Journal of Orthodontics*, 72: 333-334.
- Dworkin, J.P., and Culatta, K.H. (1980). Tongue strength: Its relationship to tongue thrusting, open bite, and articulatory proficiency. *Journal of Speech and Hearing Disorders*, 45: 277-282.
- Fletcher, S.G., Casteel, R.L., and Bradley, D.P. (1961). Tongue thrust swallow, speech articulation, and age. *Journal of Speech and Hearing Disorders*, 26: 219.
- Freeland, T.G. (1979). Muscle function during treatment with the functional regulator. *Angle Orthodontist*, 49: 247-258.

REFERENCES (Continued)

- Hanson, M.L., and Cohen, M.S. (1973). Effects of form and function on swallowing and the developing dentition. *American Journal of Orthodontics*, 64: 63.
- Hanson, M.L., and Andrianopoulos, M.V. (1982). Tongue thrust and malocclusion. *International Journal of Orthodontics*, 20: 9-18.
- Harvold, E.P., Vargervik, K., and Chierici, G. (1973). Primate experiment on oral sensation and dental malocclusion. *American Journal of Orthodontics*, 63: 494.
- Harvold, E.G., Tomer, B.S., and Chierici, G. (1981). Primate experiments on oral respiration. *American Journal of Orthodontics*, 79: 4.
- Klein, E.T. (1952). Pressure habits, etiological factors in malocclusion. *American Journal of Orthodontics*, 38: 586-587.
- Lamberton, C.M., Riechart, P.A., and Triratananimit, P. (1980). Bimaxillary protrusion as a pathologic problem in the Thai. *American Journal of Orthodontics*, 77: 320-329.
- Larsson, E., and Konnerman, H. (1981). Vertical crown length in 9, 11, and 13-year-old children with and without finger-sucking habit. *British Journal of Orthodontics*, 8: 141-143.
- Leech, H.L. (1958). A clinical analysis of orofacial morphology and behavior of 500 patients attending an upper respiratory research clinic. *Dental Practitioner*, 9: 57.
- Lischer, B.E. (1912). *Principles and methods of orthodontics*. Philadelphia: Lea & Febiger.
- Lowe, A.A., and Johnston, W.E. (1979). Tongue and jaw muscle activity in response to mandibular rotations in a sample of normal and anterior open-bite subjects. *American Journal of Orthodontics*, 76: 565-576.
- Lowe, A.A. (1980). Correlations between orofacial muscle activity and craniofacial morphology in a sample of control and anterior open-bite subjects. *American Journal of Orthodontics*, 78: 89-98.
- Miller, A.J., Vargervik, K., and Chierici, G. (1982). Sequential neuromuscular changes in rhesus monkeys during the initial adaptation to oral respiration. *American Journal of orthodontics*, 81: 99-107.
- Modeer, T., Udenrick, L., and Lindner, H. (1982). Sucking habits and their relation to posterior cross-bite in 4-year-old children. *Scandinavian Journal of Dental Research*, 90: 323-328.
- Negri, P.L., and Croce, G. (1965). Influence of the tongue on development of the dental arches. *Dental Abstracts*, 10: 453.
- Ohno, T., Yogosawa, F., and Nakamura, K. (1981). An approach to openbite cases with tongue thrusting habits with reference to habit appliances and myofunctional therapy as viewed from an orthodontic standpoint. *International Journal of Orofacial Myology*, 7: 3-10.
- Overstake, C.P. (1975). Electromyographic study of normal and deviant swallowing. *International Journal of Oral Myology*, 1: 29-60.
- Pierce, R.B. (1983). Expanding our expertise. *International Journal of Orofacial Myology*, 9: 7-17.
- Ray, H., and Santos, H. (1954). Consideration of tongue thrust as a factor in periodontal disease. *Journal of Periodontology*, 25: 250.
- Rix, R.E. (1946). Deglutition and the teeth. *Dental Record*, 66: 103.
- Robson, J.E. (1963). Analytic survey of the deviate swallow therapy program in Tucson, Arizona. Unpublished thesis, University of San Francisco, San Francisco.
- Rogers, A.P. (1918). Exercises for the development of the muscles in the face, with a view to increasing their functional activity. *Dental Cosmos*, 60: 857.
- Rogers, A.P. (1918). Muscle training and its relation to orthodontia. *International Journal of Orthodontics*, 47: 674.
- Saboya, B. de A.R. (1985). The importance of the axis in the study of oromyofunctional disorders: an integrated approach. *International Journal of Orofacial Myology*, 11: 5-13.
- Stansell, B. (1969). Effects of deglutition training and speech training. Unpublished doctoral dissertation, University of Southern California, Los Angeles.
- Straub, W.J. (1960). Malfunction of the tongue. Part I. The abnormal swallowing habit: Its cause, effects, and results in relation to orthodontic treatment and speech therapy. *American Journal of Orthodontics*, 46: 404.
- Subtelny, J.D. (1970). Malocclusions, orthodontic corrections and orofacial muscle adaptation. *Angle Orthodontist*, 40: 170.
- Toronto, A.S. (1975). Long-term effectiveness of oral myotherapy. *International Journal of Oral Myology*, 1: 4.
- Truesdell, B., and Truesdell, F.B. (1937). Deglutition: with special reference to normal function and the diagnosis, analysis and correction of abnormalities. *Angle Orthodontist*, 7: 90.
- Tulley, W.J. (1961). Long term studies of malocclusion. *Transaction of the European Orthodontic Society*, 47: 256.
- Uhde, M.D. (1981). Long term stability of the static occlusion after orthodontic treatment. Unpublished thesis, University of Illinois, Chicago. Reviewed by Graber, T.M. (1981). *American Journal Orthodontics*, 80: 228.
- Ward, M., Malone, H., Jann, G., and Jann, H. (1961). Articulation variations associated with visceral swallowing and malocclusion. *Journal of Speech and Hearing Disorders*, 26: 334.
- Websters New World Dictionary (1957). New York: The World Publishing Company.
- Werlich, E.P. (1962). The prevalence of variant swallowing patterns in a group of Seattle school children. Unpublished thesis, University of Washington, Seattle.
- Young, L.D., and Vogel, V. (1983). The use of cueing and positive practice in the treatment of tongue thrust swallowing. *Journal of Behavior Therapy and Experimental Psychiatry*, 14: 73-77.