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A Study of Changes in Swallowing Habit Resulting From Tongue Thrust Therapy

Recommended by R. H. Barrett*

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* This paper is based on a Master's Thesis completed by the second author under the direction of the first author.

Introduction

There has been much controversy regarding the effectiveness of various approaches to tongue thrust therapy in changing swallowing habits. Basically there are three approaches to tongue thrust therapy. They are: mechanical restraints or reminders, modification of the oral environment, and myofunctional therapy. Graber (1) and Cleall (2), believe that mechanical restraints should be used to correct posture of the tongue. Proffit and Mason (3) believe that correction of malocclusion usually will result in disappearance of the tongue thrust, unless there are obvious predisposing factors. If an older child does not spontaneously progress toward an adult swallowing pattern, therapy might be indicated to promote change in resting posture of the tongue and swallowing pattern. If therapy is indicated, they recommend that it be done in conjunction with tooth movement to take advantage of the tendency of function to adapt to changing form. They conclude that resting posture of the tongue as it affects the eruption of teeth contributes to malocclusion. Myofunctional therapy depends on a planned program of exercises designed to establish as routine those patterns of muscle movement utilized in normal deglutition. Hanson (4) believes that therapy should include five features: (1) the hierarchy of areas of emphasis; (2) the use of organismic principles; (3) frequent use of behavior modification procedures; (4) neuromuscular facilitation exercises; and (5) correction of dentalized speech

sounds. Although advocates of the myofunctional approach recommend the use of various modifications of specific behaviors in therapy, most programs include approximately the same general procedures. The present study is concerned with individuals who were previously evaluated by Barrett and either declined or completed therapy with him. In his approach to the remediation of tongue thrust behavior, he states that "the most important elements in any therapy program are the philosophy on which it is based and the attitude of the therapist that is reflected by that philosophy" (5, p.220). Barrett believes that the primary goal of therapy is to modify the behavior of the patient. He suggests that the therapist assess the abilities of the patient, create an atmosphere of cooperation between the clinician, patient, parent and referring professional, then proceed as directly as possible toward achieving normal deglutition. Barrett's program of therapy includes nine basic phases or categories (5).

In the evaluation of results of various techniques to remediate tongue thrust behavior, researchers have studied the responses of subjects who completed therapy under different programs of treatment. Christofferson (6) observed 25 of Hanson's patients with an age range from 12 to 25 years who had completed tongue thrust therapy at least five years previously. The results of this investigation revealed that only two were tongue thrusting when voluntary swallows were assessed. When the squirt gun test was used, two additional subjects were found to have a tongue thrust pattern. This results in a success rate of 84%.

Robson (7) did a study on the results of Barrett's therapy. He selected an arbitrary date several years previous to the time of testing. Beginning at that date he made a consecutive list of 1000 patients who had completed therapy with Barrett. From this list he located 673 former patients who agreed to participate in the study. His purpose was to determine the patient's ability to retain the habit of swallowing correctly voluntarily and on a subconscious level. He judged that malocclusion had improved in 15% of the subjects so that orthodontic treatment, in his opinion, was not essential. He did not infer

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that swallowing therapy is a substitute for orthodontics, but that improvement in occlusion sometimes occurs as a welcome side effect of tongue thrust therapy. He found that 78.1% were successful in maintaining the new pattern of swallowing. Toronto (8) studied 50 subjects, 14 to 20 years of age, who had completed tongue thrust therapy with Barrett at least five years prior to the study. He found that of the 50 subjects, 14 were still exhibiting tongue thrust behavior, a success rate of 72%. Seven of the 50 subjects were able to avoid orthodontic treatment and, at the time of the investigation, had occlusion that was judged as normal.

It appears that the few studies that have been completed of results of a therapeutic approach to remediate tongue thrust have been with subjects who completed therapy with Barrett. However, none of the reported studies has included a control group of subjects who were evaluated as exhibiting tongue thrust but who declined myofunctional therapy with Barrett. Therefore, before the longitudinal results of his approach to therapy can be adequately assessed, swallowing behavior of individuals who declined recommended therapy must be compared with swallowing behavior of individuals who completed recommended therapy.

It was the purpose of this study to (1) select from the files of R.H. Barrett subjects who had been diagnosed as manifesting tongue thrust behavior, (2) evaluate the swallowing behavior of subjects who had successfully completed therapy at least five years prior to the study, and (3) evaluate the swallowing behavior of subjects who had declined therapy at least five years ago. It was hypothesized that (1) persons completing tongue thrust therapy by Barrett would retain the new swallow for at least five years, and (2) persons diagnosed at least five years prior to this study as having tongue thrust, but who had declined therapy, would demonstrate the same incorrect swallowing habits initially noted.

Method

Fifty subjects, twenty-three females and twenty-seven males between the ages of thirteen and thirty-two years (mean age, 16 years, 8 months; median age 17 years) who had completed tongue thrust therapy with Barrett at least five years prior to this investigation, were selected from the clinical files and participated in the study. A control group of thirteen females and seventeen males in the same age range (mean age 16 years, 5 months; median age 17 years) who had been diagnosed at least five years prior to this study as having tongue thrust but who had declined therapy, were also examined. All subjects were selected in a random manner from the files of individuals who had been evaluated for therapy. They were all residents of the Tucson, Arizona area and had been referred to Barrett by dental or speech-language professionals.

Evaluation Procedures

Because of its reliability, a clinical method of evaluation was used to diagnose tongue thrust. The reliability of the clinical diagnosis was found to be approximately .79 among three judges in Wood's (9) study of tongue thrust. He also determined that the agreement between the clinical method of evaluation and

cinefluorographic film analysis yielded a contingency coefficient of .50 and was found to be significant beyond the .001 level.

Each subject included in the study was individually evaluated by the investigator in a quiet room. The procedure for the clinical evaluation required that the lips of the subject be parted as he/she swallowed liquid so that action of the tongue could be observed. Tongue thrust behavior was identified as present if the tongue could be seen protruding beyond the cutting edge of any of the upper and lower anterior or lateral teeth. During the swallowing behavior, contraction of the masseter muscle was observed. This was achieved by placing the back of the fingers against the posterior portion of the jaw. If contraction was not noted, that implied that the back teeth were not occluding as firmly as is required to provide stability for the tongue during swallowing (5). Behaviors during swallowing of saliva, liquids, and solids were also observed and movement of the mandible, actions of the lips and masseter muscle, configuration of the mentalis, and type of thrust during these activities were noted. The rating scale of 0 to 2 developed by Barrett and Hanson (5) was used to designate tongue function. Zero (0) indicated that the tongue did not contact any part of the anterior or lateral teeth during the swallowing behavior (normal swallow); one (1) designated that the tongue made linguodental contact only against the lingual aspect of the anterior or lateral dentition (tongue thrust); and two (2) signified that the tongue protruded beyond the cutting edge of any of the upper and lower anterior or lateral teeth (tongue thrust).

It has been noted that, in some cases, the subject knows how to swallow correctly on a conscious level, but swallows incorrectly habitually; therefore, the squirt gun test was used to test subconscious behavior (5). The subject was asked to count backwards from the number last stated during the test. Barrett and Hanson (5) suggest that the complete conscious attention of an average person is required to count in reverse from a large number; therefore, if the subject follows instructions, the swallowing observed during such an activity should be a dependable reflection of a subconscious swallow. This procedure was used to determine if swallowing behavior either conformed to normal behavior or to a tongue thrust pattern. The behavior of each subject was marked as pass or fail. Swallowing behavior was also observed during conversation. On the examination form, the following behaviors were noted and marked as normal or tongue thrust; (1) resting posture of the tongue, (2) lip approximation, (3) observable contraction of the facial muscles associated with swallowing, and (4) protrusion of the tongue during non-speech activities.

Case History

The initial evaluation report was obtained from the early records of each subject and included information relative to thumb-sucking, closure of the lips, respiratory allergies, size of tonsils or history of tonsillitis, and time and extent of any orthodontic procedures. Information was also obtained from the records concerning the type of tongue thrust manifested by the subject before therapy, type of malocclusion, and the date therapy was started

or not accepted. This information was used to define the sample studied.

Oral Examination

The oral examination included observations of the subject's habitual resting posture of the tongue and occlusion at this time. Occlusal relationships were classified according to types used by Barrett (5). Oral habits such as thumb-sucking were also noted.

Analysis of the Data

To determine the success rate for retention of correct swallowing patterns in subjects who had completed tongue thrust therapy with Barrett five years previous to this study, a record was made of those demonstrating the following behaviors; (1) absence of movement of the mandible, (2) contraction of the masseter muscle, (3) absence of tension of the mentalis muscle, and (4) absence of pursing of the lips. A count was also made of subjects who were able to achieve a correct clearing swallow and of those who were observed to swallow correctly during the squirt gun

test. From these figures, the incidence of individual behaviors was derived. In addition, frequency of occurrence of correct (1) resting posture of the tongue, (2) lip approximation, (3) relaxed facial muscles, and (4) carriage of the tongue during non-speech activities was computed for the sample. An identical analysis was made for each behavior under observation for the subjects who had been diagnosed at least five years prior to this study as having tongue thrust, but who had rejected therapy. The success rate achieved by the two groups of subjects was then compared.

Results

Incidence of Tongue Thrust Type

Table I shows the incidence of types of tongue thrust observed by Barrett in this population at the time of initial diagnosis. That diagnosis revealed that 17 (34%) of the therapy group and 16 (53.3%) in the control group displayed Type 2 tongue thrust. Three of the six relapsed cases found in the therapy group in this study demonstrated Type 2 tongue thrust and two of the three displayed a lips apart posture.

TABLE I
Incidence of Tongue Thrust Type
of Two Groups of
Individuals Diagnosed as Displaying Tongue Thrust

Tongue Thrust Type	Accepted Therapy - 50		Declined Therapy - 30	
	Behavior Noted Number	%	Behavior Noted Number	%
Incisor (Class I)	13	26	0	0
Full Thrust (Class II, Div. 1)	17	34	16	53.3
Mandibular Thrust (Class III)	5	10	4	13.3
Bi-Maxillary Thrust	1	2	1	3
Open Bite	4	8	1	3
Closed Bite	3	6	2	6.6
Unilateral Thrust	0	0	1	3
Bilateral Thrust	7	14	5	16.6

Using a rating scale of 0 to 2, tongue function during swallowing behavior was evaluated during the present investigation. As may be noted in Table II, 42 (84%) of the therapy group de-

monstrated correct tongue function, with a (0) rating. All of the individuals who had declined therapy (100%) exhibited tongue function indicative of tongue thrust.

TABLE II
Swallowing Behavior
of Two Groups of
Subjects Diagnosed as Displaying Tongue Thrust

	Accepted Therapy - 50		Declined Therapy - 30	
	Behavior Noted Number	%	Behavior Noted Number	%
Tongue Function During Swallow:				
Rating Scale 0 - 1 - 2				
0 - Tongue does not contact any part of anterior or lateral teeth	42	84	0	0
1 - Linguodental contact only against lingual aspect of anterior or lateral dentition	8	16	1	3.4
2 - Tongue protrudes beyond cutting edge of any of the upper and lower anterior or lateral teeth	0	0	29	96.6

Tongue Posture

A large difference existed between the two groups when correct resting position of the tongue was assessed. This evaluation was made during observation of each individual as they were quietly seated and unaware of being observed. Although resting posture of the tongue does not necessarily reflect tongue function, it was interesting to note the following results: (1) In the therapy group, the initial examination before therapy revealed that 100% exhibited an incorrect resting position of the tongue while the present examination indicated that 44 (88%) maintained a correct resting posture and 6 (12%) an incorrect resting posture. (2) In

contrast, 100% of the control group were judged initially to exhibit incorrect resting position of the tongue, with the same incidence (100%) noted at the time of this study.

Table III displays the results of an analysis of the swallowing behavior observed in the subjects in this study. At least 94% of the subjects within the therapy group were successful in demonstrating no movement of the mandible, contraction of the masseter muscles, appropriate configuration of the mentalis muscle, and lack of pursing of the lips while swallowing saliva, liquids, and solids. It was also noted that at least 94% successfully achieved the clearing swallow. In contrast to this success rate,

subjects within the control group generally exhibited movement of the mandible, no contraction of the masseter muscles, tension of the mentalis muscle, and pursing of the lips while swallowing saliva, liquids, and solids. At least 93% of this group were

unable to successfully demonstrate the clearing swallow. Only 10% of the subjects in the therapy group were unable to pass the squirt gun test, while 100% of the subjects in the control group failed the test.

TABLE III
Incidence of Swallowing Behaviors Observed in Two Groups of
Individuals Diagnosed as Displaying Tongue Thrust

Behavior Noted	Accepted Therapy - 50				Declined Therapy - 30			
	Right	%	Wrong	%	Right	%	Wrong	%
Swallowing Saliva								
a. No movement of mandible noted	49	98	1	2	2	6.7	28	93.3
b. Contraction of masseter	50	100	0	0	1	3.3	29	96.7
c. Configuration of mentalis	48	96	2	4	7	23.4	23	76.6
d. Pursing of lips	48	96	2	4	7	23.4	23	76.6
e. Clearing Swallow	49	98	1	2	2	6.7	28	93.3
Swallowing Liquids								
a. No movement of mandible noted	47	94	3	6	2	6.7	28	93.3
b. Contraction of masseter	49	98	1	2	1	3.3	29	96.7
c. Configuration of mentalis	48	96	2	4	4	13.3	26	86.7
d. Pursing of lips	48	96	2	4	5	16.7	25	83.3
e. Clearing Swallow	47	94	3	6	0	0	30	100
Swallowing Solids								
a. No movement of mandible noted	47	94	3	6	1	3.3	29	96.7
b. Contraction of masseter	47	94	3	6	1	3.3	29	96.7
c. Configuration of mentalis	47	94	3	6	4	13.3	26	86.7
d. Pursing of lips	47	94	3	6	4	13.3	26	86.7
e. Clearing Swallow	49	98	1	2	0	0	30	100
Squirt Gun Test:	45	90	5	10	0	0	30	100

Additional Manifestations

94% of the subjects in the therapy group typically maintained a rest posture with lips lightly closed or slightly parted and 92% appeared to have relaxed facial muscles. In contrast to this carriage, 63.3% of the subjects in the control group held the lips apart with the tongue protruded and 70% dis-

played unnecessarily tense facial muscles during non-speech activities.

Although this study was not designed to investigate the effects of oral habits associated with tongue thrust behavior on the retention of correct swallowing patterns, Table IV shows percentage figures associated with thumb-sucking.

TABLE IV
Associated Oral Habits Noted in
Two Groups of Individuals Diagnosed as Displaying Tongue Thrust

Behavior	Accepted Therapy - 50				Declined Therapy - 30			
	First Eval.		Present Eval.		First Eval.		Present Eval.	
	No.	%	No.	%	No.	%	No.	%
Associated Oral Habits:								
Thumb-Sucking 3 - 6 years.	22	44			13	43.3		
At Initiation of Therapy	2	4	1	2	4	13.2	2	6.6

Eval. = evaluation
No. = number

Discussion

The results of this study show that the majority of subjects who completed therapy with Barrett were successful in maintaining appropriate swallowing behaviors. This success was especially evident in the evaluation of correctly swallowing saliva. In contrast, few of the subjects in the control group who had not received therapy presented appropriate swallowing behaviors.

The most significant factors involved in maintaining correct swallowing habits appeared to be the individual subject's habitual resting posture of the lips and tongue. Barrett and Hanson (5) give first priority to training of these behaviors. It is suggested that there may be a strong relationship between resting postures of the lips and tongue and saliva handling since the individuals exhibiting correct postures of the lips and tongue were also

successful in the handling of saliva. The ability to swallow saliva appropriately assumes added importance when the frequency of the occurrence of this activity is considered. Graber (1) estimated that the average individual swallows about once a minute between meals and as frequently as 9 times a minute during eating. Subjects who received therapy were 100% successful in exhibiting strong contraction of the masseter muscles during the swallowing of saliva. It should be remembered that strong contraction of the masseter muscles is involved in some of the exercises used in Barrett's remediation sequence; therefore, this activity may be simply an artifact resulting from therapy techniques. Research should be directed toward assessment of the advantage of training correct resting postures early in the therapeutic sequence. The effect of the timing of this training on the successful conclusion of tongue thrust therapy should be investigated.

Studies should also be designed to provide information on the long term effects of other approaches to the remediation of orofacial muscle imbalance due to tongue thrust swallow. Specifically, investigations to solve the treatment approach dichotomy -- correction of oral myofunctional anomalies through orthodontic appliances only or through the combined use of myofunctional therapy in conjunction with appliances -- should be completed. Such studies might include subjects who are diagnosed as tongue thrusters and receive orthodontic treatment with mechanical devices placed in the mouth to correct tongue placement, and subjects who, in addition to receiving orthodontic treatment, also complete myofunctional therapy.

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