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An Approach to Openbite Cases with Tongue Thrusting Habits — With Reference to Habit Appliances and Myofunctional Therapy as Viewed from an Orthodontic Standpoint: PART TWO

By
Toshihide Ohno, D.D.S., D.D.Sc., Orthodontist,
1-3-29 Shinoharakita, Kohhoku-ku, Yokohama, Japan
Fumio Yogosawa, D.D.S., D.D.Sc., Orthodontist,
5-3-10 Minamiaoyama, Minatoku, Tokyo, Japan
Katsuhiko Nakamura, D.D.S., D.D.Sc., Orthodontist,
1-3 Shimizugaoka, Fucha City, Tokyo, Japan
In Collaboration with the following Dental Hygienists:
Miyako Kamijo
Noami Hoshino
Tomiko Kasai
Kaoru Fuchikami

NOTE: The Japanese original of this article appeared in the Nippon Dental Review in three installments from December, 1979, to March, 1980. This English version has been prepared for *IJOM* at the suggestion of Mr. R.H. Barrett (1978) who taught us much about myofunctional therapy (MFT). This is the final installment of the English version. Part One appeared in the previous issue of *IJOM*.

To What Extent Is Improvement Possible by MFT?

The case reports to be described in the following section have received therapy from the authors in only the past several years. As we specialize in orthodontic practices, we naturally have frequent opportunity to encounter children who have some kind of pernicious or tongue-thrusting habit. Accordingly, we consistently apply MFT for those cases in whom a tongue habit is obviously concerned with the etiology of malocclusion, for those displaying thumb or finger sucking, abnormal attachment of the lingual frenulum, and those in whom a skeletal discrepancy is presumed to develop eventually with an increase in age. It is admitted that our knowledge of MFT and our own MFT training programs are yet in a developing stage and, therefore, we are not in a position to make any categorical statement on the subject. However, we may say that, to date, our experiences confirmed definite changes in the occlusal relationship, and the position of the tongue as well, through improvement of tongue function. Although our MFT experiences are limited in scope and timewise, we regard MFT as being a very powerful auxilliary aid to routine orthodontic treatment. In actual practice, we make a point of taking preoperative cephalograms of the patients, so that we may find out the degree of the movement of teeth and positional change of tongue through a superimposition of the pre- and postoperative cephalograms.

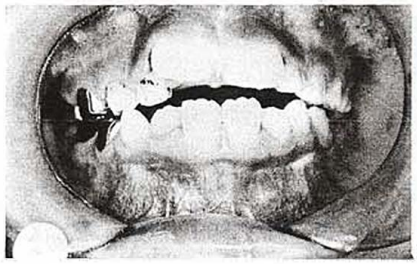


Figure 1. *A case of incisor thrust by a patient who continued thumb sucking until 6 years (8-year-old girl).*

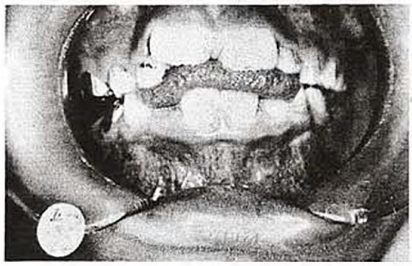


Figure 2. *The tongue protrudes between maxillary and mandibular anteriors in deglutition.*

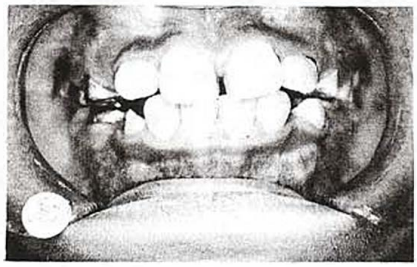
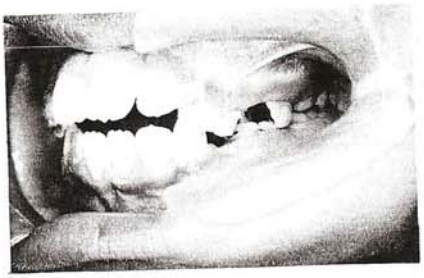


Figure 3. *The occlusal relationship of anteriors became stabilized after 18 months.*

Case 1 A girl of 8 years of age. The incisor thrust was augmented by her finger-sucking habit til the age of 6 (Figures 1, 2, and 3). The mouth was open even in resting position, with the upper lip everted and in lax condition. Because of an abnormal attachment of the lingual frenulum, it was excised and MFT was performed for about 3 months and resultant responses were observed. After 1 year and a half, her overjet decreased by 0.9mm and overbite increased by 3.9mm. The anterior occlusion came to be stabilized by the eruption of lateral incisors.

Case 2 A girl of 7 years with a chief complaint of incisor thrust (Figure 4A and B, Figure 5) which she had kept until her consultation in our clinic. Her lips were open even in resting position and the upper lip was everted and quite lax. There was no other clinical problem aside from finger sucking. For this reason, as taught by Mr. Barrett, we attempted to motivate the patient to voluntarily eliminate her finger sucking. Her mother and the patient herself were separately instructed in the procedure, the mother being taught certain points to attend to at home. After 3 months in which the finger-sucking habit was completely eliminated, we performed



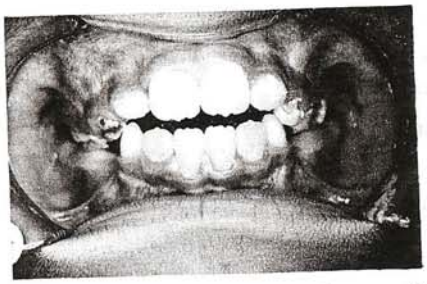


Figure 4 A and B. *Preoperative conditions of a seven-year-old girl. She continued her thumb sucking until the time of our consultation.*

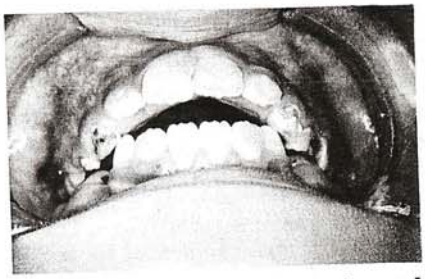


Figure 5. *An anterior-posterior and up-down space produced by the protrusion of the tongue.*

MFT on the case (Figures 6-8). After 6 months, her overjet was improved from the previous 7 mm to 2.5mm and overbite from -3mm to +1.5mm. When the conditions around the lips are compared pre- and postoperatively, a definite improvement can be noted (Figure 9). It may be mentioned in passing that this case was fortunate in that her brother was also given MFT and, for this reason, the cooperation of the entire family helped to bring about a favorable result.

Case 3 A girl 12 years of age. Her lips lacked any impression of tension and appeared in lax condition. Tenseness of the mentalis and habitual mouth breathing were observed, but there were no traces of a nasal complaint nor any enlargement of the tonsils. As there was present an extensive nonocclusal area extending from the right first premolar to the left premolar (Figure 10-12). MFT was performed for a period of about 4 months prior to any orthodontic treatment (Figures 13-16). As a consequence, the patient's overjet decreased by 0.6mm and overbite increased by 4.3mm. Her oral appearance was much improved by a change in the occlusal relationship. Habitual nasal breathing as well as

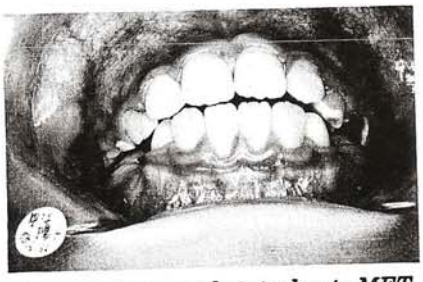


Figure 6. *Improved state due to MFT.*

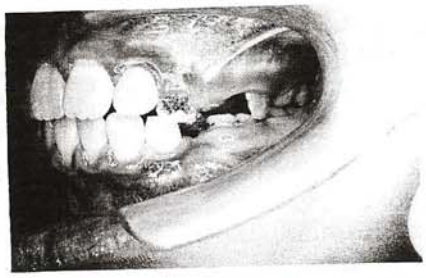




Figure 7 A and B. *After ten months, overjet decreased by 5mm, and overbite increased by 4.5mm.*

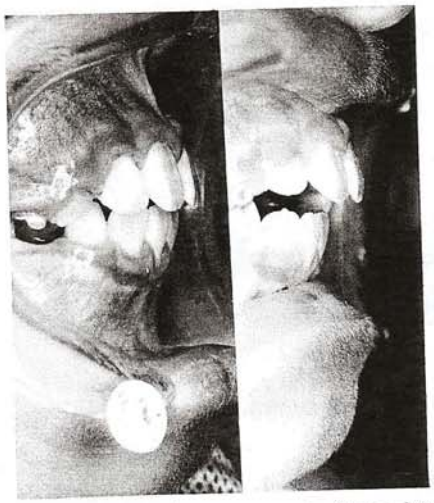


Figure 8. *An improvement of overjet typical of thumb sucking.*

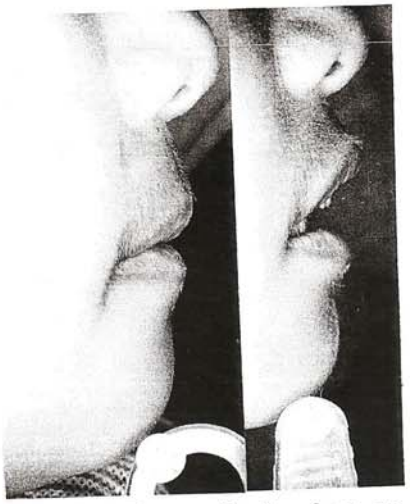


Figure 9. *The profile has been appreciably improved through MFT. Right: Preoperative—Left: Postoperative*

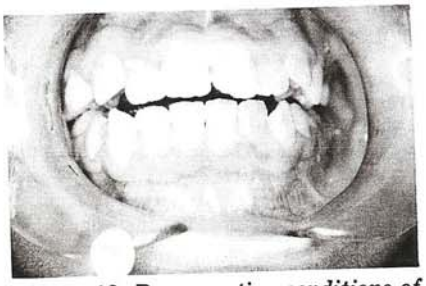


Figure 10. *Preoperative conditions of a 12-year-old girl (bicuspid to bicuspid was in non-occlusal relationship).*

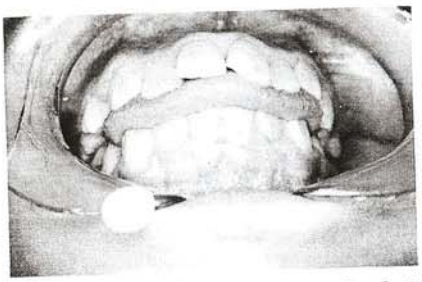


Figure 11. *The tongue protrudes between maxillary and mandibular anteriors in deglutition.*

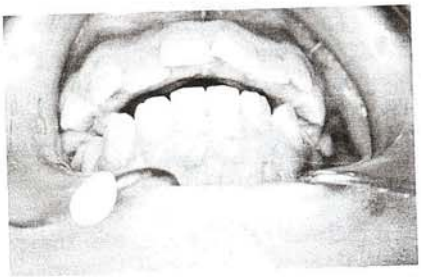


Figure 12. *An anterior-posterior and up-down space produced by the tongue protrusion.*



Figure 13. *Improved states through MFT.*

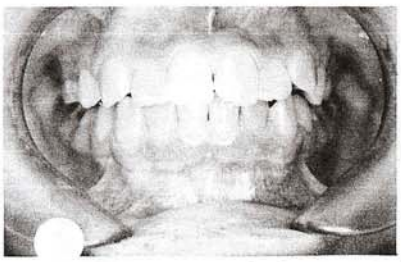


Figure 14. *After 4 months, her overjet decreased by 0.6mm and overbite increased by 4.3mm.*



Figure 15. *A superimposition of cephalograms at palatal plane for the maxilla and at mandibular lower rim for the mandible.*
———— *Preoperative*
---------- *State after 4 months of MFT*

the relaxation of tension in the lip and mentalis region was induced by means of MFT.

Case 4 A boy 12 years of age. He was in the habit of thrusting his tongue between the maxillary and mandibular anteriors in various fashions (Figures 17-20). A space between these anteriors was attributed to his tongue habit and, although evidence was observed of some nasal complaint and mouth breathing, they were not direct contributory factors to the openbite. A surgical operation was resorted to because of an abnormal attachment of the lingual

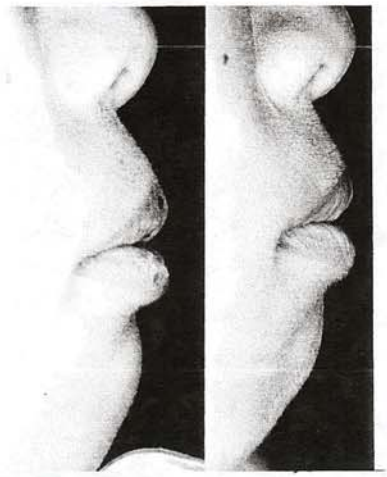


Figure 16. *A slight improvement is noted with the tense conditions of muscles surrounding the oral cavity through MFT.*
Right: Preoperative—Left: Postoperative

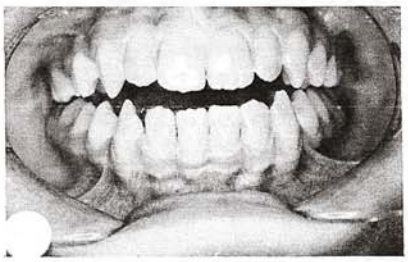


Figure 17. *Preoperative conditions of a 12-year-old boy (second bicuspid to second bicuspid was in non-occlusal relationship).*

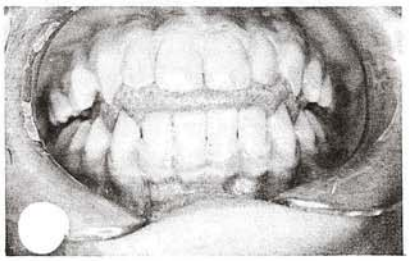


Figure 18. *The tongue protrusion in deglutition.*

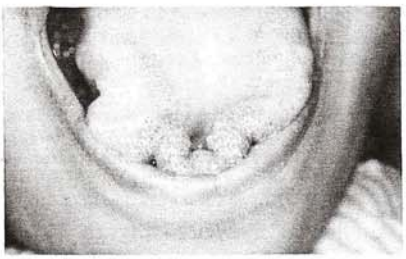


Figure 19. *A tongue habit leading to a bud-like shape.*

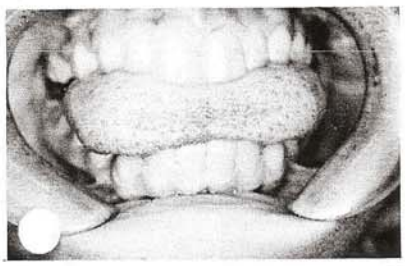


Figure 20. *A tongue biting habit could be noted between maxillary and mandibular anteriors.*

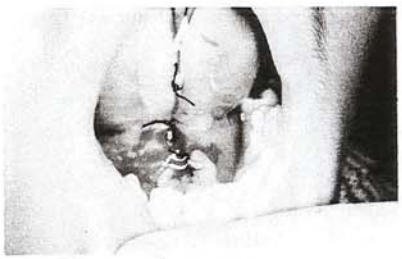


Figure 21. *Minor surgery was performed as some abnormalcy was found with the lingual frenulum attachment.*

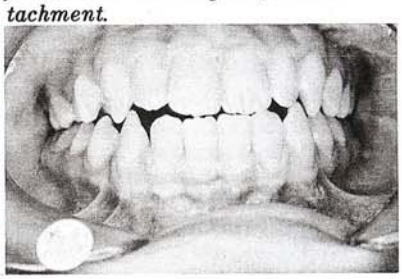


Figure 22. *After about 4 months of MFT, his overjet decreased by 2mm and overbite increased by 4mm.*

frenulum (Figure 21) and, subsequently, MFT was performed for 4 months (Figure 22). As a result, his overjet decreased by 2mm and overbite increased by 4mm. Although a noteworthy change could not be brought about around his mouth, a slight improvement can be seen in the lip and mental region (Figure 23). When the pre- and postoperative cephalograms were superimposed on each other (Figure 24), extrusion of the maxillary anteriors and of the mandibular anteriors attended by lingual movement were observed, indicating that an improvement was made in the tongue position in a posterior direction.

Case 5 A girl 10 years of age. The tongue thrusted laterally and also forced the maxillary and mandibular anteriors in a distal direction when swallowing was observed (Figure 25,

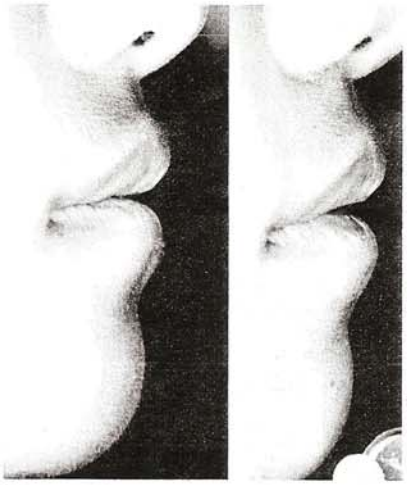


Figure 23. *An improved state of the profile through MFT. Right: Preoperative—Left: Postoperative*



Figure 24. *An extrusion of maxillary anteriors and that of mandibular anteriors attended by lingual movement. The position of the hyoid moved posteriorly.*
_____ *Preoperative*
---------- *State observed after 6 months of MFT*

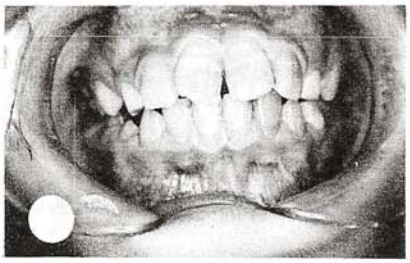


Figure 25. *Preoperative conditions of a 10-year-old girl. Tongue protrusion was noted toward the molar region in deglutition.*

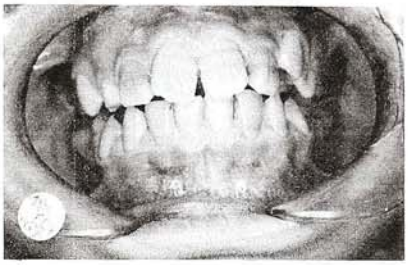


Figure 26. *The tongue protrusion was at first thought to be due to the shedding of decidous teeth, therefore transient. But as this case of bimaxillary protrusion tended to push maxillary and mandibular anteriors distally, MFT was performed.*

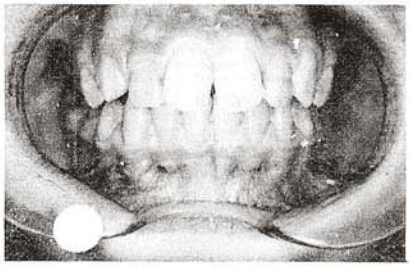


Figure 27. *The occlusal relationahip became stabilized after 1 year with 2.5mm increase of overjet.*

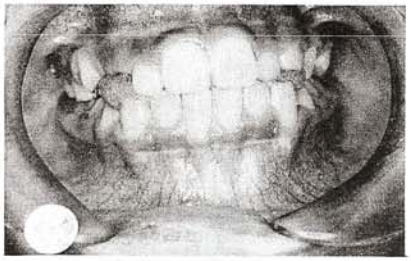


Figure 28. *Preoperative conditions of a 9-year-old girl. Note the lateral protrusion of tongue.*

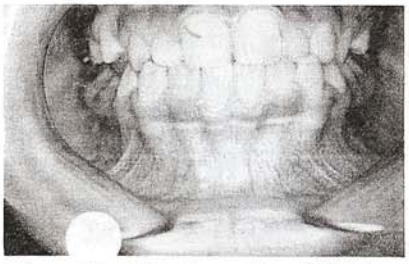


Figure 29. *After 5 months of MFT, occlusion became stabilized with 0.7mm decrease of overjet and 0.4mm increase of overbite.*

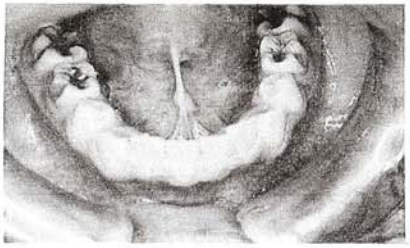


Figure 30. *Some abnormalcy was observed with the lingual frenulum. After its removal, MFT was initiated."*



Figure 31. *A superimposition of cephalograms at palatal plane for the maxilla and at mandibular lower rim for the mandible. An extrusion of maxillary anteriors and that of mandibular anteriors attended by lingual inclination. The position of the hyoid moved posteriorly indicating its positional movement.*
_____ *Preoperative*
-------- *State 8 months after MFT*

26). The case was in the later stage of mixed dentition. Since she was under surveillance prior to her orthodontic treatment, she was given MFT for 5 months and good results were observed. There was some evidence of a nasal complaint and mouth breathing but they were not of an order to interfere with MFT training. After one (1) year, the overbite increased by 2.5mm (Figure 27), and the occlusal relationship became stabilized attended by the disappearance of lateral tongue thrusting.

Case 6 A girl of 9 years of age. This was a case of bilateral tongue thrusting in a later period of mixed dentition (Figure 28), attended by mouth breathing and a nasal complaint. But these phenomena did not prove to be of any hindrance to MFT training (Figures 28-32). After about 1 year, the overbite increased by 2.5mm and the occlusal relationship became stabilized with the disappearance of lateral tongue thrusting.

Case 7 A boy of 9 years of age. This was a case of bilateral tongue thrust in a later period of mixed dentition (Figures 33-34). Although no evidence was found of mouth breathing, a nasolaryngeal complaint was definitely diagnosed as being of an habitual character. There was an abnormalcy of the lingual frenulum (Figure 35) which interfered with the proper pronunciation of the sounds /ta/, /chi/, /tsu/, /te/, /to/. Therefore, the lingual

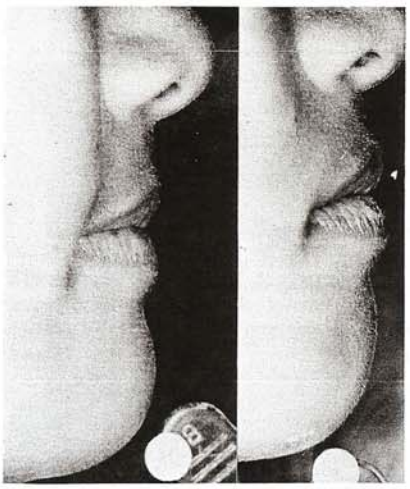


Figure 32. *The profile has been appreciably improved through MFT. Right: Preoperative—Left: Postoperative*

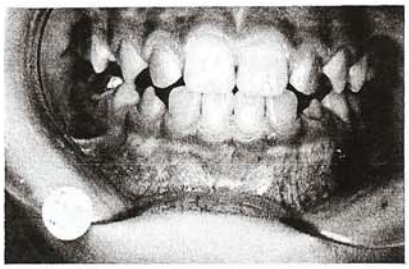


Figure 33. *A case of bilateral tongue thrust in a 9-year-old boy.*

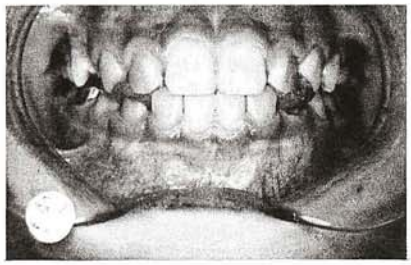


Figure 34. *Note the protrusion of tongue in deglutition.*

frenulum was surgically removed and MFT was performed for 5 months. As a result, his overjet and overbite increased by 1.2mm and 0.5mm respectively together with an improvement of occlusal relationship in the molar region (Figure 36). In the stage of mixed dentition, many cases of tongue-thrusting are encountered in which the tongue tends to be thrust into the space made by the shedding of deciduous teeth. But, for the cases in which an abnormal attachment of the lingual frenulum in conjunction with tongue-thrusting syndrome are observed, we recommend that the

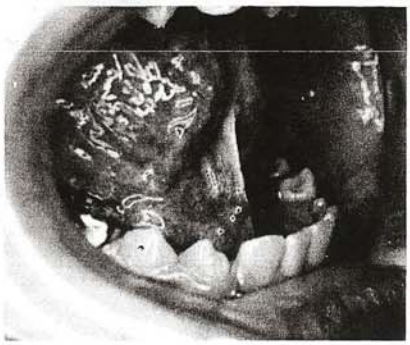


Figure 35. *Because of some abnormalcy of lingual frenulum, it was surgically removed and MFT was initiated.*

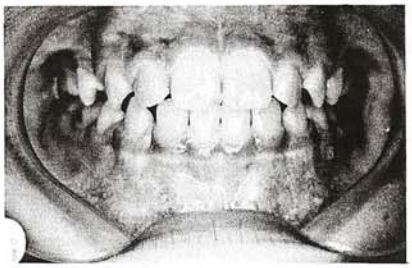


Figure 36. *After 5 months, occlusal relationship became stabilized with an increase of 1.2mm overjet and 0.5mm overbite.*



Figure 37. *A superimposition of cephalograms at palatal plane for the maxilla and at mandibular lower rim for the mandible. An extrusion of maxillary and mandibular anteriors took place and the posterior downward movement of the hyoid indicates its improvement.*

_____ *Preoperative*

- - - - - - - - *State after 5 months of MFT*

frenulum should be surgically excised and MFT introduced. A superimposition of pre- and postoperative

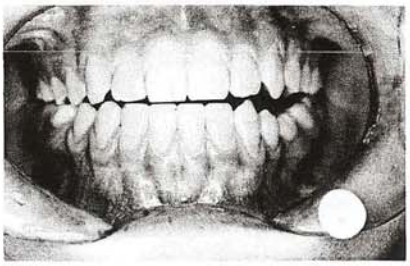


Figure 38. *Preoperative conditions of a unilateral tongue thrust case in a 12-year-old girl. Because of the tongue protrusion, mandible was shifted to right and median line deviated.*

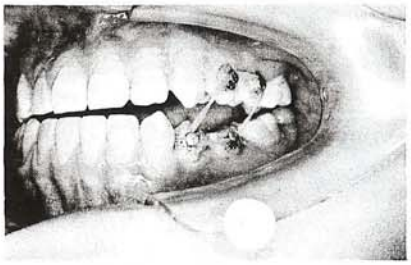


Figure 39. *In conjunction with MFT, lingual buttons were installed on* $\frac{4}{4}\frac{5}{E}$ *and an extrusion was attempted by means of vertical elastics.*

cephalograms confirmed a posterior-downward movement of the tongue position (Figure 37).

Case 8 A girl of 12 years old, with a unilateral tongue thrust from the left lateral incisor to the second premolar, resulting in an unstabilized occlusal relationship (Figure 38). Because of a deviation of the mandible to the right, the median line between the maxillary and mandibular anteriors was in disagreement, the mandible being located 2.5mm to the right of the maxillary midline. Although there were indications of mouth breathing and nasal complaint, these did not interfere with MFT training. After 5 months of MFT training, treatment of the tongue was found to be difficult and, therefore, an extrusion of teeth was attempted as an auxilliary means. Lingual buttons were attached to the left mandibular first and second premolars as well as the maxillary first and second premolars with an application of vertical elastics (Figure 39). After about one year, the lateral tongue thrust was corrected and the occlusal relationship of anteriors came to be stabilized, the result being that the midline of the two jaws came into agreement with each other (Figure 40). Genetically, this case was produced by the shedding of left C and D and delayed eruption of 3, which ultimate-



Figure 40. *After 18 months, occlusion became sufficiently deep with more or less normal median line. As 5 erupted, the occlusal relationship of left molars was considered to be fairly satisfactory.*



Figure 41. *Occlusion has been improved through an extrusion of maxillary anteriors attended by labial movement and that of mandibular anteriors attended by lingual movement.*
_____ *Preoperative*
- - - - - - - - *1 year after MFT*

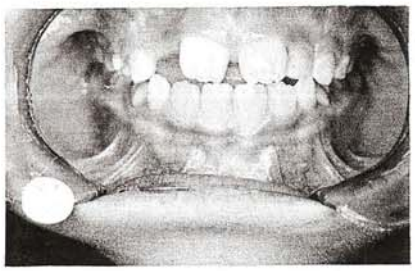


Figure 42. *Preoperative conditions of Angle Class 1 false crossbite in a 8-year-old girl.*

ly influenced the entire dentition. A superimposition of pre- and postoperative cephalograms (Figure 41) reveals that an improvement in the occlusal relationship was brought about by an extrusion of maxillary anteriors attended by their labial movement and that of mandibular anteriors attended by lingual movement.

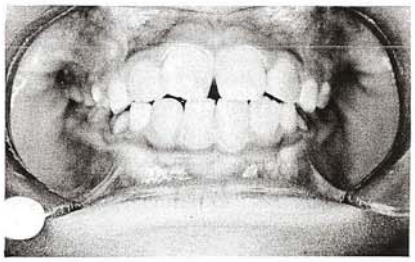


Figure 43. *State of the patient after 10 months of MFT.*

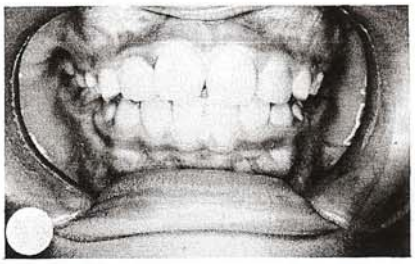


Figure 44. *State of the patient after 19 months of MFT. Her overjet increased by 2.5mm and overbite by 1.9mm.*

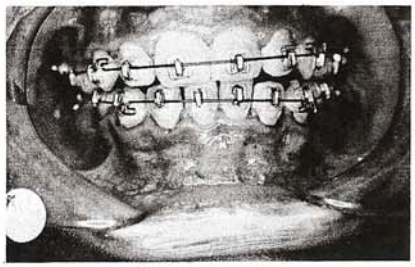


Figure 45. *A case of unilateral tongue thrust appeared in the course of orthodontic treatment in a 13-year-old boy. Second bicuspids were conveniently extracted.*

Case 9 A girl of 8 years of age, with a so-called case of pseudo Class III with Angle Class I maxillary and mandibular first molar relationship (Figure 42). Because of the fact that the patient was in the habit of pressing the mandibular anteriors labially in deglutition, MFT was initiated in an effort to observe to what extent her case could be corrected. The anterior area began to improve in several months, and after the passage of 1 year 7 months, there was no necessity for an orthodontic appliance. Her overjet was improved by 2.5mm and overbite by 1.9mm and the diastema became gradually closed through eruption of maxillary lateral incisors (Figures 43 and 44).

Case 10 A boy of 13 years of age (Figures 45-46). A unilateral tongue thrust habit occurred in the

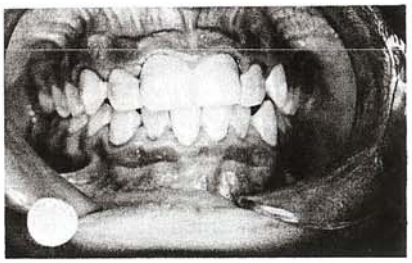


Figure 46. *There was no evidence of tongue thrust preoperatively.*

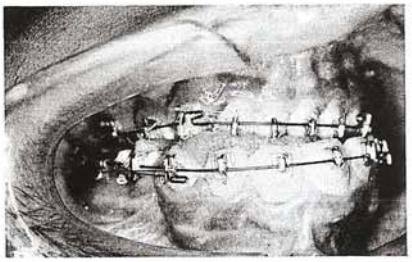


Figure 47. *Vertical elastics were applied on* $\frac{2}{2}\frac{3}{3}$ *but closing of occlusion could not be secured.*

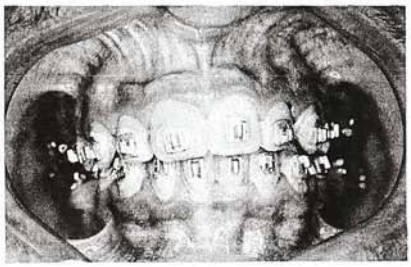


Figure 48. *Arch wires were removed and MFT was performed for 3 months. As a result, openbite conditions were improved.*

left molar region during the course of orthodontic treatment. Although there were observed definite traces of mouth breathing and nasal complaint, they were thought to have no bearings on his tongue-thrusting habit. In this belief, vertical elastics were used for the left maxillary and mandibular canines, in particular, in an effort to induce their extrusion (Figure 47). But, our effort being of no avail, the archwire was removed and MFT was performed for a period of 13 months and the result was satisfactory (Figure 48). When we undertook the case, there was no tongue thrusting but, by thrusting the tongue into the space made by dental extraction, and touching the interarch elastics with the tongue, this kind of tongue habit came to be naturally established; the result was a space produced in an up-and-down direction.

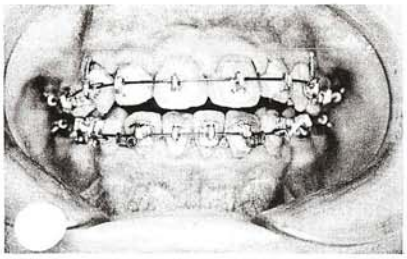


Figure 49. *A case of tongue thrust habit appeared in the course of orthodontic treatment in a 13-year-old boy.*

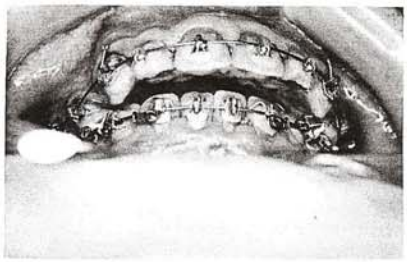


Figure 50. *Space produced by tongue protrusion between maxillary and mandibular anteriors.*

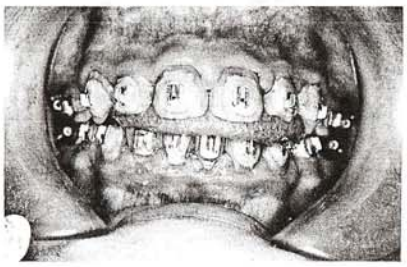


Figure 51. *Protrusion of tongue during deglutition.*

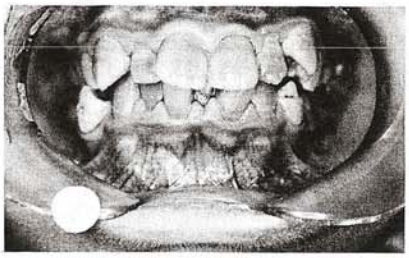


Figure 52. *No evidence of tongue thrust was noted prior to orthodontic treatment.*

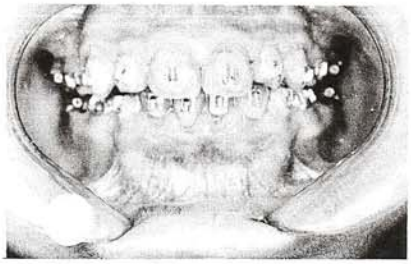


Figure 53. *Upon removal of arch wires, MFT was continued for 3 months. As a result, occlusal relationship was improved.*



Figure 54. *A superimposition of cephalograms at palatal plane for the maxilla and at mandibular lower rim for the mandible. An extrusion of bimaxillary anteriors attended by labial inclination and the posterior downward movement of the hyoid were recognized.*
_____ *Preoperative*
- - - - - - - - *State 4 months after MFT*

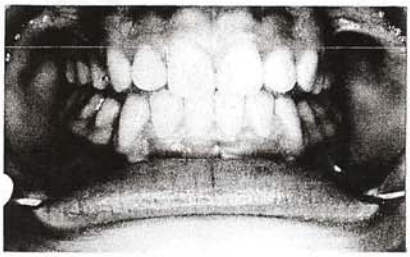


Figure 55. *A case of bilateral tongue thrust habit appearing upon removal of orthodontic appliances.*

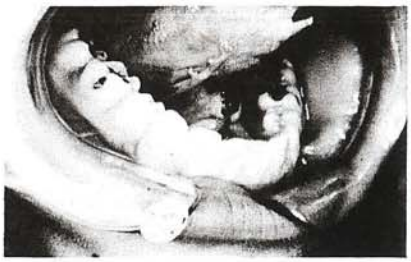


Figure 56. *The lingual frenulum was surgically removed because of abnormal attachment and then MFT initiated.*

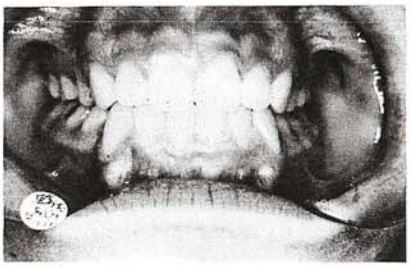


Figure 57. *The stable occlusal relationship was established after about 3 months of MFT.*

Case 11 A boy of 13 years of age, with a tense expression around his orbicular muscle due to a space between the maxillary and mandibular anteriors which had been produced by a tongue habit during orthodontic treatment (Figures 49-52). Vertical elastics were used for the purpose of closing the occlusion but, this being of no avail, the archwire was removed and MFT was performed for 3 months (Figure 53). A superimposition of pre- and postoperative cephalograms (Figure 54) shows that an extrusion was induced in the maxillary anteriors with a slight degree of labial inclination together with an extrusion of the mandibular anteriors in the same labial direction, attended by an improvement of overjet. These findings are attributed to MFT, in which the tongue position moved in a posterior downward direction thus attesting to an improvement of his tongue habit.

Case 12 A girl of 13 years of age, a case of convenient extraction of first bicuspids. A space was produced bilaterally by her tongue habit (Figure 55). In her enunciation of /ta/ and /sa/ series of sounds, we particularly noted a speech disorder and, for this reason, her lingual frenulum was surgically removed (Figure 56) and MFT was initiated. After about 3 months of MFT training, the occlusal relationship of her bilateral molar region came to be stabilized (Figure 57), but, as no recourse was had to the correction of her speech disorder, her lisping was not cured at all. In these cases, we are keenly aware of the necessity for the cooperation of speech therapists where a speech disorder is manifest in conjunction with cases of openbite and maxillary protrusion.

Contents of MFT

In Japan there is as yet no recognized profession of Myofunctional specialists, and, for this reason, we orthodontists have to include in our clinical routine, MFT for those or-



Figure 58. *Actual demonstrations of MFT for patients to grasp its essential points (Yogosawa Orthodontic Office)*



Figure 59. *Use of a handbook illustrated with cartoons for patients to learn MFT with enjoyment (Ohno Orthodontic Clinic).*



Figure 60. *Mothers are asked to accompany their children to MFT training so that they can serve as family supervisers afterward (Nakamura Orthodontic Office).*



Figure 61. *Recourse is had to audio-visual media for sufficient understanding of MFT technique.*



Figure 62-A. *Cards giving a review of each lesson.*

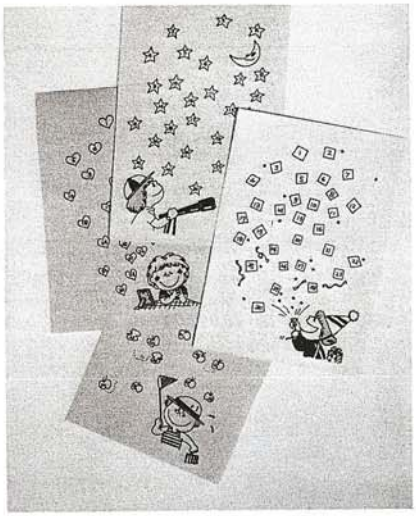


Figure 62-B. *On the back of each card are printed pictures of four seasons of a year and patients enter the number of their exercises below them.*



Figure 63. *Prior to MFT training, tongue control and oral conditions of patients are examined. (Ohno Orthodontic Clinic).*

thodontic patients who have some form of tongue-thrusting habits. What we do, therefore, is not the same as that performed by professional oral mylogists, but, in a summary form, MFT is performed as suitable to our individual clinics. MFT performed in our clinics is a combination of what is taught by Barrett (1978) and Zickefoose (1974, 1976). Eight to 10 sessions are given at intervals of 2 weeks, anywhere from 30 to 40 minutes being devoted to each lesson. The essentials of MFT are printed on an instruction card and are explained to children in an easy manner in conjunction with demonstrations till they are fairly accustomed to them. MFT sessions are performed in an enjoyable environment so that children may be sufficiently motivated to participate in the program. At each MFT session, the mothers are asked to accompany their children, as it is important that they serve as the family supervisors and check the exercise of their children. At the initiation of MFT instruction, audio-visual media especially developed by us for the purpose are used to drive home influences of tongue-thrusting habits on the dental arch, jaw bone and pronunciation. We consider it to be of prime importance that, before initiating MFT, sufficient understanding of it should be gained by the mothers and their children (Figures 58-64B).

The following are our objectives of 8 MFT sessions:

Lessons—Objectives

1st lesson—To teach the location of spots on the tongue and palate; to furnish masseter training for those patients who do not chew their food properly with the molars.

2nd lesson—To place the center of tongue in the palate.

3rd lesson—To return the posterior position of the tongue together with its tip and center. Additionally, lip training is performed. NOTE: Lip training is performed in Lesson 1 for those patients with particularly weak lip function. Thus a certain modification is made as the situation calls for it.

4th lesson—To instruct proper deglutition based on the previous lessons.

5th lesson—To make children aware of the proper resting position of tongue as well as proper swallowing in their daily life.

6th and 7th lessons—To review all the previous lessons and teach them that, even in the unconscious state, they should beware of the tongue pressing against teeth. To explain in

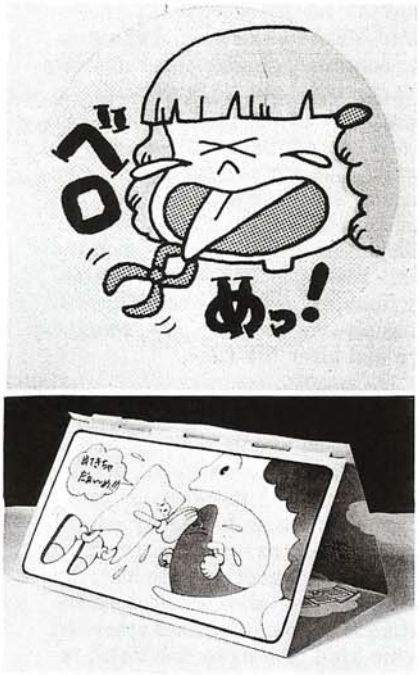


Figure 64-A. *Families are asked to paste up MFT seals in conspicuous places in their house.*

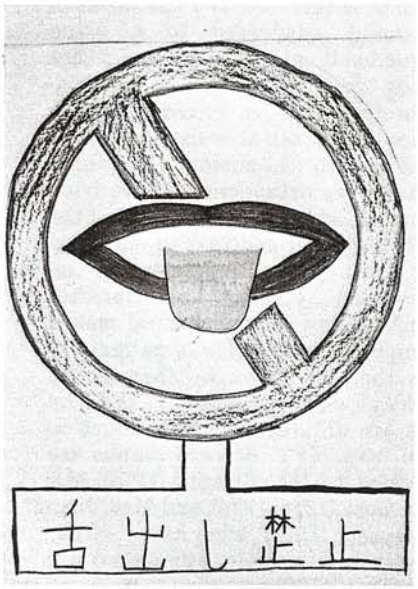


Figure 64-B. *A reminder sign designed by a patient.*

easy terms the meanings of consciousness, unconsciousness and latent consciousness (subconsciousness).

8th lesson—To evaluate how much effect has been made through the preceding 7 lessons.

The intervals of recall are proportionately prolonged timewise, i.e., from 2 to 3 months, etc., but those patients who come for their orthodontic checkup on a periodic basis are examined at their visit.

9. Possibilities and Limitations of MFT

There has been opinion negating the clinical effect of MFT from the past to the present and our studies extending over several years have convinced us that the following three points are yet to be perfected:

1. The optimum age or period at which MFT training is to be initiated.
2. The proper selection of cases for MFT.
3. Good cooperation between a fully qualified Myofunctional therapist and patients.

As for the optimum period for initiating MFT training Wildman (1976), an orthodontist, stated that MFT should not be undertaken until occlusion by permanent teeth has been accomplished. The two reasons given by him were that the tongue protrudes temporarily in the spaces caused by shedding deciduous teeth between the late period of mixed dentition and permanent dentition, and that the cases of openbite in 12-year-old children tend to reduce themselves afterward as a function of years. Goldberger (1973), an oral myologist, Barrett (1978), and Hanson (1978), respectively, gave the ages of 8, 9 and 10 years as the proper period of mixed dentition for MFT, the reasons being that unless the children become aware that the pernicious tongue thrusting brings about adverse influences on the dentition, jaw bones, adequate pronunciation and oral soft tissues, MFT will not prove to be successful. In a similar vein, Fletcher (1974) maintained that MFT training is not proper for children under 5 years in whom the deglutitional pattern is yet to change, but is most effective in those of 7 to 11 years of age. It is also true, as stated by Burstone (1970), an orthodontist, that retraining of the deglutitional pattern demands much time and effort on the part of the orthodontist, dental hygienist, oral myologist and the patient himself. Moreover, a satisfactory result will not be produced unless the patient desires to cure his own pathologic conditions. In our past experiences, it requires a vast amount of effort on the part of a patient to adapt himself or herself to a proper deglutitional pattern subconsciously. For this reason, we have found that it is difficult to secure sufficient motivation in low-age patients. However, for those cases in which tumb sucking and/or abnormal attachment of the lingual frenulum constitute definite causes for the tongue protrusion which interferes with normal eruption of permanent dentition, it is necessary that some kind of measure be adopted as early as possible. In view of our belief that correct pronunciation and occlusal relationship can be expedited through elimination of causative factors, we recommend the initiation of MFT training around 7 to 8 years of age. Mention has been made above of our basic treatment policy that for cases of functional alveolar openbite, MFT is begun before orthodontic treatment is undertaken, whereas for the cases of skeletal openbite, MFT is performed as an auxiliary aid to orthodontic appliances during orthodontic treatment. It is our experience that, when MFT is initiated prior to orthodontic treatment, we are better able to secure motivation of our patients in that they are less dependent upon the movement of teeth by mechanical means.

As for the percentage of MFT success, Goldberger (1973) gave 80% for those patients under 15 years, Barrett (1978) gave anywhere from 70 to 90% and Garliner (1974, 1976), 90%. However, it is maintained that, for cases that cannot be followed up on a periodical basis, there is a possibility of 5 to 10% relapse. In our own clinics, about 80% improvement has been secured in those cases who completed their MFT training. Of course, this high percentage of success comes from our proper selection of cases. Therefore, in those cases in whom success could not be achieved in spite of our efforts, insufficient motivation and lack of cooperation on the part of their parents can be cited as two chief reasons. It seems that, in adult cases effects of MFT cannot be expected as much as in children. The reason for this is that it is more difficult to change their established deglutitional patterns as well as the position of the tongue and, at the same time, since the teeth are long past the eruptive period, many teeth are incapable of being extruded. In our communication with Mr. Barrett concerning our treatment results and selection of proper cases, he sent us the following reply endorsing our views.

a) In high-angle cases, MFT is much more effective when the environment of the tongue has been improved. Also, the high pull headgear often interferes with lip closure; so I prefer to wait until this obstruction is out of the way.
b) In low-angle cases, where the primary task is simply to close the bite, the case is completed much

more quickly when the interposed tongue is retrained to remain within the oral cavity. For these, MFT can be completed before appliances, or started soon after appliances are in place.

The problem of selecting the proper cases and initiating MFT training in a proper manner will largely influence the end result of our treatment. As Burstone (1970) maintained, the training of a patient who has skeletal problems is most difficult and, unless causative factors are eliminated, MFT may fail for the nasal and high angle cases. According to Proffit (1975, 1977) cases of openbite unattended by a speech disorder are to be treated in an orthodontic clinic, but those with some kind of speech disorder should be sent to MFT specialists. Our experiences are in agreement with these statements. Those cases in which openbite is of skeletal character, lisping is found, articulation is made without elevating the tongue tip, with the tongue resting on the lingual side of mandibular anteriors, are beyond our competence. For even if an abnormal attachment of lingual frenulum is removed, the tongue habit has already firmly established itself, and an application of speech therapy for these difficult cases is our assignment to be resolved in the future.

Also, the effectof MFT is not apparent in those cases where normal nasal breathing is impossible because of enlarged tonsils or adenoids, as it is difficult to improve the tongue-thrusting at a resting position. It is held that, physiologically, the tonsils tend to become enlarged around 4 to 5 years and begin to shrink anywhere from 12 to 13 years. In view of an immunologic function theory, together with the inclination of otorhinolaryngologists to shy away from tonsillectomy and adenoid surgery because of a possibility of postoperative trouble, MFT is faced with difficulties against these kinds of background. The problem of low tongue position often associated with mandibular protrusion is thought to be readily solved if the tongue position can be satisfactorily changed by MFT. If such is possible, pressure or resistance from the lingual side can be reduced and a favorable prognosis regarding relapse will take place. Orthodontic treatment can proceed more smoothly after the tongue position had been improved by MFT, with the collateral merit of a shorter duration of treatment.

From these experiences, we conclude that MFT has great possibility for us orthodontists. The concept of MFT that attempts to bring about a new environment in the oral cavity provides a good line of reflection for the orthodontists of today who are inclined to be mechanically oriented. We believe, indeed, that MFT will be given a deserved recognition as a pre-orthodontic means as well as an auxiliary tool as years go by. At the same time, however, success or failure of MFT depends a great deal on the competence of staff in an orthodontic clinic. The statement by Mr. Barrett (1978) to the effect that, those orthodontists who do not believe in MFT usually have no recourse to qualified oral myologists to whom they can refer their patients in their communities, seems to us to be indicative of the present situation. So we think that it is necessary to keep up our contacts with the American MFT specialists for further advancement of MFT in Japan. As stated by Hanson (1978), dental hygienists, who have a background training in dentistry, and are engaged in the instruction of routine toothbrushing through a good rapport with the patients, are in a position to explain the meaning of MFT and, thus, to motivate the patients themselves. In orthodontic clinics, consultation rooms or a preventive dentistry office serve as convenient places to train patients in MFT. Since MFT is not able to direct movement of the teeth by use of orthodontic appliances, a friendly facial expression, clear speech, a positive helping attitude and enthusiasm are thought to be called for on the part of MFT therapists. We believe that, by furthering our knowledge of behavioral science and clinical psychology, we may be able to advance MFT effectiveness to a high level. For these reasons, suitable MFT therapists are the ones who are capable of observing the patients in an objective manner. Poupard (1977) and Short (1963) recommended that dental hygienists should be utilized, in addition to their routine assignments, to engage in conducting MFT for cases of thumb sucking and tongue habits. In Japan, we expect this new role to be assigned to our dental hygienists in the near future. The climate is obvious from the fact that a paper by the four dental hygienists who are our collaborators on the present article (Kamijo et al) presented at the paradental section of the Japan Orthodontic Society meeting in 1979, drew much attention to the importance of MFT on the part of the dentists, dental hygienists and dental assistants present. It is possible to establish a good working relationship between a dentist and a dental hygienist, the former furnishing the diagnosis and follow-up of the patients. In orthodontic clinics, sources of information are available such as intraoral photographs, dental casts, X-ray films, etc., and by use of these it is possible to compare the results before and after MFT.

Concluding Remarks

The present article deals with our concerted thinking as to what degree of improvement is possible for cases of tongue-thrusting habits by use of habit appliances and high pull headgear in conjunction with MFT by drawing on our own clinical cases. Treatment of openbite cases attended by some kind of tongue habit still remains a difficult problem for us orthodontists. The effectiveness of treatment is largely influenced by the determination of the proper time at which it is initiated and the mode of treatment addressed to a given tongue habit case. It is our belief that proper treatment should be performed in the stage of mixed dentition before a dento-alveolar openbite transfers to a skeletal openbite. Hitherto, we orthodontists have tried to move the teeth at the request of the patients but, in contrast to our practice, oral myologists attempt to improve the occlusal relationship without using any mechanical means through the motivation of patients to cure their occlusion by themselves. Although our approaches to the problem are different, we have much to learn from MFT. Sincere thanks are extended to Mr. Barrett (1978), Mr. Zickefoose (1974, 1976), and Mrs. Jean Thompson (1978) who have, either directly or indirectly, stimulated our interest in MFT and taught us much on the subject.

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