Correction of Anterior Open Bite with Spurs: Long-Term Stability

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Aim: *To show that the high relapse incidence of malocclusion characterized by anterior open bite is frequently due to an anterior tongue rest posture, an etiologic factor that has been largely overlooked both in conventional orthodontic treatment and in surgical treatment.* **Method:** *A maxillary fixed intraoral appliance with spurs was used to modify anterior tongue posture.* **Results:** *Research with this appliance in a large sample of anterior open bite patients demonstrated long-term stability postretention. Clinical cases using this method are presented.* **Conclusion:** *In the overall scheme of open bite treatment, therapy with intraoral spurs for the correction of anterior open bite has a wide range of application.*
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Psychologic problems and difficulties related to function, health, and stability may occur with anterior open bite. These difficulties may include diminished dental esthetics during speech and when smiling, lack of incisal guidance and canine disclusion resulting in molar cuspal wear, exacerbation of temporomandibular dysfunction, lisping and involuntary spitting when speaking, posterior crossbite with functional shift of the mandible related to a posterior collapse of the maxilla, and maxillary incisor root resorption.[1] If relapse of anterior open bite occurs after orthodontic treatment, the aforementioned problems may cause patient dissatisfaction and possibly result in litigation.

Orthodontists have long recognized that anterior open bite is difficult to treat and tends to relapse posttreatment.[2,3] These malocclusions do exhibit significant relapse posttreatment whether the correction was achieved with conventional orthodontic treatment or with orthodontic treatment combined with surgery. Lopez-Gavito et al[2] reported that more than 35% of anterior open bite patients treated with conventional orthodontic appliances relapsed 3 mm or more at 10 years postretention. Lopez-Gavito et al concluded that neither the magnitude of the pretreatment open bite, the mandibular plane angle, nor any other single parameter of dentofacial form was a reliable predictor of posttreatment stability or relapse.

A 20% to 40% relapse of anterior open bite has been reported with maxillary surgical impaction in hyperdivergent patients.[3–6] Hyperdivergency is considered the main risk factor for anterior open bite malocclusion and for its relapse. However, once hyperdivergency is successfully eliminated with orthognathic surgery it cannot be postulated as an etiologic factor in open bite relapse. This is particularly true for adults because they have minimal subsequent growth.[7] To further complicate matters, some authors[8,9] have shown that most individuals with a high-angle malocclusion have a normal overbite or a deep bite due to a compensatory eruption mechanism. Thus, skeletal pattern alone is not sufficient to identify those patients with an open bite or open bite tendency.

Joondeph and Riedel,[10] citing various authors, explain that open bite malocclusion may be secondary to mouth breathing resulting from nasopharynx obstruction. The obstruction could be due to anatomic blockage, allergic disease, or adenoid

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hyperplasia; or it could be habitual, which would necessitate a compensatory low anterior tongue posture to be able to breathe. Vig[11] stresses that more objective tests are required and unambiguous criteria need to be established if airway impairment is to be adequately defined and its etiologic significance in relationship to facial growth determined. She concludes that only when this issue is resolved will the clinical impact of respiratory function be clarified and the appropriate interventions advocated.

PROPOSAL TO MINIMIZE ANTERIOR OPEN BITE RELAPSE

The author proposes that anterior tongue rest posture is an etiologic factor that has largely been overlooked both in conventional orthodontic treatment and in surgical treatment. Failure of tongue posture adaptation subsequent to orthodontic and/or surgical treatment might be the primary reason for relapse of anterior open bite. Myofunctional therapy is useful for individuals with speech problems because training can modify speech; this is the basis of "speech therapy." Speech is constantly monitored by hearing, which is an important adjunct in modifying this activity. Tongue posture, on the other hand, is not constantly monitored; it is unconscious and not easily modified by volition. Since anterior tongue rest posture can cause anterior open bite, the author suggests modifying tongue posture with appliances instead of exercises. The teeth are together only 60 to 90 minutes each 24-hour period, so mandibular and tongue rest posture is a dominant factor. Delayed deglutitional maturation from infantile protrusive position to the mature retracted, contained posture can be a factor, according to Graber.[12] Nowhere is the Sicher axiom, "Whenever there is a struggle between muscle and bone, bone yields," more true than in open bite malocclusions.

During diagnosis and treatment planning of anterior open bite problems, the orthodontist must identify risk factors such as innate growth problems, excessive epipharyngeal lymphoid tissue, respiration problems, tooth eruption problems, compensatory tongue thrust during swallowing, and/or digit-sucking habits. This article will try to increase awareness that anterior tongue rest posture is also an important risk factor for anterior open bite. The author will show that an effective treatment method can modify anterior tongue rest posture to avoid relapse of anterior open bite. Anterior tongue rest posture is clinically significant due to its long duration. An individual who has anterior tongue rest posture interposes the tongue between the incisors many hours per day. This posture impedes incisor eruption and maintains an anterior open bite. Anterior tongue thrust is not as significant clinically because the short duration of the thrust (1- to 3-second maximum during swallowing[12]) does not affect tooth position. Moorrees and Lear have shown that a person swallows only 1200 to 1500 times in a 24-hour period.[13]

The objective of this paper is to demonstrate the long-term clinical results of closing anterior open bite with intraoral spurs. The spurs force a change in anterior tongue rest posture, which in turn allows incisors to erupt, closing the anterior open bite. Spur wear during orthodontic treatment of anterior open bite improves posttreatment stability.[14] This effect may be due to a permanent modification of anterior tongue rest posture.

Huang et al[14] investigated the effect of spur therapy on the stability of anterior open bite correction. The anterior open bite sample consisted of 33 patients (26 growing, 7 nongrowing) with an average of 5 years posttreatment. The sample was provided by Drs Justus, Kennedy, Kokich, Little, and Turpin. To ensure that the sample would be representative, treatment success was not a criterion used in sample selection. The results of this study confirmed that there was a statistically significant increased long-term stability in corrected anterior open bite treated with spur appliances. The patients maintained their correction many years out of retention. All patients in the adult sample had incisor contact. Although 17% of the patients in the growing sample did not have incisor contact, all of them had a positive overbite postretention. The study concluded that stability of anterior open bite correction is apparently related to a modification in anterior tongue rest posture due to the spurs in both growing and nongrowing patients.

HISTORY OF ANTERIOR OPEN BITE TREATMENT USING INTRAORAL SPURS

Rogers[15] mentioned using intraoral spurs to modify tongue rest posture to close anterior open bite in his patients. Parker[16] used intraoral sharpened spurs soldered to the lingual surface of the maxillary central incisor bands. He demonstrated dramatic closure of anterior open bite malocclusions using spurs. The results achieved by Parker were impressive. However, this author hesitated to place intraoral sharpened spurs on his patients due to fear of provoking psychologic problems and alienating parents and patients. The author's concerns about the spur method were alleviated after Haryett et al[17] concluded that no psychologic problems arose from

using any type of appliance, including spurs, to arrest thumb-sucking habits, provided there was good rapport between doctor and patient. They also concluded that a spur appliance was more effective in arresting finger habits and in correcting anterior open bite than a crib with no spurs.

The author agreed with these conclusions because a crib without spurs simply restrains, and does not retrain, the tongue, while spurs discourage the tongue from resting against them. This can be observed clinically because the tongue is scored by the crib appliance, while no marks or bruises can be seen on the tongue when using spurs. This indicates the establishment of a new tongue posture probably due to a nociceptive or proprioceptive reflex. Moreover, tongue pressure on a crib appliance could drive the supporting molars mesially, creating a Class II molar relationship or aggravating an already present Class II malocclusion.

Convinced that spur therapy had a place in orthodontics and that patients' mental health would not be damaged, the author decided to try this method of closing anterior open bite. He gave a copy of Parker's article to all his patients in orthodontic treatment during the early 1970s whose open bites would either not close or failed to remain closed. Having convinced them that the method might work, he cemented an intraoral spur appliance in each of these patients. Six years later, after achieving the same successful results as reported by Parker and by Haryett et al, the author published a paper[18] on correction of anterior open bite with spurs. Nearly 20 years later, Huang et al[14] confirmed that long-term stability could be achieved with this method.

DESCRIPTION OF INTRAORAL SPUR APPLIANCE

The intraoral spur appliance the author uses is different than that used by Parker. The maxillary lingual arch with spurs used by the author is a more versatile appliance for modifying anterior tongue rest posture than spurs on incisor bands for the following reasons:

1. It allows expansion or reduction in intermolar width.
2. It inhibits molar eruption.
3. Spurs can be placed anywhere along the arch (which allows correction of both anterior and posterior open bites).
4. It permits headgear wear by welding buccal tubes on the molar bands to which the lingual arch is soldered.

Fig 1 Recommended intraoral spur appliance. Spurs are invisible when viewed from the front.

5. It can arrest finger habits.
6. It is inexpensive.
7. It is easy to construct in the office.

The spur appliance recommended by the author (Fig 1) is constructed from 0.045-inch stainless steel wire (similar to a mandibular lingual arch) to which eight short, sharpened 0.026-inch spurs, 3 mm in length, are soldered to the anterior part. The spurs are positioned 3 mm away from the cingulae of the maxillary incisors and are directed at an angle (downward and backward) to encourage correct tongue posture, with the tip of the tongue behind the maxillary central incisor papilla. The spur appliance is soldered to maxillary molar bands and cemented. The anterior open bite usually takes 6 to 8 months to close after appliance cementation, but may take longer in some patients.

The following patient illustrates the typical correction of anterior open bite achieved with spurs.

Patient A

Patient A is a boy 9 years of age with a Class I anterior open bite malocclusion with a symmetric 6-mm dental open bite extending from lateral incisor to lateral incisor (Figs 2a and 2b). The crowns of the maxillary lateral incisors had a distal inclination, due to a mesial eruption path of the permanent canines against the roots of the lateral canines, and the maxillary left deciduous canine was in lingual crossbite (Fig 2b). An anterior tongue rest posture was noted (Fig 2c). There was no history of a digit-sucking habit, no respiration problems were noted, the patient had normal skeletal cephalometric values, and there was no family history of hyperdivergency. The patient and his parents were shown the abnormal anterior

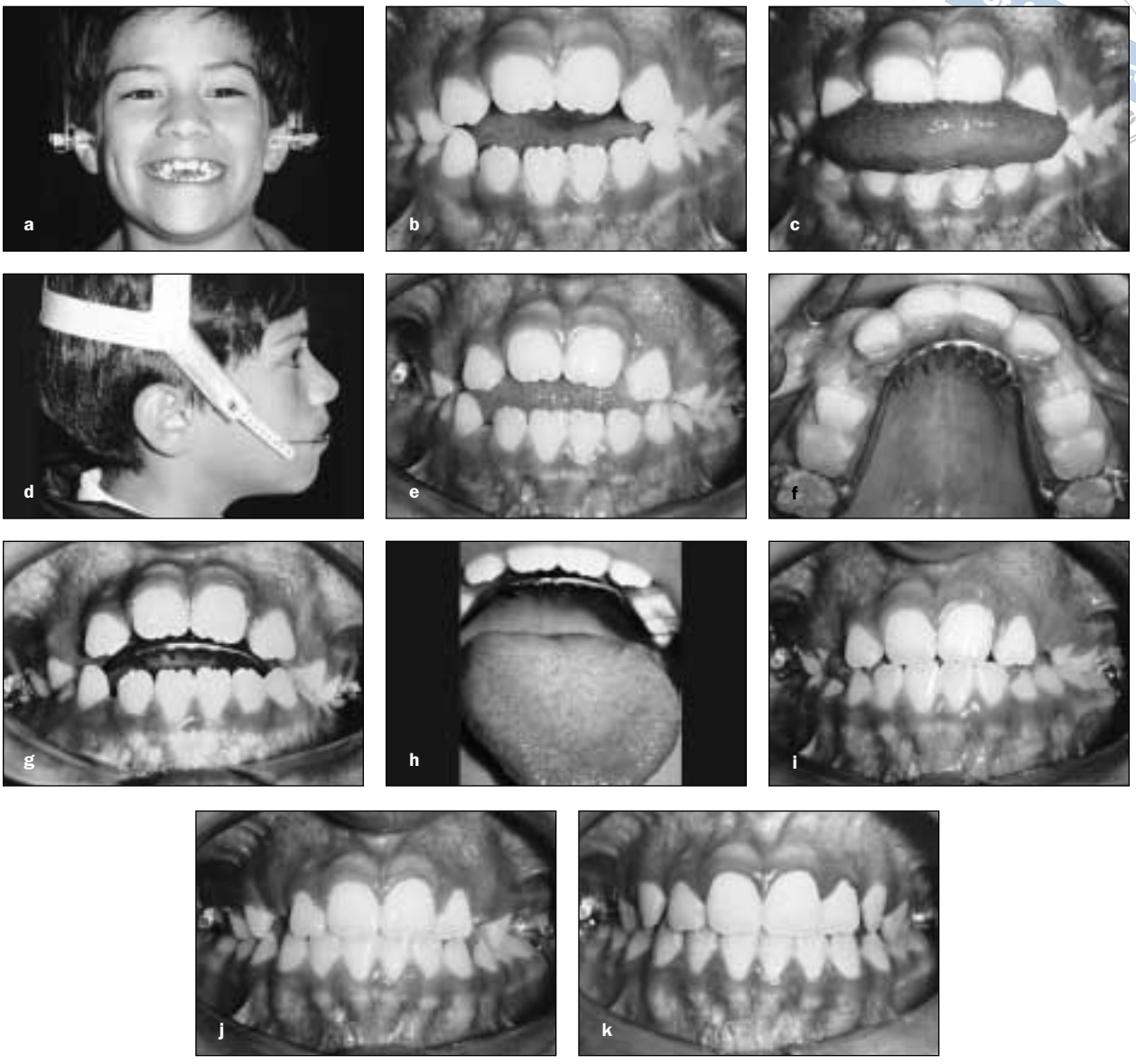

Fig 2 Patient A. **(a,b)** A 9-year-old boy with an anterior open bite. Initial facial and intraoral photograph. Note distal inclination of the maxillary lateral incisor crowns. **(c)** Anterior tongue rest posture. **(d)** Occipital traction facebow. **(e)** Intraoral photograph 6 months into headgear treatment. There has been no improvement in the anterior open bite. **(f,g)** Intraoral spur appliance. **(h)** Intraoral photograph of spurs and tongue taken 1 month after spur appliance cementation. There are no bruises on the tongue, which is probably due to a protective reflex. **(i to k)** Intraoral photographs taken 12, 24, and 30 months after cementing the spur appliance. There has been closure of the anterior open bite, probably due to the establishment of a new tongue rest posture encouraged by the spurs.

tongue resting posture of the patient and also correct tongue rest posture. They were informed of the possibility that the open bite might not self-correct with orthodontic treatment due to the abnormal tongue rest posture. In the event the open bite did not self-correct, spur therapy was presented as an alternative. The treatment plan included extraction of deciduous maxillary canines (to help redirect the eruption path of the permanent canines), wearing of occipital pull headgear (to inhibit maxillary molar eruption and maxillary vertical posterior growth), and allowing the anterior open bite to self-correct. After 6 months of headgear treatment (Fig 2d), good rapport was established with the patient and his parents. Since the anterior open bite had not improved by this time (Fig 2e), patient and parents consented to the spur method. A lingual arch with spurs (Figs 2f and 2g) was soldered to the maxillary molar bands and cemented. The patient adapted well to the spurs (Fig 2h). The incisors erupted in the following months, closing the anterior open bite (Figs 2i to 2k). Note that the maxillary permanent canines were able to erupt uneventfully and that the axial inclination of the lateral incisors autocorrected.

Since patient A had an anterior open bite of 6 mm from canine to canine, his open bite was considered "simple" and therefore had a high probability, according to Worms et al,[19] of self-correction. (Worms et al[19] investigated the incidence of anterior open bite in a population of 1500 Navajo children, 7 to 21 years of age. They classified the severity of open bite as pseudo, simple, or compound, following Moyers' classification.[20] The investigators drew longitudinal inferences from the cross-sectional data. They suggested that 80% of pseudo and simple open bites probably have spontaneous self-correction. They also speculated that compound open bites are probably not self-correcting; the incidence of these increased from 2% at 7 years of age to 10% at 21 years of age.) However, since patient A did not have any lymphoid tissue problem or any noticeable respiration problem and had normal vertical skeletal parameters with lip competency (anterior oral seal), it was believed that this open bite would not self-correct. If this open bite had not been treated while the author and patient waited for a self-correction that did not occur, many problems could have developed. These include an increased probability of incisor root resorption,[1] molar wear due to the lack of a mutually protected occlusion, posterior crossbite due to a low tongue posture, and emotional problems due to diminished dental esthetics during speech and smiling. In addition, the probability of having to resort to more complicated orthodontic mechanics (and even surgical correction) in later life also would have increased.

LONG-TERM RESULTS WITH INTRAORAL SPUR APPLIANCE

The author has treated many dental and skeletal anterior open bite malocclusions using the method described for patient A. The following case reports illustrate the typical long-term results with the lingual spur appliance.

Patient B

Patient B is a girl 8 years 1 month of age (Fig 3a) with a Class I anterior open bite malocclusion and a symmetric 3-mm dental open bite extending from lateral incisor to lateral incisor. A complete posterior right lingual crossbite (molar to canine) was present, due to a narrow maxilla (Fig 3c). A nocturnal thumb-sucking habit was present and anterior tongue rest posture was noted. The patient had normal vertical skeletal cephalometric values (Fig 3b), no respiration problems were noted, and there was no family history of hyperdivergency. The patient and her parents were shown the abnormal anterior tongue rest posture and also the correct tongue rest posture. They were informed that due to her abnormal tongue rest posture, the open bite might not self-correct despite eliminating the posterior crossbite and arresting the thumb-sucking habit. In the event the open bite did not self-correct, spur therapy was presented as an alternative. The treatment plan included rapid maxillary expansion (RME), convincing the patient to stop the sucking habit, and allowing the anterior open bite to self-correct. The RME treatment was instituted with successful results (Fig 3d). During the RME treatment, good rapport was established with the patient and her parents. In this period, the patient was unable to stop her thumb-sucking habit and the anterior open bite had not improved (Fig 3d). The patient was anxious for help in arresting this habit, so she and her parents consented to the spur method. A lingual arch with spurs was soldered to maxillary molar bands and cemented (Fig 3e). The patient adapted well to the spurs, and the incisors erupted during the following months, closing the anterior open bite (Figs 3f to 3h). The posttreatment facial photograph shows a pleasing upper-lip smile line (Fig 3i). The posttreatment radiograph demonstrates a positive incisor overbite (Fig 3j). Seventeen years later (Figs 3k to 3n), both the corrected posterior crossbite and the corrected anterior open bite seem stable (Fig 3l) in spite of a vertical growth pattern (Fig 3o). This stability is probably due to the establishment of a normal tongue rest posture.

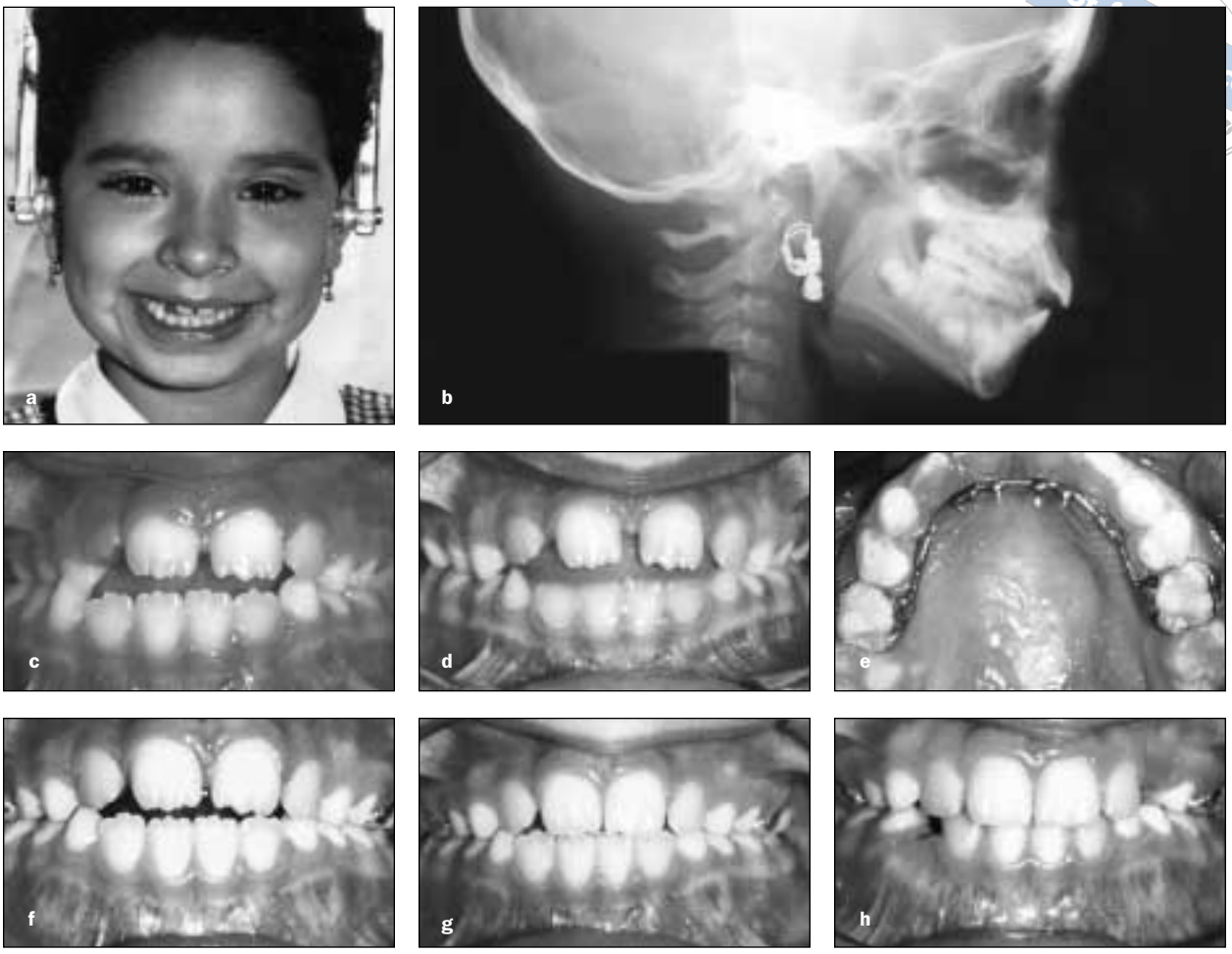

Fig 3 Patient B. The patient is a girl, 8 years 1 month of age. **(a)** Initial facial photograph. **(b)** Initial radiograph, which demonstrates the anterior open bite. **(c)** Initial intraoral photograph. Note the anterior open bite and posterior right crossbite. **(d)** Post–rapid maxillary expansion intraoral photograph taken 3 months after the start of treatment. There has been no improvement in the anterior open bite. **(e)** Intraoral photograph taken at spur appliance cementation. Patient is 8 years 4 months of age. **(f to h)** Intraoral photographs taken at 8 years 4 months, at 8 years 7 months, and at 9 years 9 months of age. The appliance was removed when the patient was 9 years 9 months of age, 6 months after the anterior open bite had closed. **(i,j)** Posttreatment facial photograph and radiograph taken at 13 years 10 months of age. A pleasing upper-lip smile line and a positive overbite with incisal contact were established. **(k to n)** Photographs and radiograph taken at 26 years 11 months of age, 17 years posttreatment without retention. Note the stability of the corrected anterior open bite and the posterior crossbite. A positive overbite without incisal contact is evident. **(o)** Superimposition of radiographic tracings at 8 years 1 month of age, 13 years 10 months of age, and 26 years 11 months of age. A vertical growth pattern is demonstrated.

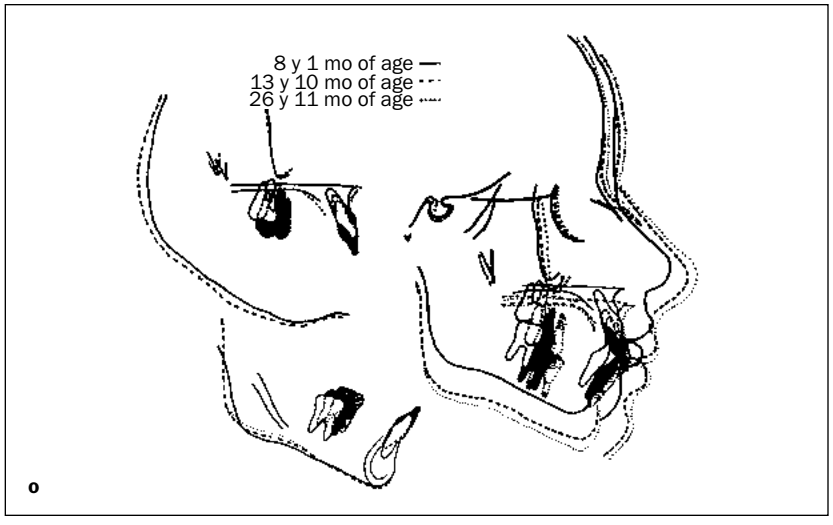
8 y 1 mo of age
13 y 10 mo of age
26 y 11 mo of age

Fig 4 Patient C. The patient is a woman 34 years 3 months of age. **(a)** Initial facial photograph. Note the anterior open bite. **(b)** Initial radiograph, which demonstrates the anterior open bite with skeletal hyperdivergency. **(c)** Initial intraoral photograph. **(d)** Close-up of the initial facial photograph, which shows an unconscious anterior tongue rest posture. **(e)** Initial facial profile photograph, which demonstrates lip protrusion. **(f)** Radiograph taken immediately before debonding when patient was 38 years 5 months of age. The anterior open bite has closed after 22 months of spur appliance wear. **(g to i)** Photographs taken when patient was 45 years 10 months of age, 7 years posttreatment. Note the stability of the corrected anterior open bite, the pleasing upper-lip smile line, and the improved facial profile. **(j)** Radiograph taken when patient was 45 years 10 months of age. Note the positive overbite with incisal contact. **(k)** Superimposition of radiographic tracings when patient was 34 years 3 months of age, 38 years 5 months of age, and 45 years 10 months of age.

Patient C

Patient C is a woman 34 years 7 months of age (Fig 4a) with a Class II, Division 1 skeletal anterior open bite malocclusion with a symmetric 5-mm open bite extending from lateral incisor to lateral incisor (Fig 4c). Her mandibular first molars were missing. A hyperdivergent cephalometric pattern was present (Fig 4b) and an anterior tongue rest posture was noted (Fig 4d). In addition, the patient had a protrusive profile (Fig 4e). No respiration problems were noted. The patient was shown her abnormal tongue rest posture and also the correct tongue rest posture. She was informed that due to her abnormal tongue rest posture, the open bite might not self-correct even with orthodontic treatment. In the event the open bite did not self-correct, spur therapy was presented as an alternative. The treatment plan included retraction of maxillary and mandibular incisors by closure of the mandibular molar spaces and extraction of two maxillary first premolars, use of occipital traction headgear and full appliances, and allowing the anterior open bite to self-correct. After 2 years of headgear treatment and orthodontic therapy, the open bite had not closed, even though the patient was now able to close her lips with no strain. Good rapport had been established with the patient and she consented to the spur method. A lingual arch with spurs was soldered to maxillary molar bands and cemented. The patient adapted well to the spurs. The incisors erupted in the following months, closing the anterior open bite (Fig 4f). Seven years later (Figs 4g to 4i), the corrected anterior open bite seems stable (Fig 4j) in spite of a hyperdivergent pattern (Fig 4k). This stability is probably due to the establishment of a normal tongue rest posture.


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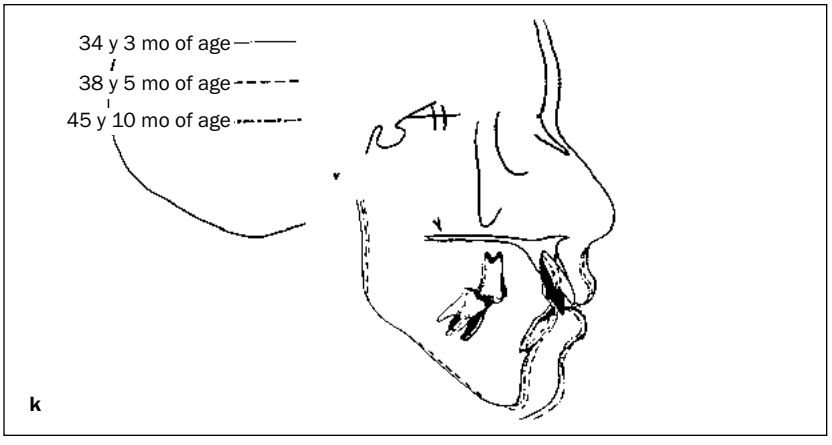

k

Fig 5 Three designs of the parietomandibular traction appliance to intrude both maxillary and mandibular molars. This appliance provides a true vertical force.

The etiologic factor for anterior open bite in the clinical cases described above was probably an anterior tongue rest posture, because the open bites closed and remained closed many years postretention following the use of spurs. This occurred despite the vertical growth pattern observed in two of these cases. Supported by the research carried out by Huang et al,[14] the author concluded that anterior tongue rest posture is a frequent risk factor for anterior open bite.

In growing Class II patients with anterior open bite, the author recommends simultaneous use of occipital high-pull facebow headgear with the spur appliance. This type of headgear helps to inhibit both vertical and horizontal maxillary growth. In patients with a Class I malocclusion with anterior open bite, parietomandibular vertical pull gear (Fig 5) is recommended to intrude both maxillary and mandibular molars. The parietomandibular gear, constructed in-office, consists of a circumferential headcap to which a vertical elastic strap is hooked anterior to the ear lobes. The elastic strap, which is identical to that used for cervical facebow traction, is positioned under the mandible behind the chin. This type of extraoral gear provides a true vertical force. It is important to remember that for every millimeter of molar intrusion, or noneruption, there is a 2- to 3-mm closure of the anterior open bite. Thus, it is advantageous to inhibit molar eruption with this extraoral appliance while simultaneously allowing incisor eruption by not allowing the tongue to posture between maxillary and mandibular incisors. The author recommends posttreatment nighttime wear of the parietomandibular gear to reduce the possibility of open bite relapse.

NEUROPHYSIOLOGY OF INTRAORAL SPURS

The case reports that the author has shown and the research by Huang et al[14] demonstrate that anterior open bite malocclusions corrected with spurs have long-term postretention stability. If the etiologic factor was not anterior tongue rest posture, it would be difficult to explain why the anterior open bite closed with spur wear and experienced no relapse. The author proposes that this is due to a modified tongue rest posture. The neurophysiologic basis for using the spur appliance involves the form-function concept. The neural pathways that allow a change in anterior tongue rest posture are

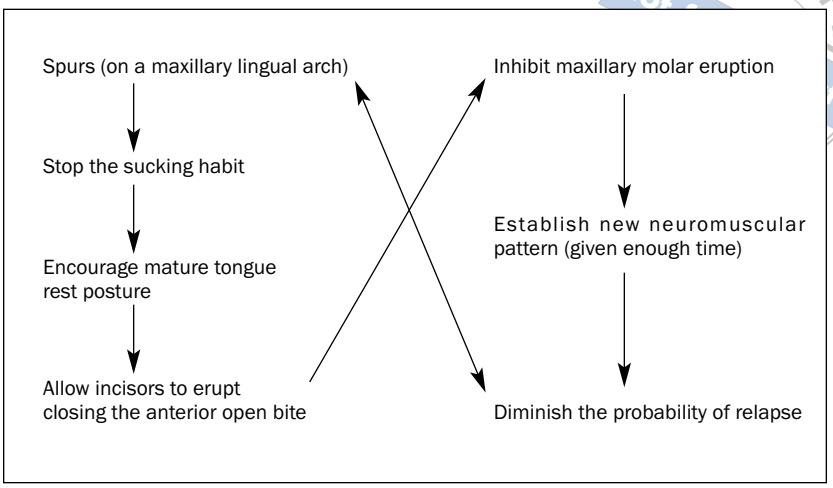

Fig 6 Flowchart of the neurophysiologic basis for changing anterior tongue rest posture.

the lingual nerve, which is afferent or sensory, and the hypoglossal nerve, which is efferent or motor. The spurs alter orofacial function, resulting in a change in form. In other words, the sensory input to the brain is modified by the spurs. This proprioceptive change leads to an altered motor response, resulting in a new normal tongue rest posture (change in function) that allows the incisors to erupt (change in form).

To avoid relapse of a corrected anterior open bite, the changed motor response, a nociceptive reflex, has to be permanently imprinted in the brain (learned). The learning process occurs because a movement that has been elicited repeatedly by successive stimuli may, after a while, be evoked without the need of the conditioning stimulus, since it has been imprinted in the cerebral cortex (Fig 6).

Haryett et al,[21] in a 3-year follow-up study, found a 91% success rate in arresting thumb-sucking habits when a cemented intraoral spur appliance was worn for 10 months compared to a 64% success rate when the appliance was worn for only 3 months. Taking these results into account, the author suggests that the spur appliance be nonremovable and remain in the mouth for at least 6 months after the open bite has closed.

CLINICAL RECOMMENDATIONS AND DISCUSSION

At the end of active orthodontic treatment, some patients, particularly those who have had an anterior open bite corrected with a spur appliance, want their maxillary removable retainer to have spurs to prevent relapse. The author believes that this is a good idea if the patient so desires. However, if the patient did not have a cemented spur appliance during orthodontic treatment and the open bite relapsed, a removable appliance with spurs will not be successful because it would probably not be worn full-time. Part-time wear of a removable spur appliance is not effective in closing open bites; this is analogous to somebody who wishes to quit smoking but avoids smoking only part of each day.

Many patients are not willing to comply with full-time removable spur wear and, consequently, the retainer might not be worn at all. This places maxillary incisor alignment in jeopardy. It takes 2 to 3 weeks for patients to adapt to speaking, swallowing, and eating with cemented spurs. Therefore, it is not reasonable to expect patients who have never used fixed spurs to wear a removable spur appliance full-time until the bite closes.

When an orthodontist is faced with an anterior open bite relapse, the author recommends the following:

1. Explain to the family the possibility that the relapse is due to an anterior tongue rest posture problem.
2. Determine whether orthognathic surgery is indicated.
3. If surgery is not advisable, recommend a cemented reminding appliance with spurs and the use of parietomandibular extraoral gear, which would be worn at night.
4. Encourage the family by giving them a copy of an article that shows cases successfully treated with the spur appliance.
5. When cementing the reminding appliance, be sure to have a holding appliance on the mandibular arch to avoid incisor crowding, which can readily occur because the tongue will not be there to support the mandibular incisors. A mandibular fixed canine-to-canine retainer or a removable retainer worn during the night is adequate.
6. Bond a maxillary canine-to-canine retainer while the spurs are in the maxillary arch to ensure that maxillary incisor alignment is maintained.
7. Allow the spur appliance to remain in the mouth for at least 1 year, even though the bite may have closed in 6 to 8 months. This is the length of time it normally takes to close an open bite with a spur appliance.
8. Keep reminding the family that the appliance is not just to arrest a digit-sucking habit but also to correct abnormal tongue rest posture.
9. Do not expect the bite to close immediately.

To avoid alienating patients or parents, the author recommends referring to the maxillary lingual arch with spurs as “the reminding appliance” instead of “the sharpened spur appliance.” A mandibular lingual arch with spurs is probably as useful as a maxillary one, except that it is visible and patients might find it objectionable since they would be continuously asked about the appliance.

Contraindications to the spur appliance are as follows:

1. Diminished muscular control.
2. Abnormally large tongue.
3. Maxillary lateral incisors have not yet erupted (indicating that the central incisors might still be erupting; ie, closing a transitional anterior open bite).
4. Good rapport has not been established.
5. Stressful periods in patient/parents lives (illness, divorce, school exams, etc).
6. No desire to quit digit-sucking habit.
7. Immaturity (lack of understanding treatment goals).
8. Increased nasal resistance, allergic rhinitis, or enlarged tonsils and/or adenoids (particularly during an acute episode).
9. Ongoing speech therapy. (If indicated, speech therapy should preferably be instituted after the bite has closed because the speech therapist can work more effectively with a child who does not have an anterior open bite.)
10. Bad oral hygiene.
11. Severe skeletal dysplasia (including lip incompetency) where orthognathic surgery is part of the treatment plan. Spur therapy for patients who will require orthognathic surgery should be considered postsurgically and only if an open bite begins to reappear.

It is critical that parents and patients be made aware of why the individual has an anterior open bite. Remember that good rapport must be established before cementing the appliance. Therefore, conventional orthodontic treatment can be attempted for a few months before cementing the spur appliance. This allows the orthodontist to observe whether the bite is closing without a spur appliance and also provides sufficient time for the orthodontist to establish the necessary rapport with the patient. One can additionally earn the family’s trust by introducing other patients presently in spur treatment.

When cementing the spur appliance, the family should be informed that there will be some initial difficulty speaking, eating, and swallowing. All of these problems will be resolved in 2 to 3 weeks. During this period, patients are asked to cover their spurs with cotton. The tongue is thus protected and can gradually adapt to the spurs. The patients should also be advised to pay particular attention to hygiene on the lingual aspect of the maxillary incisors because the spur appliance makes brushing this area more difficult. During the subsequent monthly appointments, it will be necessary to bend the lingual arch downward, with a three-prong pliers, to prevent the lingual arch from impinging on the palatal tissue as the erupting maxillary incisors descend. One must not overdo the bends, thus preventing the mandibular incisors from touching the lingual spur appliance.

CONCLUSIONS

1. The selection of myofunctional therapy with intraoral spurs for correction of anterior open bite has a wide range of applications in the overall scheme of open bite treatment.
2. The effectiveness of the spur appliance, both in closing anterior open bite and in achieving long-term stability, has been validated through research.
3. Although dental and skeletal malrelationships can be corrected, the stability of anterior open bite treatment will improve if etiologic factors for the open bite are eliminated.
4. Since anterior tongue posture and the orofacial musculature might play primary roles, not just adaptive ones, they must be addressed in orthodontic therapy to minimize relapse.
5. The etiology of anterior open bite is complex and multifactorial. Thus, it behooves the clinician to find out the etiologic factors for the open bite in each patient under his/her care to thus determine treatment that will not result in relapse.

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