

Case Report

Managing Low Tongue Posture in Open bite: Composite Habit Breaking Appliance

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ABSTRACT

Tongue dysfunction in form of altered tongue rest posture and tongue tip protrusion during swallowing, go along with anterior open bite malocclusion in majority of cases. Once the etiology of open bite has been identified and ascribed to an abnormal posture of the tongue, orthodontists should classify tongue posture through an analysis of the morphological features of the malocclusion. Vertical orientation of tongue at any given posture deserves equal consideration to that of its forward thrusting potential. In cases with low tongue rest posture, only blocking mechanism such as cribs may not solely be effective as upward elevation of tongue is also needed to achieve normal rest posture. Contrarily, tongue stimulator appliances namely blue grass appliances and tongue practice beads as well as myo-functional therapy require a great deal of patient engagements to become clinically effective in modifying tongue behaviour. We endeavour to find therapeutic potential of hybrid approach; that combines forward tongue restriction and vertical elevation via a composite habit breaking appliance (CHBA), in patients having low forward resting posture of tongue. A case report has been presented to exemplify the idea.

Key words: Open bite, Resting tongue posture, Crib appliance, Tongue beads.

Researchers have found that resting posture of the tongue holds greater significance than the swallowing position in determining dental arch form. Forward resting posture of the tongue with its light and sustained pressure against the teeth would be expected to affect vertical and horizontal positioning of teeth, thereby causing and maintaining anterior open bites (AOB). Normal position of tongue at rest is one in which the tip of the tongue rests on the incisive papilla and its back lies along the palate, maintaining anterior occlusion and transverse dimension of upper arch (Fig 1).

However, AOB presents positional changes in both maxillary and mandibular incisors at different combinations based on various postures of the tongue at

rest. Based on these morphological traits in AOB, vertical orientation of the tongue in different resting positions are suggested as high, horizontal, low and very low (Fig 2) [1].

High and horizontal forward tongue postures are close to normal posture that calls for control in the horizontal plane only. Restrictors such as crib aim to achieve this tongue retraction and compel it to assume its correct posture at rest. However in the low and very low tongue postures, the tongue is not only protruded but also its dorsum lies below occlusal plane and needs both retraction and elevation as well. This process is difficult to learn and automate [2], thus necessitating incorporation of training devices like spurs or tongue stimulators such as blue grass

appliance or tongue practice beads that foster vertical lift of the tongue. Good patient compliance is a prerequisite for this tongue training approach to be successful.

To address low tongue posture problem, an attempt has been made by present author to modify existing tongue habit breaking appliances [3], by incorporating a spinable acrylic bead posteriorly, instead of placing it in palatal rugae area. Therapeutic fundamental is based upon tongue inquisitiveness; the tongue while always remain in contact with the acrylic bead will gradually assume a more posterior and superior position with minimum patient engagement.

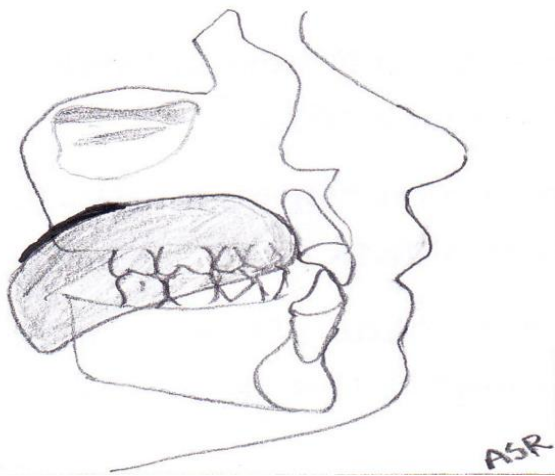


Fig 1: Normal rest posture of tongue

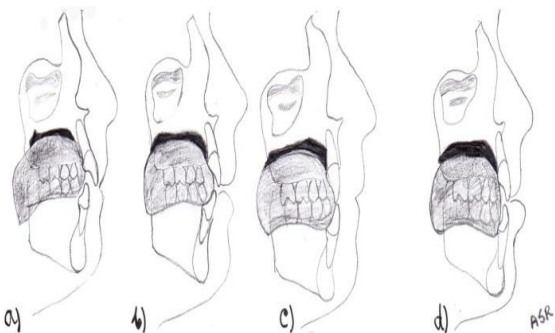


Fig 2: Different postures of tongue at rest. a) High b) Horizontal c) Low d) Very low

Detailed impression of the upper arch was taken and poured with dental stone for fabrication of working cast. Tailor-made metal bands were then placed on first

permanent molars and a stainless steel wire of 0.9 mm width was adapted along the neck of molars and premolars. Stretching from one canine to the opposing one, wire forms a crib containing 5-6 bends of height around 15-25 mm and ran up to 15 mm posterior to the upper incisors. It should be constructed in such a way as to not interfere with occlusion and to not cause any impingement on mucosa. Additionally a transpalatal arch (TPA) incorporating omega loop in the center was made with 0.9 mm diameter stainless steel wire. Assembly of metal crib and TPA were then soldered to the molar bands to form a composite appliance. Thereafter small amount of cold cure acrylic was molded around the omega and cured to form a movable acrylic sphere. Utility of this composite habit breaking appliances (CHBA) (Fig 3) has been illustrated in the following case report.



Fig 3: Composite habit breaking appliance (CHBA) with posteriorly placed acrylic bead

CASE REPORT

We present a case of 34 year old female complaining of low self esteem due to unaesthetic spacing among upper and lower anterior teeth. On clinical examination she was diagnosed with simple tongue thrust habit that led to generalized spacing in the upper and lower dental segment and a Class I dental open bite malocclusion with a symmetric 3mm open bite limited in incisor region (Fig 4a-c). The main objective of the treatment was to eliminate the etiology which in this case was the forward low tongue rest posture. The other treatment objectives were to improve the profile, smile aesthetics and to achieve normal overjet, overbite along with securing an ideal inter-incisal relationship. The treatment plan included retraction of upper and lower incisors with fixed mechanotherapy and placement of composite habit breaking appliance to

mitigate tongue habit in the first phase (Fig 4d-e), followed by keeping the same device as retention appliance in the second phase.

The transpalatal part of the assembly was placed 4-5 mm away from the palate to avoid any extrusive component acting on molars which could worsen the profile. After 8 month of treatment case was debonded but the habit breaker was kept retained in the mouth for another six month (Fig 4f-g). Two years post treatment photograph showing preservation of pleasing upper lip-smile line and a positive incisor overbite (Fig 4h-i). The stability is probably due to establishment of normal resting tongue posture.

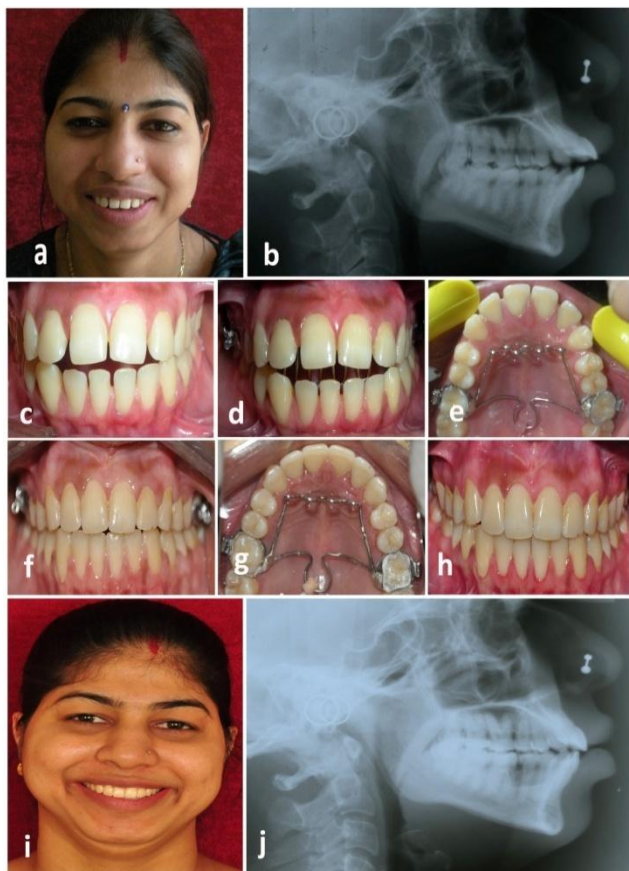


Fig 4: Initial photographs and lateral cephalogram(a-c), Note the anterior open bite with dento-alveolar protrusion and low tongue posture. Treatment started and composite habit breaking appliance in place (d-e), Following debonding, the appliance was kept as retainer (f-g), Two years post treatment record (h-j), Note the stability of corrected open bite, pleasing upper lip smile line and improved resting tongue posture.

DISCUSSION

Obstacles faced in securing stable results for AOB correction can be explained by the fact that their true etiology still fly in the face of understanding due to myriad etiological factors described in the literature and postulation of various types of treatment for correcting the same. No consensus has been reached, however, as to what would be the best treatment for this malocclusion [4]. The only consensus that seems to exist is that AOB treatment is challenging [5], and has poor stability [6].

Nevertheless, backed by the research carried out by Huang et al [5]; Justus concluded that anterior tongue rest posture is a frequent risk factor for anterior open bite and reasoned that, failure of tongue posture adaptation following orthodontic and/or surgical treatment might be responsible for relapse of AOB [7]. There is more than one possible resting position for the tongue [1].

It can position itself on a higher or lower level, producing open bite with different morphological characteristics and severity. Appropriate treatment should be selected based on these characteristics, and can be conducted by either restraining or orienting the tongue along with employing myofunctional therapies [8]. Although there are not enough evidence based findings to support the effectiveness of AOB treatment or stability of AOB correction [9], once the posture of the tongue has been corrected both in its horizontal and vertical aspects, the treatment stability may be ensured with greater certainty [10].

Conventionally, management of tongue dysfunction revolves around controlling the anterior part of the tongue with very little attention has usually been paid to its vertical orientation. Present article focuses on encouraging posterior part of tongue to mitigate the tongue posture problem and thereby managing AOB with acceptable long term stability. Further research is warranted particularly to assess role of posterior part of tongue in determining specific type of tongue posture and its significance with respect to overall management strategy of AOB.

CONCLUSION

Patients in whom compliance with tongue exercise regimen is suboptimal; the tongue may still be placed between the teeth, thereby missing the stimulant effect of

the anteriorly placed practice bead altogether. Demand on patient's compliance with tongue exercise instructions, may be reduced by stimulating hind part of the tongue; thereby, favoring effortless vertical elevation in cases associated with low forward tongue rest posture.

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