

# MANAGEMENT OF DENTAL ANTERIOR OPEN BITE WITH TONGUE THRUSTING IN GROWING PATIENT

(PENATALAKSANAAN GIGITAN GIGI DEPAN TERBUKA KARENA KEBIASAAN MENDORONG LIDAH PADA PASIEN TUMBUH KEMBANG)

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## Abstract

Unfavorable growth pattern in vertical direction, heredity, digital habits, tongue function, and habitual mouth breathing are some abnormal functions that change the craniofacial morphology. This condition is also related with intensive bad habit that is not realized by the anterior open bite patient. Elimination of the etiology factor and patient motivation influenced the success of anterior open bite correction. The etiology of this anterior open bite can affect the treatment time, result, and stability of treatment. This case report describes orthodontic treatment systematically of a 17.5-year-old boy with retrognathic profile who had thumb-sucking habit in the past, infantile swallowing, and tongue-thrusting. The type of anterior open bite was dental and malocclusion consisted of accentuated curve of spee at maxilla and reversed curve of spee at mandible. The treatment started by correcting curve of spee along with instruction to keep oral muscle activity in normal occlusal forces during orthodontic treatment. After the correction in vertical direction was achieved, four-premolar extractions were done. The result after 19-month-treatment showed overcorrection of overbite of +3.5 mm, overjet of +2 mm and tongue thrusting eliminated. In conclusion, the proper orthodontic treatment concurrently with bad habit management in growing patient will affect the treatment result and stability.

**Key words:** dental anterior open bite, tongue-thrusting

## Abstrak

Beberapa gangguan fungsi yang dapat mempengaruhi morfologi kraniodentofasial antara lain mencakup pola pertumbuhan dalam arah vertikal yang tidak menguntungkan, masalah herediter, kebiasaan menggigit, fungsi lidah serta kebiasaan bernafas melalui mulut. Kondisi ini juga berkaitan dengan kebiasaan buruk yang kadang-kadang tidak disadari oleh pasien dengan maloklusi gigitan terbuka. Kunci keberhasilan dalam perawatan kasus gigitan terbuka terletak pada usaha menghilangkan faktor penyebab maloklusi dan motivasi pasien. Faktor penyebab maloklusi ini dapat mempengaruhi lamanya waktu perawatan, hasil perawatan serta kestabilannya. Laporan kasus ini memaparkan perawatan ortodonti seorang pasien anak laki-laki usia 17,5 tahun dengan profil retrognatik dan kebiasaan menggigit jempol pada waktu dulu, pola penelanan infantil, dan kebiasaan *tongue thrusting*. Tipe gigitan terbuka anterior bersifat dental dan kurva spee dalam pada rahang atas dan terbalik pada rahang bawah. Perawatan dimulai dengan koreksi kurva spee dengan instruksi aktivitas otot-otot rongga mulut dalam keadaan normal selama perawatan ortodonti. Setelah koreksi dalam arah vertikal diperoleh, dilakukan pencabutan keempat gigi premolar. Setelah 19 bulan perawatan terlihat overkoreksi overbite menjadi +3,5 mm, overjet +2 mm dan kebiasaan tongue thrusting tidak ditemukan lagi. Sebagai kesimpulan, perawatan ortodonti yang tepat bersamaan dengan penatalaksanaan kebiasaan buruk pada pasien tumbuh kembang memberikan hasil yang baik serta stabilitas hasil perawatan.

**Kata kunci:** gigitan terbuka tipe dental, kebiasaan tongue thrusting

## INTRODUCTION

An open bite exists when there is a lack of vertical overlap between the maxillary and mandibular

teeth.<sup>1-4</sup> Especially if the open bite presence in anterior segment, this condition is the most unesthetic, as the patient's tongue is anteriorly between the teeth and the lips during speech and while swal-

lowing. The etiology of anterior open bite must be identified as soon as possible before the treatment begun and has to be concerned because this condition can prolong the treatment, effect the result and treatment stability. The complexity of this malocclusion is attributed to a combination of skeletal, dentoalveolar, functional, and habit related factors.<sup>4,5</sup>

Based on the skeletal or dental components involved, openbites can be classified as skeletal or dental open bite. The difference of these type, is dentoalveolar height, occlusal plane, and cephalometry value. In skeletal open bite, there is excessive vertical growth of dentoalveolar complex, especially in the posterior molar region (Figure 1A). The skeletal open bite has been sometimes camouflaged by over eruption of the anterior teeth. Conversely, dental anterior open bites is primarily due to reduced incisor dentoalveolar vertical height (Figure 1B).<sup>2</sup>

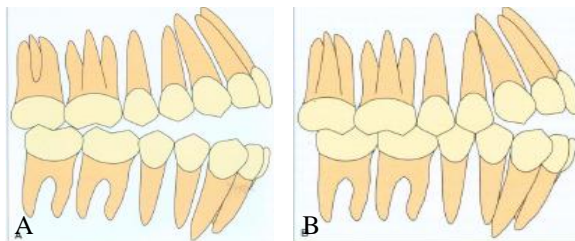


Figure 1. Occlusal lanes (A) skeletal type, (B) dental type<sup>2</sup>

Accurate differentiation is essential in determining the appropriate treatment plan. Dental open bite may close spontaneously in the growing patient and is generally amenable to orthodontic treatment, where as skeletal open bite is frequently worsening with growth and usually requires a combination of orthodontics and orthognatic surgery.<sup>4</sup>

A major etiology factor that reported contributes to open bites is an imbalance between the tongue and perioral musculature. Example: digit sucking can be with or without tongue thrusting. Conversely, skeletal anterior open bite can become worse in untreated growing patient.<sup>2</sup>

Correction of dental anterior open bite can be treated orthodontically or combination with functional appliances, such as extrusion arch, MEAW (*Multi-loop Edgewise Archwire Appliances*), vertical elastic intermaxillary, tongue-crib, and extraction of posterior teeth to obtain wedge effect. Dentoalveolar correction can be achieved by curve of spee modification to get close to the bite effect.<sup>1,2,6</sup>

This case report will show the management of dental anterior open bite with tongue thrusting prior to thumb sucking habit in male growing patient. The combination of orthodontics treatment by dentoal-

veolar correction and swallowing exercise. The objective of this report case was to describe some aspects that should be considered in treating dental anterior open bite with tongue thrusting.

## CASE

A 17,5-year-old boy who sought for orthodontic treatment due to lip incompetence and lack of vertical overlap between the maxillary and mandibular anterior teeth. This condition caused deficiency labial contact. Extra-orally, patient appeared to have a symmetrical dolico-facial face but imbalanced proportion and incompetent lips. His profile was retrognathic (Figure 2).



Figure 2. Extra oral before treatment (frontal and profile photo)

On intra oral examination, it was found that his oral hygiene and gingival health were moderate, moderate palatal depth and middle-sized tongue. Clinical examination revealed that Molar relation and Canine relation were Class I Angle on both sides in centric occlusion. The presence of anterior open bite that involved tooth elements 12,11,21,22 with the overjet was +4,5mm (11 with 41), +8mm (21 with 31), -1mm (22 with 32) and the overbite was -3mm (11 with 41), -6mm (21 with 31), -5mm (22 and 32). The upper and lower arch form was oval. The curve of spee was accentuated curve of spee at maxilla and reversed curve of spee at mandible. Upper midline shifted 1mm to the right side and lower midline shifted 2mm to the right side too. On vitality test, tooth element of 16 and 26 had amalgam filling (Figure 3).



Figure 3. Intra oral photography before treatment

Functional examination showed abnormal swallowing and speech when spelling words ended with "t". He had thumb sucking habit that had been stopped since five years ago. Because of the anterior open bite, he also showed mouth breathing and tongue thrusting habit in rest position.

The cephalometric analysis in centric occlusion showed the bimaxillary dental protrusion with skeletal class II (protrusive maxilla and normal mandible). Skeletal and soft tissue profile were convex whilst high-angle mandible and mandibular length shorter than normal value. The proportion of mid and lower face were imbalance (Figure 4).



Figure 4. Cephalometric lateral before treatment

The panoramic radiographic examination showed tooth elements 18,28,38, and 48 had not erupted yet whilst tooth elements 38 and 48 in mesio angular position. The maxillary sinus and nasal airways were normal and mandibular ramus were symmetrical (Figure 5).



Figure 5. Panoramic before treatment

The discrepancy index showed that the size of lower anterior teeth larger than the upper teeth which showed +3,5mm in maxilla and -3mm in mandible. In order to get normal overjet and overbite, normal midline, maintain Canine and Molar classification was Class I, extraction had been chosen to treat this malocclusion.

## CASE MANAGEMENT

Orthodontic treatment was started by bonding

ding a. 022" standard Edgewise appliances using minimum anchorage by involving tooth elements 16,26,36 and 46. The first step was levelling and aligning of the teeth in the upper jaw and lower jaw concurrently with curve of spee correction. The correction of curve spee by using reversed curve archwire in maxilla for levelling aligning and accentuated curve arch-wire in the mandible for unravelling levelling.

The patient was instructed to correct his swallowing pattern to normal function by doing tongue lift and popping exercise during the orthodontic treatment. After three months of treatment, the overbite has become -1,5mm (Figure 6).



Figure 6. Three months intra oral photography after treatment

In the four months of treatment, patient was referred to have four first premolars extraction after vertical correction was achieved and tongue thrust could be controlled. Moderate anchorage was being considered after four premolars extraction by involving all of the four second molars. After canine moved distally, the anterior retraction upper and lower teeth were done.

In nineteenth month of treatment, the overjet +2 mm and overbite +3,5mm were obtained. The individual arch form must be maintained during this treatment. After retraction of anterior teeth was achieved, the mesialization of posterior teeth was done (Figure 7).



Figure 7. Nineteenth months intra oral photography after treatment

## DISCUSSION

The anamnesis, clinical examination, model and radiology analysis showed that the anterior open bite was dental and the malrelation was class II skeletal. The ideal treatment for this case was orthognatic surgery to correct retrognathic profile. But patient preferred to correct the dental anterior open bite only by dentoalveolar compensation with orthodontic treatment and refused the surgery procedure.

The anterior dental open bite could be treated with modification curve spee during levelling aligning. The main principle was occlusal plane correction in order to get closing the bite effect. The mechanics of curve spee modification were using light force to maintain the posterior moment at minimal level. The anchorage involved posterior teeth and this force was applied labially to the center of resistance of the incisors and the moment of the force would produce an uprighting movement (crown lingual). Although it was different from extrusion arch, both of those technique using light force and involved posterior teeth as anchorage.<sup>2</sup> Generally, extrusion of anterior teeth will be followed by alveolar bone adaptation in new position.<sup>7</sup> Then, posterior teeth extraction was done to obtain wedge effect. Wedge effect was achieved by extrusion anterior teeth segment and posterior teeth mesialized. In this treatment, first premolar extraction was done to achieve sagittal and vertical correction.<sup>2</sup>

Abnormal swallowing which positioned the anterior portion of the tongue on the incisal edges of the lower incisors and on the lingual surface of the upper incisors continuously.<sup>8,9</sup> According to Fujiki T there were significant correlations between mandible plane angle, ramus height of the mandible, or sagittal dimension of the maxilla and movement of the frontal part of the dorsal tongue during deglutition in patient with anterior open bite. Therefore, when the anterior tongue protrusion disappears, the open bite will correct itself spontaneously.<sup>10</sup> Oral muscle exercises can be done to achieve normal freeway space.

Masticatory exercise is an important adjunctive treatment in correcting an open bite malocclusion in an extremely compliant adult patient.<sup>4,6,9</sup> One of the tongue exercises that is called tongue lift and popping, is gum chewing. First, chewing a piece of gum to soft consistency and roll it up on the back of the tongue and put the gum to the palate with the tongue. Then, spreading the thin gum on the palate with the tongue. Finally, swallowing saliva while keeping the gum with the tongue pressed to the palate (gum spreading along the palate after swallowing).<sup>6,11</sup>

The other swallowing exercise is called Alexander method as follows, click, slurp and squeeze procedures. The click procedure is to place the tip of tongue in the anterosuperior area of the palates, press, and then bring it down forcefully to make clicking or popping sound. The slurp procedure is to pull the tongue distally and swallow by pressing the tongue against the palate, without allowing the tongue to thrust forward. The squeeze procedure is to constrict the muscle of mastication and force the teeth together as strongly as possible.<sup>11</sup>

In this case report, the successful orthodontic treatment was achieved by proper treatment plan that included combination of correcting curve spee and swallowing exercise followed by four first premolars extraction. In the 19-month-treatment, overcorrection of overbite of +3,5 mm, overjet of +2 mm and tongue thrusting eliminated.

Tabel 1. Cephalometric evaluation before and after 19 months treatment

Data	Norm	Before Treatment	After Treatment	Difference
SNA	82°	88°	88°	0°
SNB	80°	82°	82°	0°
ANB	2°	+6°	+6°	0°
The Wits		+3mm	0mm	-3mm
Facial-Angle	87°	77°	77°	0°
Angle of C	0°	+13°	+13°	0°
Y-axis	60°	72°	68°	-4°
Go-angle	123°	122°	122°	0°
SN-MP	32°	36°	32°	-4°
1 – T	130°	100°	140°	-40°
1 – SN	104°	121°	99°	-12°
1 – NA	4mm	+13,5mm	+4mm	-9,5mm
1 – Apg	4mm	+19mm	+10,5mm	-8,5mm
T – Apg	2mm	+9,5mm	+5mm	-4,5mm
T – NB	4mm	+15mm	+9mm	-3,5 mm
T – MP	90°	107°	88°	-19°
Pg-NB	4mm	-0,5mm	-0,5mm	0
Upper-Lip-E Line	1mm	+8mm	+5,5mm	-2,5mm
Lower-Lip-ELLine	0mm	+10mm	+7mm	-3mm
Occl.-plane-SN	14°	13°	13°	0°
Mandible-Length	103mm	106mm	106mm	0
Growth trend	65%	70,3%	72,86%	
MT:MB	45:55	39.8:59,2	42,6:57,4	



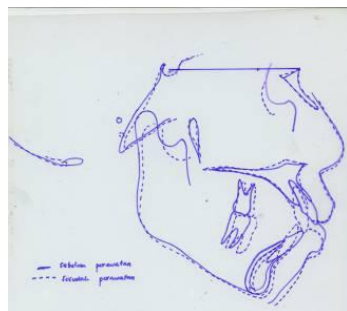


Figure 8. Tracing lateral cephalometric before and after 20 months of treatment

The cephalometric lateral evaluation as had been shown in Table 1 revealed that there were no skeletal changes during this orthodontic treatment. Even though the patient had high angle, the potential growth was horizontal and this condition gave the beneficiary in vertical correction (Figure 8). The profile patient was better and there was no interlabial gap after anterior teeth retraction (Figure 9).



Figure 9. Extra oral (frontal and profile photo) after 19 months treatment

The incidence of post-treatment relapse of open bite malocclusions is higher than other types of malocclusions. Relapse sometimes happened due to myofunctional habit that had not been eliminated during treatment, such as tongue thrust. The overcorrection of the overbite was done to avoid relapse incidence in this dental anterior open bite.

In conclusion, the final outcome of this dental anterior open bite was a great improvement in function, esthetics, and speech. The successful ortho-

odontic treatment was achieved by the management of appropriate orthodontic biomechanics and patient's compliance. The overcorrection was suggested to avoid relapse in dental anterior open bite.

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