

Research Article

Camouflage Orthodontic Treatment for Skeletal Prognathic with Anterior Openbite

Herlia Nur Istindiah

Prof. University. Dr. Moestopo (Beragama), Jakarta, Indonesia

Email: herlia.ni@dsn.moestopo.ac.id

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Abstract: An ideal treatment is an orthognathic surgery for patients having prognathi skeletal with crossbite and openbite anterior. When a patient chooses camouflage treatment, the treatment applied is upper anterior dental proclination, lower anterior dental retroclination, and upper and lower incisive extrusion. Limitation of camouflage treatment results in the need to heed etiological factors and patient complaints. Treatment of prognati skeletal and Class III dental (Angle) cases accompanied by skeletal type openbite anterior and crossbite anterior on a female patient aged 32. Orthodontic treatment using a pre-adjusted system and palatal crib. Type of anchorage for moderate upper and maximum lower dental arc. The position of the upper anterior dental bracket is installed 0.5 mm toward the gingival. Anterior dental protraction with protraction arch. Removal of 34 and 44 to retract lower anterior dental. Openbite anterior is corrected by upper anterior dental extrusion using extrusion arch and elastic vertical. After 26 months of treatment, the treatment goal is achieved, i.e., 2 mm overjet and overbite, better smile incisal display, and lowered concave profile. In a patient with camouflage orthodontic treatment, improvement occurs mostly at dental. Use of palatal crib provides an opportunity for upper anterior dental extrusion and lower anterior dental movement to lingual. The success of camouflage treatment occurs when esthetic and dental are not compromised to get good occlusion. To get stability, the dental movement must heed the position of supporting tissues.

Keywords: *Prognati, Openbite, Crossbite, Camouflage.*

A. INTRODUCTION

Skeletal prognathism is a disharmony of the jaw relationship with the characteristic position of the mandible more forward than the cranial and maxillary bases. This classification of facial dysplasia is mandibular prognathic, maxillary retrognathic, or a combination of both, which influences the variation in the sagittal relationship. In the skeletal type, it is usually accompanied by an anterior, posterior, or combination crossbite. The complex interaction of genetic and environmental factors exacerbates this malocclusion, especially its dentoalveolar appearance. Skeletal prognathism can also be classified based on the vertical relationship: long, average, and short face¹⁻⁴. In the long face type, in addition to the anterior crossbite, it can also be accompanied by an anterior openbite¹.

Anterior openbite is a malocclusion in the vertical plane with the characteristic that there is no vertical overlap between the maxillary and mandibular anterior teeth. The skeletal type anterior openbite is influenced by the direction of growth and development of the maxilla and mandible. The main cause of a skeletal openbite is a mismatch between the anterior and posterior facial heights. The etiology comes from genetic, environmental, or a combination of both. Oral bad habits such as tongue thrusts can worsen the patient's dentoalveolar appearance⁵⁻¹⁰.

Skeletal management of this type must pay attention to the degree of skeletal severity in the anteroposterior, transverse and vertical directions, the inclination and position of the incisors, and facial appearance¹⁻⁴. A skeletal anterior openbite affects the treatment plan,

especially if the patient has a bad oral habit⁵⁻¹⁰. Correction of abnormalities in the vertical direction and the type of retention should be carefully considered when developing a treatment plan. The ideal treatment for adult patients with severe skeletal abnormalities is orthognathic surgical correction¹⁻¹⁰. However, patients often object, so camouflage orthodontic treatment is an option. This treatment places the teeth to get a good occlusion to compensate for the disharmony of the jaw relationship. In some cases, it is necessary to extract several teeth to support orthodontic treatment^(2,3). The limitations of camouflage treatment require careful planning of treatment. In addition to paying attention to etiological factors and patient complaints, tooth movement must also pay attention to the position of the teeth on the supporting tissues so that stability is obtained after treatment is complete. This paper aims to report orthodontic camouflage treatment in patients with openbite and anterior crossbite patients with skeletal prognathism.

B. METHOD

This research was conducted using a qualitative approach. This study was conducted by performing a cephalometric analysis of the patient's condition and condition before and after camouflage orthodontic treatment. The data used in this study are primary data obtained from the Dental and Oral Hospital of the orthodontic clinic.

C. RESULT AND DISCUSSION

A 32-year-old female patient with a civil service job came to the RSGM orthodontic clinic complaining of open and crowded upper and lower front teeth. The patient has a bad habit of tongue thrusts. On extra oral examination, the patient's face was unbalanced, and there was a positive lip step when the lips were in contact and an anterior openbite (Figure 1).

On intraoral examination (Figure 2), class III molar relationship (Angle), class III canine relationship (Angle), overjet: – 5 mm (21 to 41), and openbite – 4 mm (12 to 41). The midline of the maxillary dental arch to the left is 3 mm, and the midline of the mandibular dental arch to the right is 2 mm. Crowding of the maxillary and mandibular dental arches. The asymmetrical shape of the dental arch. Gear 24 is missing. Space of 3 mm between 23 and 25. There was a gingival recession in the buccal regions 26, 34, 35, 36, 44, and 45.



Figure 1. Extra-oral photos before treatment





Figure 2. Intra-oral photos before treatment

In cephalometric analysis, the relationship of the prognathic jaw with the protruded mandible and the normal maxilla tends to be retruded. Concave skeletal profile. Hyperdivergent facial type. Skeletal type openbite. Protrusive interincisal relationship. Position of incisors above proclination. Proclination of the lower incisors. The upper lip is normal, and the lower lip is advanced. Based on space analysis, the lower dental arch needed extraction (34 and 44).

The target of treatment, skeletal abnormalities, was not corrected. Care is required for the correction of openbite and crossbite to obtain an overjet and overbite of 2mm. Tongue-thrust was prevented from reducing openbite and proclination of lower anterior teeth. The crowding of the teeth was corrected so that a good interdigitation of the teeth was obtained. The midlines of the upper and lower dental arches were corrected to coincide with the face's midline. The asymmetrical maxillary dental arch and the square mandibular dental arch shape were corrected to make it oval. The positive lip trap was corrected by moving the upper anterior teeth forward and the lower anterior teeth forward. Gingival recession was referred to as periodontics. Spaces between 23 and 25 are referred to as prosthodontics.

The initial treatment plan for this case was orthognathic surgery because of the expected skeletal and esthetic abnormalities and long-term stability. However, the patient refused because of fear and cost factors, so the second treatment plan was chosen, namely camouflage orthodontic treatment. Referral to a periodontist for a gingival recession in buccal region 26, 34, 35, 36, 44, 45. Referral to prosthodontics to close the space between 23 and 25. Referral to oral surgery for extraction of 34 and 44. The orthodontic treatment of choice was pre-adjusted system MBT slot 0.022. Installation of a palatal crib to prevent tongue thrust. Types of anchorage for moderate upper dental arch and maximum lower dental arch. Retention using a Hawley retainer with a palatal crib on the upper jaw and a Hawley retainer on the lower jaw.

1. Orthodontic Treatment

Before orthodontic treatment, a periodontist consulted the patient for a gingival recession in the buccal region 26, 34, 35, 36, 44, 45. As a result of a referral, orthodontic treatment could be performed, and gingival recession was observed during orthodontic treatment. The patient was referred to oral surgery for extraction of 34 and 44. Treatment began with placing a molar band and bracket, as well as a palatal crib and LHA. Placement of the bracket on the upper anterior teeth more to the gingiva by about 1 mm. Aligning and leveling used archwire 0.014 NiTi to 0.018 SS for 5 months, and the laceback was tightened at each visit. At the 7th month of treatment, overjet - 3 mm (21 - 31), there was a space between 32 - 33 and 42 - 43, with 25 cusp to cusp relationship with 34 and 35. Distalized 33 and 43 with powerchain. The next control was maxillary dental arch protraction using U-loop at mesial 25 and out at distal 11 to distal 23 with 0.018 SS archwire. After the distalization of 33 and 43 was completed, ligate 33 - 37 and 43 - 47 with ligature wire. Correct the midline of the lower dental arch by shifting left 32, 31, 41, and 42, one by one, using the powerchain. Retraction of the four mandibular anterior teeth using a powerchain connected from the circle loops distally

32 and 42 to the molarband hooks 36 and 46 with a 0.018 SS archwire. The LHA loop is reduced during retraction. During the treatment, some of the recessions diminished except on the 26th buccal, so a referral to a periodontist was made. Frenectomy was performed on the buccal frenulum in the 26th region.

12th month of treatment, overjet and overbite 1 mm. Slicing 15 – 11. Then correct the midline of the maxillary dental arch by shifting to the right 14 – 23 one by one using an open coil spring and a power chain. In the 16th month of treatment, the treatment progress was an overjet and overbite of 2 mm, space closure of the mandibular dental arch was completed, and then the LHA was removed. Mediation 25 using open coil spring (buccal 25 – 26) and powerchain. The button is installed on the palatal 25, and the powerchain is connected from the button to bracket 21. Buccoconversion 37 and 47 are fixed on mesial 37 and 47 with archwire 0.016 x 0.016 SS followed by 0.016 x 0.022 SS. After 25 came into contact with 23, stepdown 23 – 25 was carried out to correct the interdigitation of the 0.016 x 0.016 SS archwire followed by 0.016 x 0.022 SS. Palatal crib removed to personalize 26 and 27. Personalize 26 with a powerchain. Currently, the patient is still under treatment for 26 and 27 mesialization.

2. Treatment Results

Some treatment goals have been achieved: facial changes seen when smiling (Figure 3). Smile incisal display is better. The convexity of the profile is reduced, and the positive lip step is corrected. In intraoral (Figure 4), overjet and overbite were obtained at 2 mm, the mandibular dental arch's midline coincided with the face's midline, and the crowding in the lower dental arch was resolved.



Figure 3. Extra-oral photos during treatment



Figure 4. Intra-oral photos during treatment

The cephalometric analysis results showed changes in skeletal and dental values (Table 1). The ANB increases by 1° as the SNB value increases. The value of Wits increases. Facial angle increases as the pogonion advances (Pg – NB increases). The angle of convexity increases so that the profile becomes more concave. The reduction is on the Y – axis, and SN – MP. The inter-incisal relationship increases so that the degree of protrusion decreases. The value of the upper incisors towards SN, NA, and APg indicated that there was a proclination. Lower incisor values for reduced APg, MP, and NB indicate retroclination. The chin is advanced. Position the lower lip slightly back.

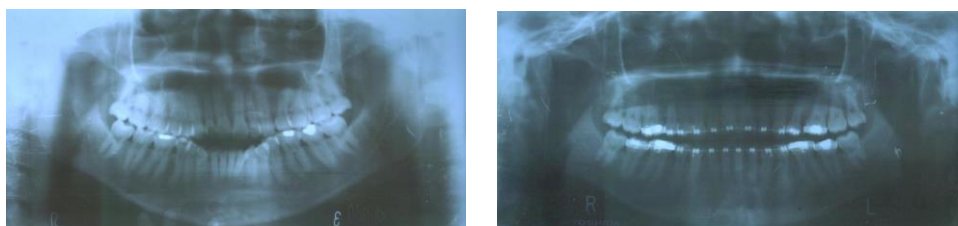


Figure 5. Panoramic before and 26th month of treatment
Table 1. Cephalometric analysis before and after treatment

	Mean	Sebelum	22 bulan
SNA	82°	82°	82°
SNB	80°	83°	84°
ANB	2°	-1°	-2°
The Wits	±1 mm	-8mm	-9 mm
Facial Angle	87°	89°	90°
Angle of Convexity	0°	-4°	-6°
Y-axis	60°	64°	63°
Go angle	123°	124°	124°
SN-MP	32°	35°	34°
Interincisal Angle	130°	118°	132°
UI-SN	104°	106°	110°
UI-NA	4 mm	7 mm	10 mm
UI-APg	4 mm	6 mm	8 mm
LI-APg	2 mm	12 mm	5 mm
LI-MP	90°	98°	84°
LI-NB	4 mm	11 mm	3 mm
Pg-NB	4 mm	1 mm	3 mm
Bibir atas-E line	1 mm	+1 mm	0 mm
Bibir bawah-E line	0 mm	+8 mm	+3 mm



Figure 6. Cephalometry before treatment. Cephalometry of the 26th month of treatment. Cephalometric superimposition before treatment (red line) and during treatment (blue line)

3. Discussion

Based on the history, clinical examination, study model, and radiographs, it was concluded that the patient had major skeletal prognathic problems with protruded mandibles and normal maxillae tending to be retruded. Skeletal type anterior openbite with a bad habit of tongue thrust. The facial profile shows prognathic skeletal characteristics with a forward mandible and a flattened nasomaxillary region. Lower lip forward with a positive lip step. When speaking, the tongue protrudes anteriorly and inferiorly. This results in the proclination of the lower incisors. When smiling and laughing, patients often hold the tip of the tongue from sticking out by pressing the lingual area of the lower incisors.

On clinical examination, there was an anterior crossbite and an anterior openbite. Crossbite was caused by a protruded mandible and asymmetrical maxillary dental arch due to the absence of tooth 24. Anterior openbite is caused by tongue thrust and reduced dentoalveolar height in the maxillary anterior region. The prognathic mandibular relationship was followed by class III (Angle) right and left a molar relationship, and class III (Angle) right and left a canine relationship with openbite. The loss of 24 causes the anterior teeth to shift to the left so that the midline is left, the dental arch is asymmetrical, and there is a space between 23 and 25.

Cephalometric analysis results, ANB (-1°), and the Wits (-8 mm) showed a class III jaw relationship. Protruded mandible (83° SNB) and normal maxilla (82° SNA). McNamara's evaluation resulted in different positions of the maxilla. In linear measurement, the maxillary position is indicated by point A behind the line drawn through the plane perpendicular to the FHP (-2 mm), while point B is in front of the line (1 mm). A sunken skeletal profile is characteristic of skeletal class III malocclusions. Skeletal type openbite based on ODI value of 63° , PFH : AFH = 0.62 and UFH : LFH = 0.68. The skeletal type was determined based on cephalometric analysis, although the patient's occlusal plane characteristics suggested a dentoalveolar type openbite.

The ideal treatment for this patient is orthognathic surgery because of the skeletal abnormalities in the sagittal and vertical planes, the expectation of high esthetic improvement, and long-term stability. However, the patient chose camouflage orthodontic treatment so that more repairs occurred in the dental. Based on the discrepancy envelope, camouflage orthodontic treatment was chosen because it allowed retracting of the lower incisor by 4 mm and advance of the upper incisor by 3 mm, as well as extrusion of the upper and lower incisors to obtain an overjet and overbite of 2 mm. Although the mandible is protruded, the position of

the lower incisors is protrusive, thus allowing retroclination of the lower incisors. However, it should be noted that the maxillary position tends to be retruded, and the incisive position is above the proclination, so there is not too much proclination. The normal upper lip position allows proclination of the upper incisors and the lower lip, which is advanced backward if retroclination of the lower incisors is performed. Extrusion of the incisors is possible because there is no gingival display when smiling.

Before orthodontic treatment, a periodontist consulted the patient for a gingival recession in the buccal region 26, 35, 36, and 45. As a result of a referral, orthodontic treatment could be performed and observed during orthodontic treatment. During treatment, 36 and 45 gingival recession decreased, while 26 and 35 remained. September 2011 was referred to a periodontist clinic. Frenectomy was performed on the buccal frenulum in the 26th region to reduce the gingival recession. The next plan is frenectomy labialis frenulum region 35. Periodontal control is done every 6 months.

At the beginning of treatment, using a palatal crib made it difficult for the patient to adapt when speaking and eating. Psychological factors determine the patient's ability to adapt and accept the use of this tool. Aligning and leveling were carried out for 5 months. In the maxilla, the aim is to improve the dental arch as much as possible and to regenerate the alveolar bone. Protraction of the upper dental arch was carried out in the left region with U-loop at mesial 25 and distal 11 to distal 23. Protraction of the upper anterior teeth was not too much because when the lower anterior teeth were retracted, there was already a positive overjet. A year of maintenance, overjet and overbite 1 mm. Four months later, overjet and overbite 2 mm. Changes to the treatment plan were made to close the space between 25 and 26. The original plan was for the space to be covered with dentures. However, the space available after mesialization 25 was too small for the denture, so the space was closed with mesialization 26 and 27. This mesialization is advantageous because it can improve interdigtation. The palatal crib was removed for mesialization 26 and 27. In this case, the lower second molar was included from the start of the treatment for added anchorage. However, there are still mesial drifts 36 and 46. Currently, the patient is still being treated for mesialization 26 and 27.



Figure 7. Use of palatal crib to treat tongue thrust

Based on cephalometric values, significant changes were found in the position of the lower incisors. Superimposition results showed that the lower incisors were more erect and extruded. The greatest compensation occurred in the relationship of the lower incisors to the mandibular plane (L1 – MP) from 100° to 84°. Changes in the position of the lower incisors, namely retroclination and extrusion, cause the mandible to rotate anteriorly and superiorly, shifting point B and pogonion anteriorly. The chin is advanced (facial angle 89° to 90°), while the Y – axis (64° to 63°) and SN – MP (35° to 34°) are reduced. The lower lip recedes due to retroclination of the lower incisors and rotation of the mandible. Although the upper incisors were proclined and extruded, the position of point A remained relatively unchanged. This affects the ANB value (-1° to -2°), and the profile is more concave (angle of convexity -4° to -

6°). The proclination angle of the upper incisors measured from the axial axis to the palatal plane was 119°, this value was below the recommended proclination angle of 120°. So it is necessary to do labial root torque. The lower incisor retroclination angle measured from the axial axis to the mandibular plane was 84°, this value was still above the recommended retroclination angle of 80°. On superimposition, it appears that the extrusion type of the upper incisors is controlled tipping, while the lower incisors are uncontrolled tipping¹¹⁻¹⁸.

The treatment goals that have been achieved are overjet and overbite 2 mm, the lower dental arch midline coincides with the facial midline, and the crowding in the lower dental arch is resolved. Changes in the face are seen when smiling. Smile incisal display is better. The convexity of the profile is reduced, and the positive lip step is corrected. Openbite and crossbite corrected due to proclination and extrusion of upper incisors, while lower incisors retroclined and extruded. Some treatment targets that have not been achieved include interdigation of the cusp to the fossa, the maxillary dental arch's midline, the maxillary dental arch, and the shape of the maxillary dental arch.

D. CONCLUSION

This patient underwent camouflage orthodontic treatment, although the ideal treatment would be orthodontic treatment with surgical correction of the jaw. The camouflage treatment for skeletal prognathism is proclination of the upper anterior teeth and retroclination of the lower anterior teeth to compromise jaw discrepancy in the sagittal direction. At the same time, the camouflage treatment for the anterior openbite is extrusion of the upper and lower incisors. Tooth movement must pay attention to the supporting tissue to obtain stability. Camouflage treatment is said to be successful if good aesthetics and dental interdigation can be obtained by paying attention to the position of the teeth on the supporting tissues.

During orthodontic treatment, a frenectomy was performed to reduce the gingival recession at the labial 26. Extraction of 34 and 44 were required to retract the lower anterior teeth. The palatal crib is used to overcome tongue thrusts. During 26 months of treatment, the incisal smile display was good, the facial profile became straighter, and the lower lip receded so that the positive lip step was corrected. Some of the treatment goals that have not been achieved are the relationship of the cusp to fossa teeth, the midline of the upper dental arch to the left, and the asymmetry of the upper dental arch. Orthodontic treatment is still being carried out to mesialize 26 and 27, then correct the occlusion of the teeth. The observation of gingival recession was continued with the periodontics section.

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