CASE REPORT

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Orthodontic Camouflage Treatment of Skeletal Class III Malocclusion with Mandibular Bite Turbo Application

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ABSTRACT

Treatment of skeletal class III malocclusions is difficult malocclusions. The treatment of skeletal class III malocclusions varies according to the jaw and the growth period of the anomalies. Adult individuals whose growth is over are treated with fixed orthodontic mechanics or orthognathic surgical approaches. If skeletal class III malocclusion is not severe and does not constitute a problem aesthetically, camouflage treatment can be done with fixed orthodontic mechanics. This case report presents the results of orthodontic camouflage treatment and treatment applied to a skeletal class III malocclusion female patient with chronological age of 17 years and 9 months and skeletally in the Ru period. The molar relationship of the patient with a slightly concave profile is Angle class III. In cephalometric examination, skeletal class III malocclusion was detected (ANB angle= -6). At the end of treatment, a Angle class I relationship and a smooth soft tissue profile were obtained.

Key Words: Skeletal class III treatment, adult treatment, camouflage treatment, bite turbo

Introduction

Skeletal class III malocclusions are anomalies that require difficult and complicated treatment (1). Skeletal class III malocclusion may be observed due to maxillary retrognathia, mandibular prognathia or both of them. Skeletal class III malocclusion is reported to be seen mostly with normal or mildly prognathic mandible, in addition to maxillary insufficiency (2,3,4). In 25% of the individuals with Skeletal Class III malocclusion, mandibular protrusion is observed together with maxillary retrusion (4,5). In patients with this malocclusion, there is a concave profile, and a retrusive nasomaxillary field. Lower lip protrusion is noted in individuals with skeletal class III anomaly. The upper arch is narrower than the lower arch, and there is negative overjet and decreased overbite (6,7). For this reason, the main factor for orthodontic treatment demands of this type of patients is the dissatisfaction with dento-facial appearance (8,9).

Effect of peripheral factors and oral function as etiologic factors in skeletal class III malocclusions has not been understood clearly. However, familial and genetic factors are known to play significant role in mandibular prognathism (10). Today, treatment options for class III anomalies vary according to the jaw with anomaly and the growth period of the individual. Main treatment methods for skeletal class III malocclusion include the following ones. The first one, chincup, is an orthopedic treatment option which is performed by devices such as class III activator or face mask. Functional treatment should be performed before growth-development spurt completed (11). The second one is orthodontic camouflage treatment which is performed by extracting mandibular 1 st premolar teeth and providing dental movement. With orthodontic camouflage treatment, occlusion and facial aesthetic improve without correcting the skeletal problem. The third treatment modality is orthognathic surgery. With orthognathic surgery maxilla, mandible or both are repositioned with surgical operation (8). In adults, combined orthodontic and orthognathic surgical treatments are currently valid methods (1,12,13).

A good evaluation should be done before deciding treatment option in adults with class III malocclusion. Kerr et al. In adults with class III malocclusion, some authors stated that orthognathic surgery should be performed when the ANB angle is less than -4 °, and the IMPA angle is less than 83°. In this case report, we present orthodontic camouflage treatment without tooth extraction in an adult woman with skeletal class III malocclusion and the results of this treatment (14).

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Fig 1. Pretreatment facial and intraoral photographs

Fig 2. Pretreatment lateral, posteroanterior cephalometric and panoramic radiographs

History and Diagnosis: An adult female patient at Ru period whose chronological age was 17 years and 9 months and skeletal age was 18 years admitted to Van Yüzüncü Yıl University, Faculty of Dentistry, Departmen of Orthodontics with a skeletal class III malocclusion. The patient's complaints were crowded of her upper teeth and prognathic mandible. Communication was established usually with the aid of the father due to the patient's hearing and speech problem making direct communication hard. Also, treatment plan and treatment-related information were shared with the patient by writing.

The patient's clinical examination demonstrated a mild concave profile, she had a class I molar relation at right and class III molar relation at left, and she had negative overjet (-3 mm) and increased overbite (7 mm). The patient had no dental midline deviation

Fig 3. Mandibular bite turbo application

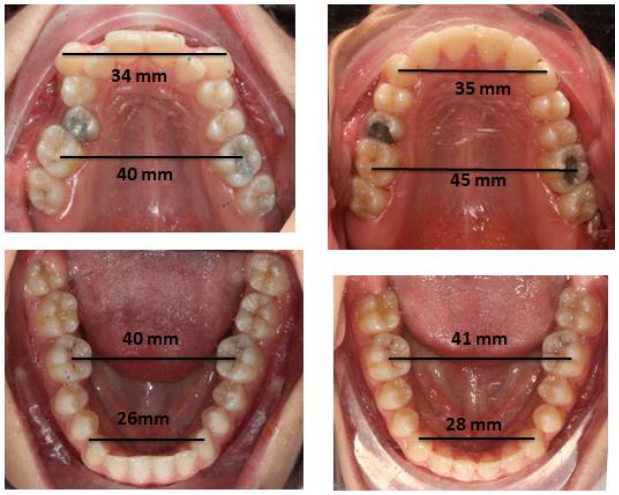

Fig 4. Pretreatment and posttreatment maxillary and mandibular transverse records

(Fig 1). Model analysis showed deviation in arch length at upper jaw (-13.5mm). There was no shortage of space in the lower jaw. Cephalometric analysis revealed that the patient had skeletal class III malocclusion (ANB: - 6 °) due to maxillary retrognathia (SNA: 78.8) and mandibular prognathia (SNB: 84.8 °). According to Bolton analysis there was a 1.9 mm excess at mandibular anterior teeth at anterior ratio. As a result of the panoramic examination the patient was detected to have all 20 age teeth (Fig 2).

The vertical dimensions of the patient were norm values close to lower margin (SN-GoGn: 28.1 °). The angle of the upper incisor teeth with the NA line was (U1/NA) 26,9° and its distance was (U1-NA) 3,1 mm and these were normal values The angle of the lower incisors with NB line was reduced (L1 / NB) 15.3 ° and the distance (L1-NB) was 2.7 mm.

Treatment Objectives: Orthodontic treatment goals in this case are; the expansion of the upper jaw which has deficiency, leveling of the upper and lower arches, correction of overjet and overbite relation and

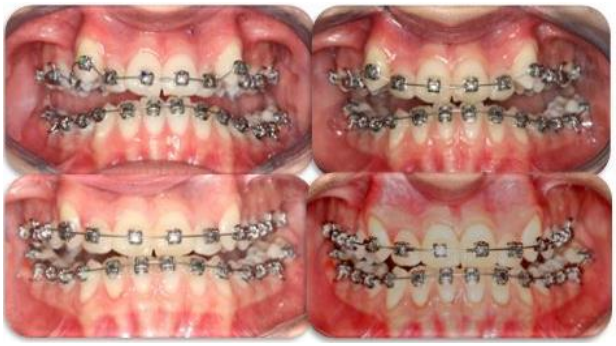

Fig 5. Mid-treatment photos

Fig 6. Posttreatment facial and intraoral photographs

improvement of the dentofacial appearance. Main treatment objective is to correct the anterior crossbite which is the primary complaint of the patient and affects the quality of life.

Treatment Alternatives: With regard to its possible healing effect in conduction-type hearing losses considering patients hearing problem and in order to expand maxilla, application of rapid maxillary expansion (RME) could have been beneficial. However, due to the patient's skeletal maturation period being RU, it was thought that RME application would not have been effective and therefore it was not preferred. A method used in adult individuals, Alt-RAMEC (alternating rapid maxillary expansion and constriction) protocol could have been tried with the patient. With this treatment method, expansion of maxilla and forward movement of point A could have been achieved. This treatment offer was not accepted by the patient. The patient was informed that a more effective treatment and aesthetic appearance could be achieved with orthognathic surgery and patient again refused surgical treatment option.

Treatment Progress: A damon bracket system was used for the patient (Damon Q, 0.022"). While bonding was being performed on upper jaw, composite bite turbo application was performed to the lingual region of lower incisors with mini mold

Fig 7. Posttreatment lateral and posteroanterior cephalometric and panoramic radiographs

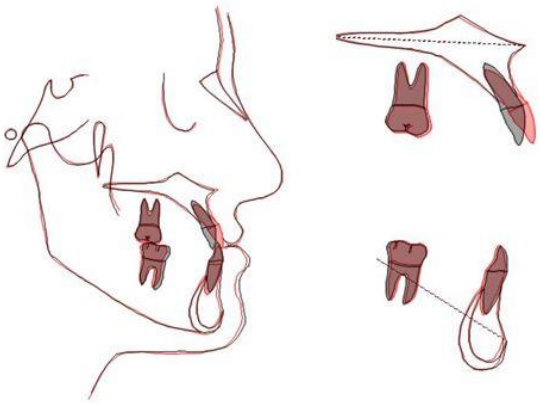

Fig 8. Superimposed tracings of the pretreatment (black lines) and posttreatment (red lines) total and local cephalometric radiographs

technique. (Fig 3). By this way closure of teeth with cross-bite at anterior area was prevented. Mandibular bite turbo was removed, after the completion of upper dental arch leveling and transversal expansion. Adequate maxillary and mandibular transverse expansions was achieved in the anterior and posterior regions of the patient (Fig 4).

After the bonding of tshe lower teeth was completed, an amount equal to the Bolton discrepancy was stripped from the lower anterior teeth in order to relieve the Bolton discrepancy in the mandibular anterior segment and retract some lower incisor teeth. We waited for the leveling of upper arch and lower arch (Fig 5).

Table 1. Changes in cephalometric variables

Variable	Pretreatment	Posttreatment
SNA (◦)	78,8	79
SNB (◦)	84,8	83
ANB (◦)	-6	-4
Wits (◦)	-10,4	-7
SN-GoGN (◦)	28,1	31,8
U1/L1 (◦)	147,8	134,4
U1/SN (◦)	105,9	116,6
U1/NA (◦/mm)	26,9 / 3,1	32 / 6,6
L1/NB (◦/mm)	15,3 / 2,7	15 / 1,7
IMPA (◦)	83	82,1
S line-Lips (U-L)	-3 / +1,5	-2 / 0

A class III elastic (75g) was given to prevent lower incisor protrusion during the leveling of lower dental arch. After leveling of the upper arch and the lower dental arch were completed with Cu Niti (0,13-0,14-,0,16-0,18-14,25-16,25) arch wires, angled stainless steel arch wires were used. After the finishing arch ((0,019"X0,025' stainless steel) stayed in patient's mouth for 2 months Class I closure relation was achieved. The lower wisdom teeth were extracted. Debondig was performed after active orthodontic treatment and essix plate was applied to the upper and the lower jaws.

Treatment Results: Orthodontic camouflage treatment without tooth extraction was completed in 1 year and 4 months. On the right and left side, a class I molar and canine relationship, a normal overbite and a positive overjet relation were achieved (Fig 6). Posttreatment cephalometric analysis detected these values: SNA: 79,4 °, SNB: 83 °, ANB:-4 ° and SN-GoGN: 31.8 °. The angle of upper incisors with the NA line was U1/NA:32° and the distance U1-NA was 6,3 mm; the angle of lower incisors with the NB line was L1/NB: 15° and the distance was L1-NB:2 mm. The pretreatment and posttreatment cephalometric analysis are shown in Table 1. These changes in the patient's values are due to upper incisor protrusion and lower incisor retrusion. At the end of the treatment the patient had a compatible profile. Thus, a satisfactory improvement in the profile was also obtained (Fig 7 and 8).

Discussion

Skeletal class III malocclusion can stem from maxillary retrognathia, mandibular prognathism, or a combination of both conditions (2-4). In this case report, treatment process of a patient with skeletal class III malocclusion that stems from maxilla being behind in relation to the skull base and mandibula is described.

The aim of orthodontic treatments is to provide the correct overbite and overjet relationship and maximum interdigitation insofar as the biomechanical limits allow. But orthodontic treatment by itself is not always sufficient in the patients with skeletal malocclusions in addition to dental problems (15). The treatment of Class III malocclusions with skeletal disharmony varies depending on the patient's age and different skeletal and dental characteristics. Treatment directed at correcting a skeletal deformity in adult individuals whose growth potential is completed is performed with either of two options (15). The first one of these options is accepted as correcting the skeletal deformity by means of a combination of orthodontics and orthognathic surgery, and the other one as camouflaging the malocclusion via orthodontic tooth movements (15).

Skeletal Class III anomaly is one of the most challenging problems confronting an orthodontist. Surgical treatment of skeletal Class III malocclusion is performed according to the source of malocclusion: mandible is taken back with sagittal split osteotomy, maxilla is taken forward by Le Fort 1 osteotomy or both operations are performed together. However, when choosing this treatment option, surgical complications and increased cost should be considered. If orthodontic camouflage treatment is thought to be successful this treatment option should be given priority (6,16). By orthodontic camouflage treatment of Skeletal Class III anomaly it is thought generally that maxillary incisors will protrude and mandibular incisors will rotate backwards and downwards (17).

In this case mandibular premolar tooth extraction was not performed for the treatment of Class III malocclusion and the anterior cross-bite was tried to be overcome by turbo effect. Stripping was performed using Bolton excess in the mandible and the lower incisors were retracted. The improvement in the inclination of the lower incisor axis helped the protrusive lower lip to become to the ideal position, which resulted in a satisfactory improvement in the profile (18-22). Downward and backward rotation movement was observed in the mandible. Previous studies emphasized that the goal of treatment should be to correct the profile. In this case, retrusion of the upper lip was obtained as a result of the upper incisor protrusion and a facial profile close to ideal was achieved (6,11,23).

When treatment option for class III malocclusions is being determined, treating the anomalous skeletal component is important for successful treatment outcome. A combination of rapid maxillary expansion and face mask therapy has been in practice for many years in the treatment of Class III malocclusion arising from a maxillary deficiency in growing patients (24-26). It was reported by some researchers that surrounding maxillary sutures were opened with rapid maxillary expansion and this action positively affected the upper jaw advancement. However, side effects emerging from the rapid maxillary expansion and especially not being able to prevent relapse led researchers in pursuit of a new effective expansion method that will be used prior to maxillary protraction and which would not only be effective on midpalatal suture but also the surrounding sutures and could be employed in the cases where jaw disharmony has to be treated without maxillary expansion (27). In a study conducted with growing individuals with cleft lip and palate, rapid maxillary expansion constriction method was used and this method was defined as alternate rapid maxillary expansion and constriction (27). It was reported that in order to advance maxilla more effectively creating an elevation in the sutures that connect maxilla to the skull base was necessary. Because of this, Alt-RAMEC procedure was disputed in the literature. Liou, likens Alt-RAMEC procedure to the forward-backward forces that are applied in the vestibular and lingual directions during the extraction of a tooth and reports that sutures around the maxilla are elevated by opening and closing the screw that is used in this method for one week each (27). It was reported that the forces created during the opening-closing process of the maxillary screw affect and loosen the sutures around the maxilla and in this way maxilla was able to be advanced more easily and effectively (27-29). If with this case Alt-RAMEC protocol was applied before the orthodontic treatment, point A could have been advanced more and thus SNA angle's increase and a more significant correction in the soft tissue profile could have been achieved.

As a result of orthodontic camouflage treatment of skeletal Class III malocclusion, a favorable occlusion and a harmonious esthetic profile were achieved. Absence of tooth extraction and short treatment duration are other factors that may increase patient satisfaction during orthodontic camouflage treatment. In conclusion, in this case report, it is seen that a treatment suitable with the needs of the skeletal Class III patient who came to our clinic in the period her skeletal maturation was completed. Patients expectations were met and patient satisfaction was achie.

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