

CASE REPORT

Treatment of Severe Anterior Protrusion Using Maximum Anchorage of Intra-maxillary

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ABSTRACT

The dental protrusion is the second highest case of malocclusion after crowding. This case report aims to discuss orthodontic management of class II malocclusion with severe anterior protrusion. The patient's profile is convex, 8 mm overjet, 5 mm overbite, the positive curve of Spee, and the lips are incompetent. To obtain good anchorage and avoid the happening anchorage loss, ideally, the additional anchorage is required. Additional anchorage requires good patient cooperation and takes a large amount of extra cost for the addition of the anchorage. Based on these considerations, the management of this patient was carried out using only the maximum intramaxillary anchorage and the edgewise standard bracket. After 2 years and 4 months of treatment, the goal of treatment to improve the patient's aesthetics was achieved. The incisor inclination was normal, the curve of Spee was flat, and the overjet and overbite were normal at 2 mm. The lips become competent and can close completely in a relaxed position.

Keywords: Class II Malocclusion; Severe Protrusion; Intra-maxillary Anchorage

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INTRODUCTION

At the stage of diagnosis and treatment planning of a case, the ultimate goals of the incisor position should be considered which will affect the patient's profile. According to Tweed's treatment philosophy, the most important step in the edgewise mechanism and clinical orthodontics is anchorage preparation. The need for anchorage will vary from case to case. There are two main aspects to controlling anchorage. First, the reduction of anchorage needs during leveling and aligning. Sometimes it is necessary to minimize factors that could compromise the anchorage and which could lead to unwanted tooth movement. Second, anchorage support or additional anchorage to help control certain teeth or groups of teeth (1).

Graber divides these anchorage types according to their location. Extraoral anchorage: when the anchor unit is outside the mouth; intraoral anchorage: when the anchor unit and driven unit are inside the mouth; intra-maxillary anchorage: when the

anchoring unit and driven unit are in the same arc; and inter-maxillary anchorage: when the two units are located on different jaws. Even in the current development, skeletal anchorage system with screw installation has also started to be widely used (2,3).

In these additional anchors, almost all of them need good cooperation from the patient to achieve the expected results. In addition, a large additional cost is also required for the addition of anchoring tools such as the headgear or miniscrew earlier. This of course can be burdensome for patients who are disadvantaged economically. Therefore, in this case, the management was carried out only by using the maximum intramaxillary anchorage and selecting the bracket using the edgewise standard.

CASE REPORT

Female patient, age 13 years, class II malocclusion with severe anterior protrusion. The protrusion also causes a deep bite and a positive curve of Spee. The patient's profile is convex and the lips are incompetent. The positive curve of Spee 4 mm, overjet 8 mm, overbite 5 mm. The sagittal relation of the right and left canines is a cusp to cusp, while the first molar relation is neutroclusion (Fig.1).

Pre-treatment cephalometric evaluation showed SNA 75o, SNB 70o, and ANB 5o. The angle of the occlusal plane concerning S-N is 24o due to the positive curve of Spee. The angle of the upper incisor to N-A and the angle of the lower incisor to N-B are both highly protrusive (Table I).



Figure 1 : Extra and intraoral view showing severe anterior protrusion before treatment. The image shows a convex facial profile with incompetent lips and severe overjet.

Treatment

The treatment plan was to extract all four first premolars. The bracket chosen was using a standard 0.018 inch edgewise bracket and the anchorage was planned intra-maxillary. To strengthen the anchorage, banding was performed on all first and second molars. In addition, to prevent anchorage loss, the extraction of the first four premolars was postponed during the initial leveling and aligning stages until all teeth were in the correct arch and curve of Spee.

Before canine retraction, the intra-maxillary anchorage was maximized. In addition to including the second molar which has been compared to the

anchorage unit, a second order bend was made on the arc in the vertical direction using a 0.016 x 0.022-inch rectangular wire. The anterior retraction was performed using an arch loop with torque in the anterior region to obtain crown and root movement in a labio/buco-lingual direction. Anterior retraction is performed gradually with light force.

Treatment Result

After 2 years and 4 months of treatment, the goal of treatment to improve the patient’s esthetics was achieved. The incisor inclination was normal, the curve of Spee was flat, the overjet was normal from 8 mm to 2 mm, palatal bite corrected, overbite to 2 mm and canine relation to neutroclusion (Fig.2). Cephalometric evaluation after treatment showed the angle of the occlusal plane to S-N to be 21°. The angle of the upper incisor to N-A and the angle of the lower incisor to N-B became normal (Table I). The lateral cephalometric super imposition before and after the correction is shown in figure 3.



Figure 2 : Two years and four months after orthodontic treatment. Severe overjet corrected, resulting in a better facial profile with competent lips.

Table I : Subjective Measures Before and After Orthodontic Treatment

Component	Normal Range	Before Treatment	After Treatment
SNA	81 ± 3°	75°	74°
SNB	78 ± 3°	70°	70°
ANB	3 ± 2°	5°	4°
SN – Occlusal Plane	14°	24°	21°
SN - Mandibular Plane	32°	44°	42°
U1 – NA (degree)	22°	36	16°
U1 – NA (mm)	4	12	5°
L1 – NB (degree)	25°	41	36°
L1– NB (mm)	4	10	7



Figure 3 : Lateral cephalometric superimposition before and after the treatment (black: before the treatment; green: after the treatment).

DISCUSSION

Anchorage is a way to restrain the movement of several teeth in orthodontic treatment that can be done by several techniques. Teeth, bone, intraoral implants, or extraoral devices such as headgear, can be sources used as anchorage. Tweed mentioned that anchorage preparation should be the operator's initial concern to achieve successful orthodontic treatment. Production of unstable anchorage will cause anchorage loss.

In this patient, management was carried out using maximal intramaxillary anchorage which could be applied to patients who were less cooperative and economically disadvantaged. The bracket selection uses the edgewise standard because it is good for controlling anchorage and the price is more affordable. While the use of pre-adjusted brackets in the early stages can cause anchor loss and tend to cause anterior teeth proclination (4). Anchorage loss that can occur in cases with premolar extraction is that the posterior teeth, usually the first molars, tend to move mesially during the closure of the premolar extraction space.

The selection of the standard edgewise bracket, in this case, gives the advantage that the edgewise Tweed orthodontic technique can be used, namely on stainless steel archwires, molar tip-back bands are made. The wire banding technique can direct the first molar distal tipping to reinforce anchorage and prevent mesial tipping of molar teeth. Another technique used to prevent anchorage loss is delaying the extraction of premolars. Cases with mild crowding (<4mm) can effectively assist in anchorage preservation in cases of conventional extraction

treatments. In this case, there are also a few teeth that are rotated and a positive curve of Spee. Extraction is carried out after the leveling stage is reached, and the curve of Spee is normal.

The six anterior teeth can be retracted by two methods: mass retraction of the six anterior teeth or two-stage retraction. In this case, the two-stage retraction was chosen to prevent anchorage loss. The two-stage retraction was performed by retraction of the canines first followed by retraction of the four anterior teeth (5). The two-stage retraction was performed in orthodontic treatment using Edgewise standard fixed appliance. Canine retraction is usually performed on 0.018" stainless steel wire with a sliding mechanism using a power chain, while retraction of the four anterior teeth is performed using a closing loop with stainless steel rectangular wire. A rectangular stainless steel wire measuring 0.016" x 0.022" is required for anterior tooth extraction on a bracket with a 0.018" slot.

Two-stage retraction using a loop mechanism eliminates friction between the archwire and bracket, predicts tooth movement, and minimizes anchorage loss. This is because the load on the anchorage teeth will be lighter during the retraction of the canines alone compared to the retraction of the six anterior teeth. Canines can also be used to strengthen anchorage when extracting all four anterior teeth (5).

CONCLUSION

The management of cases of severe anterior protrusion in orthodontic treatment with the Edgewise standard bracket can provide good results using maximum intra-maxillary anchorage. Good anchorage preparation is required, delaying retraction and performing two-stage retraction.

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