



ARCH DEVELOPMENT FOR MODERATE CROWDING USING SELF LIGATING BRACKETS: A CASE REPORT

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ABSTRACT

The use of self ligating bracket system is gaining popularity because of its effectiveness in treating patients with moderate crowding using a non extraction therapy. The author report a case of 14 year 3 months old female who presented to the orthodontic clinic with moderate upper and lower anterior crowding, proclination of upper anterior and increased overjet and overbite. It was decided to treat the case with non extraction orthodontic therapy using self ligating bracket system. Following 28 months of treatment time, there was a favorable outcome in the profile of the patient. The patient presented with Class I molar and canines relationships bilaterally with normal overjet and overbite after the conclusion of the treatment. The present case study demonstrates that self ligating bracket system could be feasible choice in treating moderate to severe crowding cases without extraction therapy.

KEYWORDS: Crowding, Self-Ligating Brackets, Damon Brackets, Non extraction

INTRODUCTION

The advent of Damon system by Dwight Damon in 1990's is gaining importance at a rapid pace among the orthodontist worldwide.¹ This is due to the fact that Damon bracket system have revived the non extraction orthodontic therapy in resolving minor to moderate crowding cases.² The Damon system incorporates low force and low friction wire technology with the use of passive self-ligating brackets.³ They have several advantages over the traditional or ligated bracket system such as saving time during appointments, enhanced efficacy of

treatment, increased patient comfort and excellent final treatment results.⁴

Furthermore, the friendly light forces in Damon system do not affect the oral musculature. The expansion in the damon system occurs at the posterior region which is the path of least resistance.^{5,6} The anterior movements of incisors are restricted by perioral muscles, the orbicularis oris and the mentalis muscle. Damon further stated that with his system, there is no significant change in the mandibular intercanine width and very minimal labial movement of incisors do occur.⁵

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CASE PRESENTATION

A 14 years 3 month old Saudi patient presented to Orthodontic clinic with a chief complaint of crooked upper and lower teeth. The patient had no history of any significant medical and dental history. On examination, she had mesocephalic face with equal facial proportion. The profile was straight with inconsonant smile and lips were competent with slightly retrusive upper lip (Figure 1). On intra oral examination, the patient had class 1 molar relation bilaterally. The overjet was 4mm and overbite was 60%. The anterior crowding was 6mm in upper arch and 7mm in lower arch. The patient had a slight buccal corridor. Upper dental midline was shifted to the left for 1mm relative to the facial midline (Figure 2). The radiographic examination revealed normal morphology of the condylar head and neck, no bony pathologies and normal maxillary sinus borders. The cephalometric radiograph presented with slight skeletal class I relationship with equal facial proportion. Upper teeth were slightly proclined and lower teeth were normally positioned. The soft tissue analysis presented with obtuse naso - labial angle with retrusive upper lip (Figure 3).

After complete intra oral and extra oral examination and radiographic analysis, the patient was diagnosed with Angle's class I malocclusion with moderate upper and lower anterior crowding and proclination of upper anterior and increased overjet and overbite.

The treatment objective was to improve the lips position, harmony and smile esthetics in soft tissues. Dentally the objective was to relieve upper and lower crowding, achieve normal overbite and overjet and to correct upper midline deviation.

After considering all the aspects, it was planned for Comprehensive, non-surgical, non-extraction orthodontic treatment. Damon® self ligating bracket (Ormco Corporation, Orange, California, USA) system was used for treatment as there was scope for expansion in both lower and upper posterior region. The self-ligating brackets can be a good

treatment option for cases with moderate to severe arch crowding where extraction is not indicated because of an acceptable or obtuse profile as seen in the present case which helps to develop the arch posteriorly.

The upper and lower 6's were bonded and Damon prescription bracket (0.022-in, Straight Wire) was bonded from premolar to premolar. The treatment stages included a) Leveling and alignment, b) Interproximal reduction and c) finishing and detailing. The retention plan was upper wrap around Hawley retainer and a lower canine to canine fixed retainer.

The initial leveling and aligning was carried out using 0.014 X 0.025" Damon Copper NiTi. After the initial arch wire a 017 X 0.025" copper NiTi was placed for the sequential leveling. A TMA wire of 017 X 0.025" in upper and lower arch was placed to start finishing and detailing process. Box elastic with class II component (4.5 oz, ¼) was placed for midline correction. After discontinuing box elastic, power chain was placed from molar to molar in both arches. The total treatment duration was 28 months.

The post treatment extra oral photographs showed a favorable outcome in the profile of the patient (Figure 4). The post treatment intra oral photographs showed a Class I molars relationships bilaterally with normal overjet and overbite. The upper and lower midline was in straight line (Figure 5). Following the conclusion of the treatment procedure, upper wrap around retainer and lower canine to canine fixed retained were placed.

The cranial base superimposition showed forward and downward movement of nose tip by 1 mm, forward and upward movement of upper lip by 0.5mm, forward and downward movement of lower lip by 0.5mm, forward movement of soft tissue pogonion (Pog') by 1mm and downward and forward movement of mandible (Figure 6).

The comparison of pre and post treatment cephalometric readings demonstrated overall growth of face and forward movement of upper and lower incisors (Table 1).



Fig. (1) Pre treatment extra oral photographs



Fig. (2) Pre treatment intra oral photographs



Fig. (3) Pre treatment radiographs A) orthopantomograph B) Lateral Cephalogram

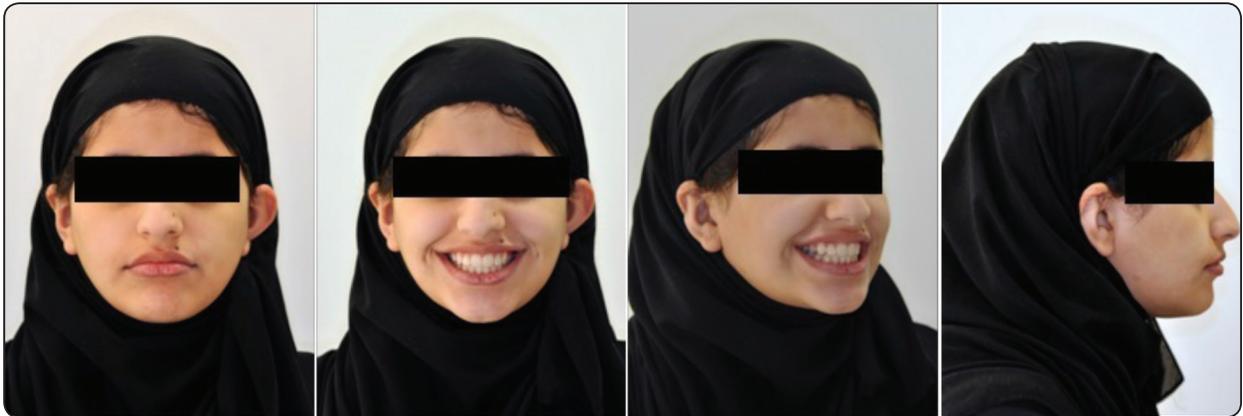


Fig. (4) Post treatment extra oral photographs



Fig. (5) Post treatment intra oral photographs

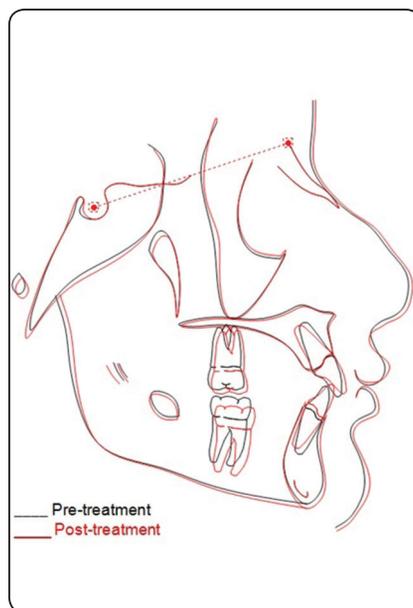


Fig. (6) Cranial base superimposition

TABLE (1) Comparison of pre and post treatment cephalometric measurements

Measurements	Normal values	Pre-treatment values	Post-treatment values
Sagittal Relationship			
SNA	$82^{\circ} \pm 2^{\circ}$	82°	82°
SNB	$80^{\circ} \pm 2^{\circ}$	78°	79°
ANB	$2^{\circ} \pm 2^{\circ}$	4°	3°
Wits Appraisal	-1 to 0 mm	4 mm	5 mm
SN-Pog	$80^{\circ} \pm 3^{\circ}$	79°	79.5°
NA-A Pog	$0^{\circ} \pm 5.1^{\circ}$	8°	11°
NSBa	$130^{\circ} \pm 6^{\circ}$	134°	135°
Vertical Relationship (Divergence)			
SN to Palatal Pl.	$8^{\circ} \pm 3^{\circ}$	9°	13°
SN to Mand. Pl.	$32^{\circ} \pm 5.1^{\circ}$	29°	34°
Palatal Pl. to Mand. Pl.	$25^{\circ} \pm 3^{\circ}$	22°	27°
Y-Axis (N-S-Gn)	$59.4^{\circ} \pm 3.8^{\circ}$	60°	65°
Face Height (ANS-Me/N-Me)	$55\% \pm 3\%$	51 %	56 %
Dental Relationship			
U Inc. to L Inc.	$131^{\circ} \pm 5^{\circ}$	130°	120°
U Inc. to SN	$104^{\circ} \pm 2^{\circ}$	106°	109°
U Inc. to Palatal Pl.	$110^{\circ} \pm 6^{\circ}$	108°	118°
U Inc. to NA	$22^{\circ}/4 \text{ mm}$	$22^{\circ}/4 \text{ mm}$	$26^{\circ}/6 \text{ mm}$
L Inc. to NB	$25^{\circ}/4 \text{ mm}$	$25^{\circ}/4 \text{ mm}$	$32^{\circ}/8 \text{ mm}$
L Inc. to A Pog	$1 \pm 2 \text{ mm}$	3 mm	6 mm
L Inc. to Mand. Pl.	$93^{\circ} \pm 6^{\circ}$	96°	108°
Soft Tissue Relationship			
U Lip to E-line	$-4 \pm 2 \text{ mm}$	-4.5mm	-4 mm
L Lip to E-line	$-2 \pm 2 \text{ mm}$	3.5mm	-1mm
Nasio-Labial Angle	$90^{\circ}-110^{\circ}$	105°	98°

DISCUSSION

The introduction of self ligating bracket dates back to 1930's when Stolzenberg introduced the Russell attachment.⁷ The Russell attachment was more pleasant to the patient and had a reduced visit time. The lack of promotion or less popularity at

that time resulted in disappearing of the Russell attachment from the market⁸. The interest in self ligating bracket has been revived in past decades with the introduction of new bracket systems into the market. These bracket systems are reported to have many advantages over the conventional edgewise bracket system.^{5,9,10}

The self-ligating brackets are of two types based on their mechanisms of closure; active and passive. The active types of brackets have a spring clip that stores energy and presses against the archwire and provides active seating force on the archwire thus ensuring engagement for rotation and torque control. The examples of active type of brackets are In-Ovation, SPEED and Time. In the passive self-ligating brackets, the clip does not press against the archwire but these brackets use a rigid door to hold the archwire providing more room for the archwire. Damon and SmartClip are the popular brands of passive type.⁸ The most renowned self-ligating bracket system is the Damon system introduced by Dr. Dwight Damon in 1996.¹¹

The advantages of the self-ligating bracket are reported after comparing the performance with the conventional edgewise brackets. The reduced friction with self-ligating brackets is the primary advantage over conventional brackets system. The reduced friction requires less force to bring the tooth movement.^{3,12} The self-ligating brackets are reported to produce more physiologically harmonious tooth movement without much effect on the musculature and interruption with the periodontal vascular supply.¹⁰ So this result in more alveolar bone generation, increased expansion, less proclination of anterior teeth and less need for extractions. Other advantages include reduced friction between archwire and bracket, reduced orthodontic forces, better alignment and occlusal outcomes, decreased treatment time, faster alignment, faster space closure, different arch dimensions, less patient discomfort and improved oral hygiene.

The self-ligating brackets do possess some disadvantages such as high cost, possible breakage of the slide or the clip, complicated mechanical design, more occlusal interferences and lip discomfort and difficulty in finishing due to incomplete expression of the archwires.⁸

The main objective of the present case report was to demonstrate a more efficient method of managing

moderate crowding cases. This is important because such cases are usually treated by extraction of upper and lower first premolars by pre-adjusted edgewise appliance. The present case used self ligating Damon brackets with non extraction approach for treating moderate crowding.

Previous studies have reported that in non extraction therapeutic approach to treat crowding cases, expansion of the buccal segments together and advancement of the mandibular incisors is necessary.^{2,6,13} The Damon self ligating bracket produces passive expansion effect by copper NiTiwires used throughout the treatment. Additionally mandibular intermolar width would also increase significantly compared to the conventional bracket system.⁵

CONCLUSION

The present case study demonstrated that Damon self ligating bracket system could be feasible choice in treating moderate to severe crowding cases without extraction therapy.

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