

Management of Partially Impacted Canine with Damon Philosophy: A Non-extraction Case

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Abstract

Background: Correction of partially impacted canine cases in orthodontics is very challenging without the extraction of premolars. According to Buchin, any case is borderline when extraction of permanent teeth is required for an ideal and functional occlusion, but facial esthetics might get disturbed due to extraction, so a dichotomy exists diagnosis and treatment planning of borderline cases. This case report describes a case of young Indian female having buccally placed, partially impacted canine of maxilla. This case was managed with a combination of non-extraction and DAMON philosophy using ceramic self-ligating bracket system.

Keywords: Partially Impacted, Buccally placed canine, Non-extraction, Ceramic self-ligating, DAMON.

INTRODUCTION

Damon™ Self-ligating bracket system, a synonym for non-extraction treatment, works on expansion principle. Self-ligating system (SPEED, TIME, DAMON Q, etc.) is not new in orthodontics but its popularization is quite new, as history of self-ligating system starts from Russell attachment, first Self-ligating system. The Damon™ philosophy works on the principle of using threshold force. A very low force when applied, lip restricts anterior movement of the dentition and the tongue contribute to posterior expansion.^[1] A secure passive or active ligation mechanism that ensures predictable full brackets engagement, decreased friction between the arch wire and the brackets that permit progressively quick tooth movement, great control of tooth position through a sufficiently dimensioned brackets, less chair side time, quicker arch wire removal, and ligation.^[2] A number of case reports have documented increased arch length with the Damon Self-ligating system, up to more than 10 mm in intermolar region that facilitates non-extraction. The long-term stability of this significant change is highly reliant on permanent retention.^[3] Self-ligating brackets have purported advantages in efficiency, effectiveness, and patient centeredness. This proposed advantage arises from the unique combination of low friction and good control that such brackets provide. This combination enables light forces to rapidly align teeth with the advocates of this system believing that there is much less need for extraction to provide space for tooth movement.

CASE REPORT

A 14-year-old female patient comes to the department of orthodontics and dentofacial orthopedics with the chief complaint of irregularly placed teeth in the upper front region of jaw. No relevant medical history was given and the dental history of root canal treatment with respect to 36 followed by stainless steel crown was given by the patient.

Significant extraoral clinical finding reveals that the patient has a straight facial profile, with a straight facial divergence having a brachycephalic head shape and mesoprosopic facial form.

Patient showed an orthognathic chin with a vertical pattern with average nasolabial angle (Figure 1) and competent lips (Figure 2). Intraoral finding reveals Angles Class I molar relationship bilaterally with 100% of incisor display without any gingival exposure. Due to high labial placement of the upper canines, the canine relationship cannot be recorded. A “U shaped” maxillary and mandibular arch, with proclined maxillary incisors and 2 mm of overjet and 3 mm overbite was seen (Figure 3). The oral hygiene status of the patient was good. TMJ examination shows no history of pain or clicking

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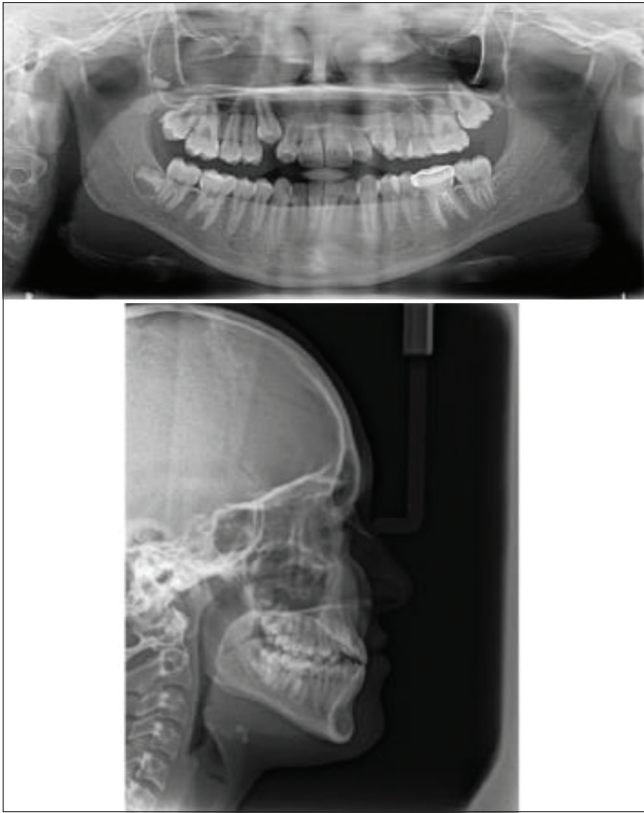


Figure 1: Pre-treatment radiographs

while various jaw movements. The right and left excursive movements were normal with a maximum mouth opening of 46 mm.

In the cephalometric findings, SNA-82°, SNB-82°, ANB-0°, FMA-24°, IMPA-86°, and Inter incisal angle-124° (Table 1). On Model Analysis, the Arch perimeter analysis concluded a 2.5 mm of maxillary tooth material excess and Carey's analysis showed 2.75 mm mandibular tooth material excess. Bolton says mandibular anterior tooth material excess of 3 mm while overall mandibular tooth material excess was 2.12 mm.

Treatment objective

Treatment objectives involved providing the fixed orthodontic treatment to level and align the teeth in both the arches. Dental corrections included achieving an ideal overjet and overbite, aligning of maxillary canines in the occlusion, rotation of the premolars, development of both arches, crowding and rotation in the mandibular anterior region, and Class I molar and canine relationship. Soft-tissue corrections include improvement of profile, correction of nasolabial angle and mentolabial sulcus, and correction of smile, followed by wrap around retainer in the upper arch and fixed lingual bonded retainer in the lower arch.

Treatment alternative

1. Non-extraction approach, as with Damon™ self-ligating system
2. Extraction 14, 24, 34, 44 for achieving better smile and esthetic.



Figure 2: Pre-treatment extraoral photographs

Table 1: Pre- and post-cephalometric values

Parameters	Pre-treatment	Post-treatment
SNA	82°	83°
SNB	82°	81°
ANB	0°	2°
Wits (AO-BO)	-6 mm	-4 mm
UI-NA	34°, 6 mm	33°, 6 mm
LI-NB	22°, 5 mm	26°, 5 mm
FMA	24°	34°
IMPA	86°	84°
Interincisal Angle	124°	121°
Nasolabial Angle	87°	93°
Mentolabial Sulcus	145°	121°

Treatment plan

Both treatment alternatives were discussed with patient and her parents. Patient was willing for non-extraction.

Treatment progress

Fixed orthodontic appliance with a pre-adjusted edgewise appliance of 0.022-inch slot (Damon™ Clear2) bracket prescription was used (Figure 4). For the beginning of arch form development and initial leveling, 0.013-inch light round



Figure 3: Pre-treatment intraoral photographs

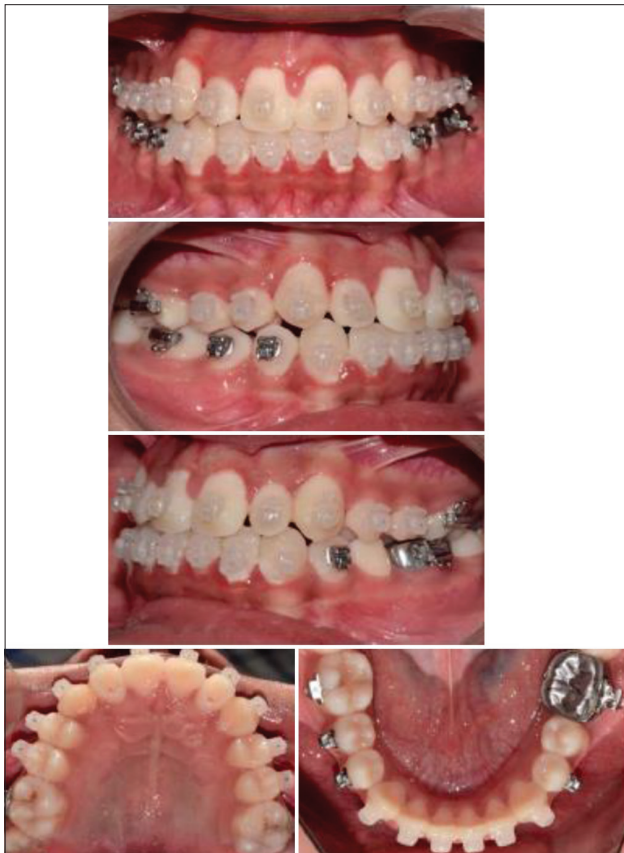


Figure 4: Mid-treatment intraoral photographs



Figure 5: Post-treatment intraoral photographs

copper NiTi wires were used in both upper and lower arches. Further, 0.014×0.025 -inch copper NiTi, a great transition wire was used. Later, 0.018×0.025 -inch copper NiTi wire was used which is an excellent wire to prepare for insertion of the working rectangular stainless steel transition wire. For maintaining the integrity of the arch, 0.019×0.025 -inch SS wires were used during anteroposterior correction and final settling. At last, 0.013 -inch copper NiTi wires were used again for final finishing and detailing.

Treatment result

In this case, partially impacted labially placed maxillary canines were corrected using DAMON™ self-ligating bracket system. Class I molar and canine relationship was achieved with 2 mm of overjet and 1.5 mm of overbite (Figure 5). The comparative cephalometric evaluation showed that SNA was increased by 1° and SNB angle was reduced by 1° showing a stable Class I skeletal base (Figure 6). The nasolabial angle was increased by 7° and mentolabial sulcus was reduced by 24° improving the initial profile of the patient (Figure 7). The mandibular plane angle was increased by 10° showing a downward and forward rotation of the mandible with increase in the lower facial height (Figure 8). S line was improved from negative to positive (Figure 9).

Thus, the cephalometric skeletal analysis showed that the mandibular length was increased and drifted forward and rotated downward. The treatment contributed to an increase

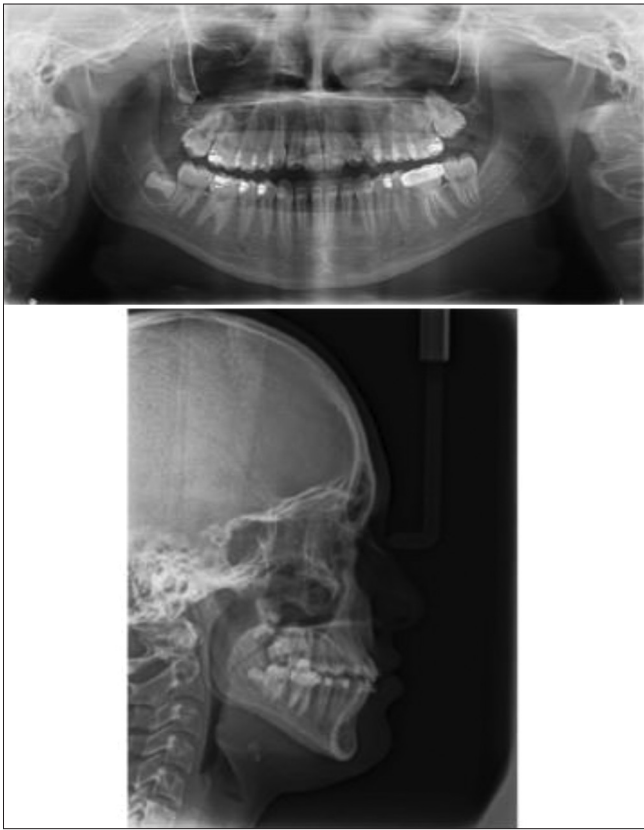


Figure 6: Mid-treatment radiographs



Figure 8: Mid-treatment extraoral photographs

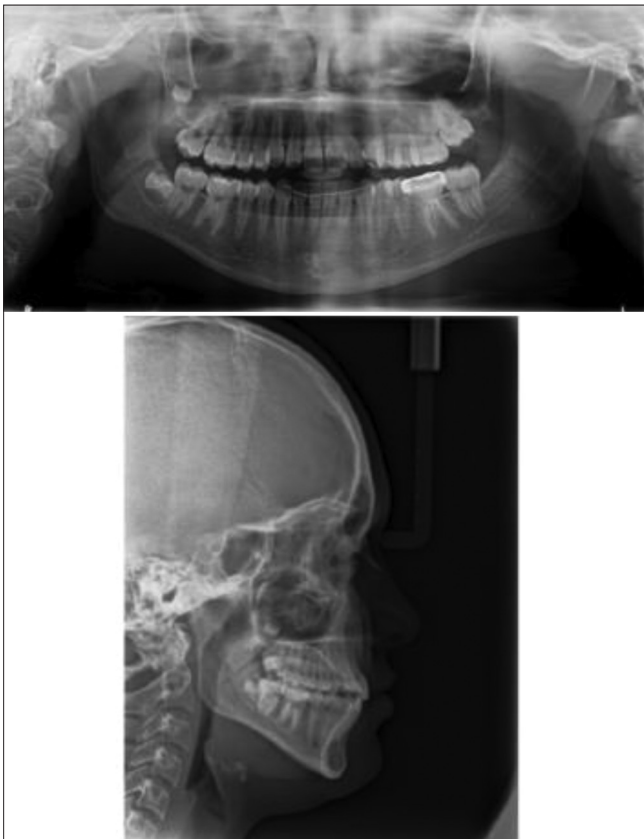


Figure 7: Post-treatment radiographs



Figure 9: Post-treatment extraoral photographs

in the mandibular prognathism (SNB, 81°), better maxillary positioning (SNA, 83°), and an improvement in sagittal relationship between maxilla and mandible (ANB, 2°) (Table 1).

DISCUSSION

An impacted or unerupted canine tooth is usually easy to diagnose, but the skill and expertise of the orthodontist, the oral surgeon, and the general practitioner are needed to bring it to its proper position.^[4] According to Moyers, “The maxillary cuspid follows a more difficult and tortuous path of eruption than any other tooth. At the age of 3 years it is high in the maxilla, with its crown directed mesially and somewhat lingually.” The canine changes its position in the bone: At first, its crown lies in close proximity to the distal aspect of the root of the lateral incisor. As it erupts farther into the oral cavity it tends to upright itself and finally assumes its position in the arch.^[5] Johnston further noticed that labially impacted canines are more difficult to manage because ordinarily there is lack of room in the bony trough for one tooth to pass the other.^[4] Class I malocclusion was treated by: Extraction and non-extraction alternatives. Extractions are done to correct crowding, protrusion and the overlying soft tissue. In non-extraction cases expansion of the arches, molar distalization or proximal stripping is done. Straight soft-tissue profile and upright incisor position are pre-requisite for non-extraction.^[6]

Compared with conventional pre-adjusted edgewise appliances, it is suggested that the use of passive self-ligation results in a significant reduction in the need for extractions to facilitate orthodontic mechanics because alignment is not hindered by frictional resistance from ligatures and can therefore largely be achieved with small diameter copper nickel titanium archwires. In non-extraction cases, the tooth alignment results in significant posterior expansion without the need for auxiliary expanders such as rapid maxillary expansion and quad helices or W springs.^[1]

CONCLUSION

The Damon self-ligating bracket (Ormco, Glendora, Calif) was developed as an integral component of a low-friction appliance. It has been suggested that the low-level friction

associated with this bracket encourages more rapid leveling and alignment, allowing longer appointment intervals, and reducing overall treatment time. The primary outcome measure was rapidity of tooth alignment, although secondary outcome measures included changes in root length and associated changes in arch dimension. The DAMON passive edgewise self-ligation system provides three key features: Very low levels of static and dynamic friction, rigid ligation due to the positive closure of the slot by the gate or slide, and control of tooth position because there is an edgewise slot of adequate width and depth.

DECLARATION OF PATIENT CONSENT

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

CONFLICTS OF INTEREST

The authors declare that they have no potential conflict of interests regarding this article.

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