Orthodontic management of transposed tooth, impacted and ectopic canines, midline shifting and crossbite correction by fabrication of a CAD/CAM made temporary bite raising crown.

Mohammad Khursheed Alam [1,2,3*]

ABSTRACT

Background

Patients presenting with transposed tooth are relatively rare and the aim of the Orthodontist is to manage a healthy, functional, and aesthetically acceptable dentition. The consequences of transposed tooth, impacted and ectopic canines, midline shifting, crossbite include an abnormal occlusion or an altered facial appearance which may lead to psychological distress in some patients.

Methods

The present case report describes a 16 year old Saudi female patient with non-syndromic, transposed tooth, impacted and ectopic canines, midline shifting and crossbite. Clinical examinations revealed multiple malalignment problems. Following fabrication of a CAD/CAM made temporary bite raising crown [TBRC] used to unlock the bite to correct the crossbite #12 and open coil spring to open the space for transposed lateral and other problems corrections are managed using fixed orthodontic braces.

Results

Innovative new technique used to unlock the bite using TBRC to correct the #12 crossbite. Transposed #42 managed successfully after open up the space using NiTi open coil coil spring.

Conclusion

A combined TBRC and Fixed Orthodontic treatment approach can achieve an improved favourable healthy, aesthetics and functioning occlusion.

Keywords

Impacted Canine; Open surgical exposure.

INTRODUCTION

The orthodontic treatment of transposed tooth remains a challenge to today's clinicians. The treatment of this clinical entity usually involves multiple planning by fixed orthodontic treatment to guide and align it into the dental arch. [1] Though there are varied opinions about the etiology of transposed tooth, [2] impacted and ectopic canines, [3,4] it is generally agreed that it is multifactorial with inadequate arch length discrepancy [5] and anterior-posterior growth of the jaws to be the major factor.[6]

Crossbite tooth with locked bite need proper planning. In this case CAD/CAM made TBRC used to unlock the bite. In another case, fixed appliance-based management was not indicated as the patient had locked bite in anterior teeth that resulted in a difficulty in bracket adhesion. Thus, posterior bite plane was planned to unlock the bite for alignment of teeth with fixed orthodontic appliance. [7]

From these figures, it can be assumed that the impact of transposed tooth with multiple malalignments can affect the psychological development of the individual and may in general affect the quality of life. Early diagnosis

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of such transposed tooth, midline shifting, crossbite, impacted and ectopically developing maxillary canines instituting the corrective measures would minimize the negative impact of teeth and boost up the morale and confidence of the individual affected.

Case presentation

Diagnosis

A 16-year-old Saudi female patient was diagnosed with 1: Midline shift, 2: Impacted Canine, 3: Space in lower arch, 4: Malaligned teeth, 5: Labially placed Canine, 6: Transposed Lateral, 7: Crossbite, 8: Buccally placed Canine **(Figures 1)**.

After discussing possible treatment options with patient and her father, they agreed to undergo TBRC and fixed orthodontic treatment in an effort to restore healthy, aesthetics and functional occlusion.

Treatment objectives

The treatment aims were:

(1) to unlock the bite using TBRC
(2) to align transposed #12 in proper occlusion
(3) to align impacted and ectopic canines in proper occlusion
(4) to correct the midline shifting
(5) to achieve normal overjet and overbite
(6) to achieve an acceptable functional occlusion, and
(7) to restore healthy aesthetics.

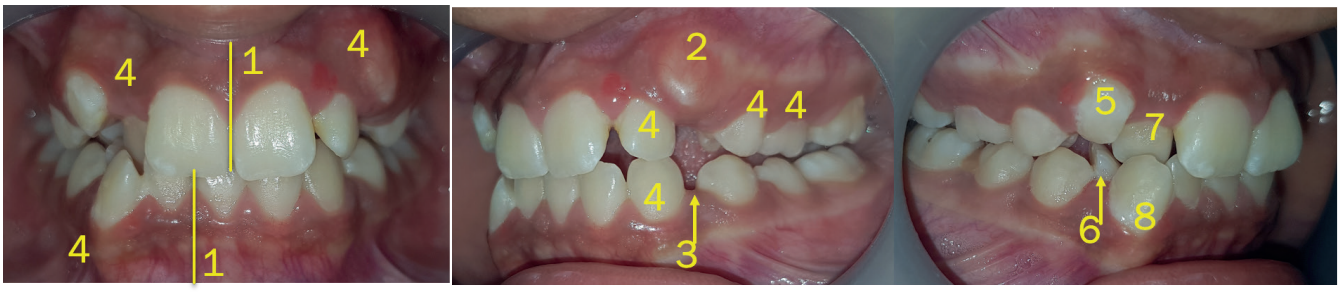

Figure 1. Problem list. 1: Midline shift, 2: Impacted Canine, 3: Space in lower arch, 4: Malaligned teeth, 5: Labially placed Canine, 6: Transposed Lateral, 7: Crossbite, 8: Buccally placed Canine.

Orthodontic treatment

CAD/CAM made TBRC **(Figure 2 and 3)** bonded on lower 1st molar to unlock the bite to manage #12 crossbite using orthodontic fixed appliance on the upper teeth. Conventional Preadjusted Edgewise Appliance

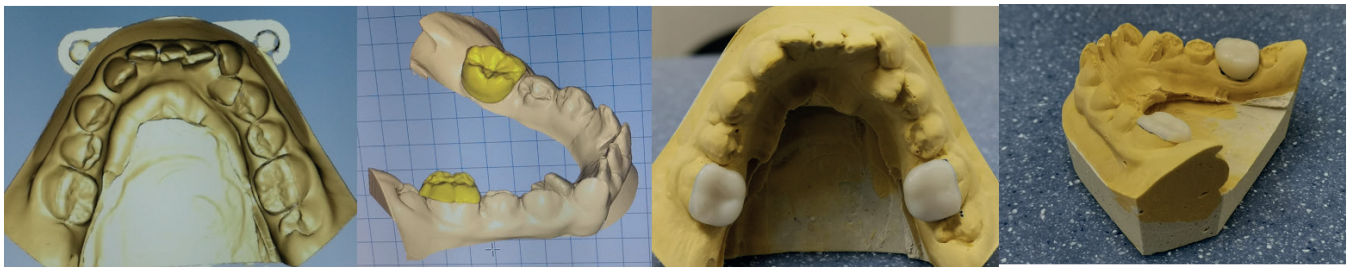

Figure 2. CAD/CAM designed TBRC

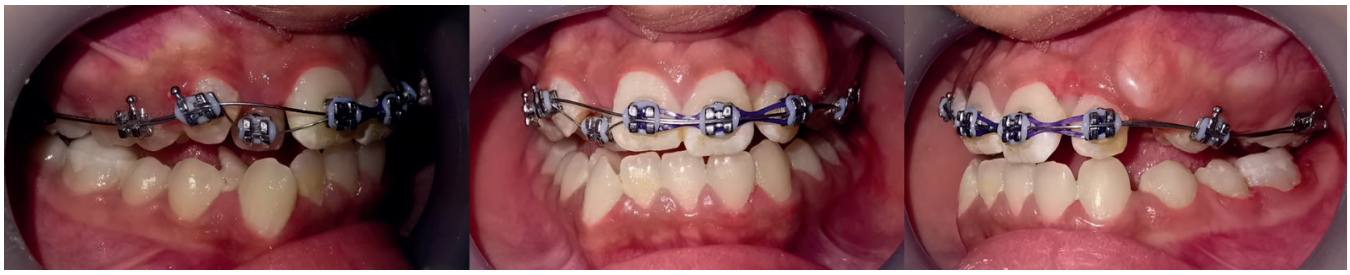

Figure 3. CAD/CAM designed TBRC in-situ

The maxillary and mandibular teeth were levelled with continuous arch wires, starting with 0.012-inch, 0.014-inch, 0.016-inch, 0.016×0.016-inch, 0.017×0.025 super elastic nickel-titanium and progressing to a 0.017×0.025 and 0.019 × 0.025-inch stainless steel wire. Open coil NiTi spring was used to open-up the space for transposed #42 and alignment done using multiple planning to the #12 (Figure 4 and 5).

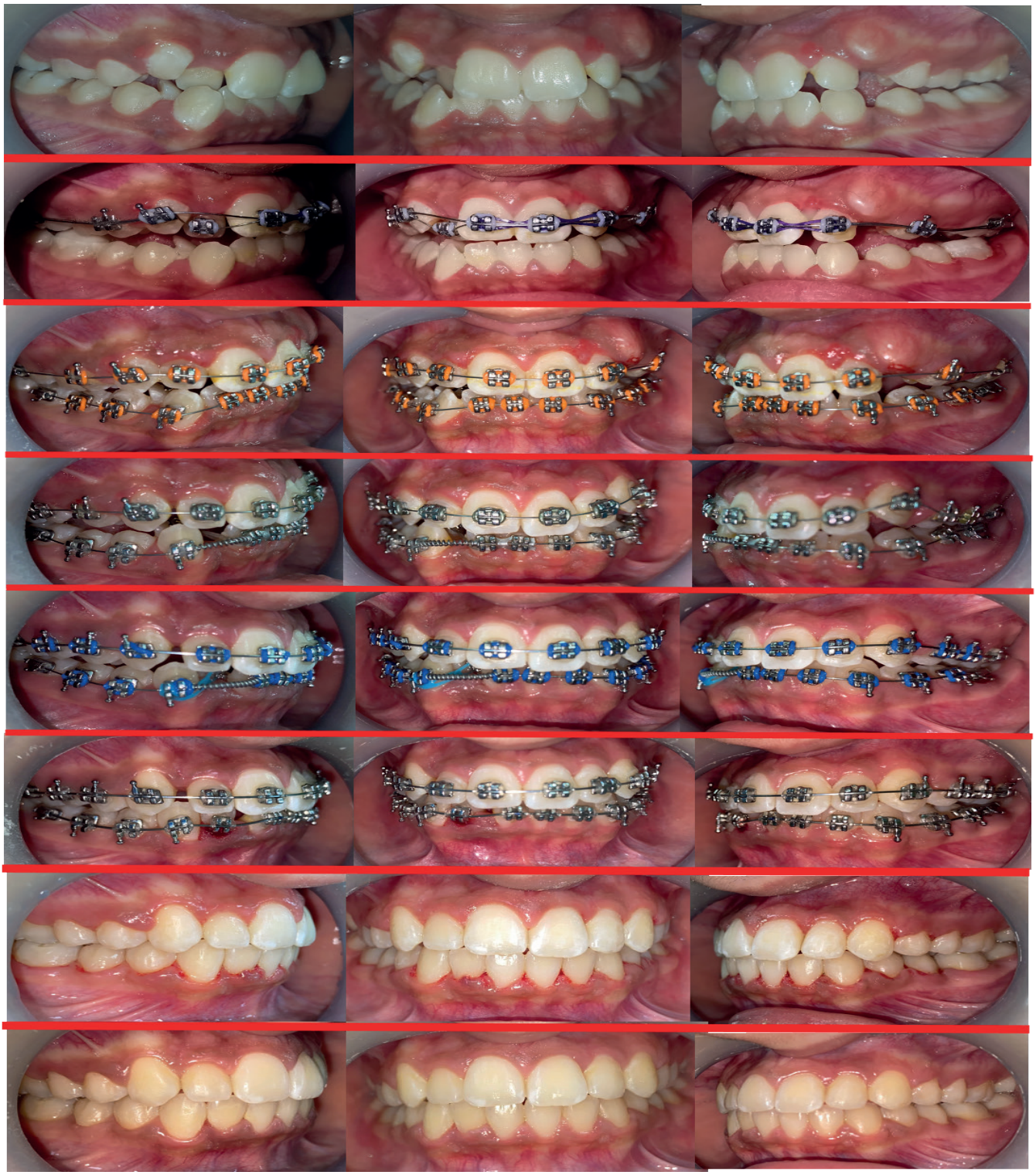

Figure 4. Treatment progress. Initial and progress - intra oral pictures.

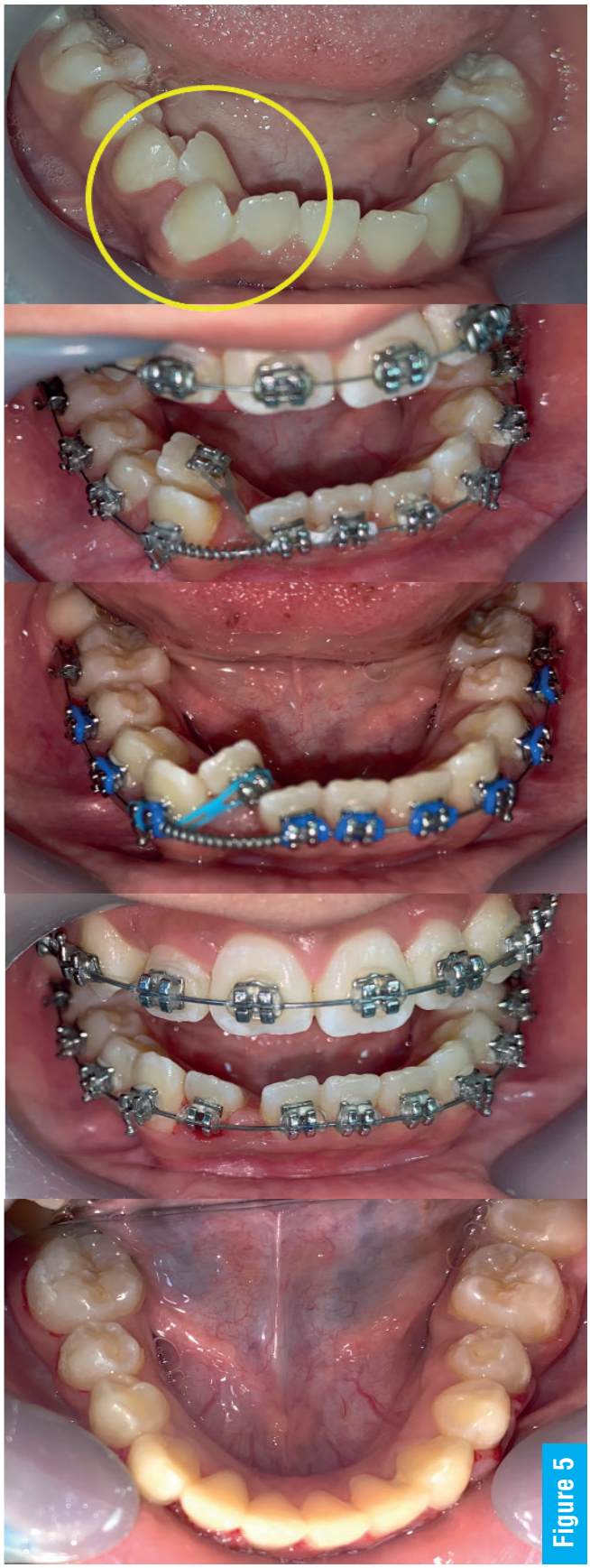

Figure 5. Initial, progress and post-treatment photos of lower arch - transposed #42: Here, lower right lateral incisor is severely rotated and lingually placed in the position of canine. No space left for alignment of the lateral incisor.

TBRC removed after 8 weeks and the fixed orthodontic management lasted for 16 months and was stabilised and finished with bonded rigid wires. The fixed orthodontic appliances were removed and essix form of retainer were provided in both arches. Patient cooperation in the maintenance of oral hygiene was moderate, and the examination after active orthodontic treatment revealed that the clinical status observed at the completion of the treatment and follow-up after a year was excellent (**Figure 6**). The patient was completely satisfied with the results of the TBRC combined with fixed Orthodontic Treatment.

DISCUSSION

Transposed tooth management is one of the most challenging dental anomalies to treat in the orthodontic clinic. [2] Multiple considerations should be taken into account with an observation of making the finest decision to restore healthy smile. [2] Correction of malposed teeth [8], ectopic and impacted canines [3,4], crowding [9], spacing [10], median diastema [11], Class I malocclusion [12], Class II malocclusion cases [13,14], congenitally missing [15], periodontally compromised malocclusion [16], and discrepancies [5] related to the jaw growth and their relation is being done by orthodontics since its inception. Such management has progressive effect on dental health, functional improvement and smile and facial aesthetics. [3-5,8-16]

Management of transposed tooth, ectopic and impacted canine is both time consuming and costly. It involves multiple planning followed by fixed orthodontic braces for 2-3 years to bring the transposed tooth and ectopic and impacted canine into alignment within the occlusion. [2] TBRC used for the first to unlock the bite for the successful management of #12 in crosssbite position. Other mechanism can be used such as posterior bite plane; however, it has demerits too. [7] TBRC can be considered more favorable compared to posterior bite plane.

Londhe et al. [17], uncovered with an apically positioned flap in the management of labially impacted maxillary canines which have more unesthetic sequelae, such

Figure 6. Initial, final and follow-up intra oral pictures.

as enlarged clinical crown length, gingival scarring, intrusive relapse, enlarged width of attached tissue, and impaired periodontium than those uncovered with the closed eruption technique. [17]

With the positive benefit of conventional fixed orthodontic braces technique and slow force mechanics, this case has been successfully finished by 1.8 year only. As the patient and parents was extremely happy with the outcome, and the fixed orthodontic appliances were removed. Essix retainers are used to prevent the relapse. This case report presents the management of multiple malalignment problems such as, transposed tooth, crossbite, ectopic and impacted canine, midline shifting that was applied for restoration of healthy smile, function, aesthetics, and appearance. Proper orthodontic planning and orthodontic treatment may result not only in the restoration of healthy smile, function, and appearance but also manifest an improvement in aesthetics. One year follow-up results are recorded with successful stabilisation of the healthy, aesthetic and functional occlusion.

CONCLUSION

This case report establishes the importance of proper method in therapeutic treatment and restoration of transposed tooth and crossbite by new technique of TBRC and fixed orthodontic treatment to manage multiple malalignments to achieve long-lasting healthy, functional and aesthetic results.

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Author Contributions

Conception and design: MKA

Case management: MKA

Analysis and interpretation of the data: MKA

Drafting of the article: MKA

Critical revision of the article for important intellectual content: MKA

Final approval of the article: MKA

Provision of study materials or patients: MKA

Administrative, technical, or logistic support: MKA

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