



Case Report

ISSN: 2581-3218

IJDR 2020; 5(2): 57-61

Received: 20-07-2020

Accepted: 13-08-2020

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Multidisciplinary Management of a Patient with Multiple Missing Maxillary Incisors

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Abstract

Avulsion of maxillary incisors following dentofacial trauma is common. Management of cases with multiple avulsed maxillary incisors is challenging and requires a multidisciplinary treatment approach. Various issues related to optimum esthetics, static and functional occlusion, restoration, and individualization of orthodontic appliances in the management of such cases are important for optimum results. The present article highlights the multidisciplinary management of a patient with three maxillary incisors avulsion following trauma.

Keywords: Incisor avulsion, Trauma, Orthodontic management, Prosthodontic management, Multidisciplinary management

INTRODUCTION

Avulsion of the multiple maxillary incisors following maxillofacial trauma is very common.^[1,2] The management of patients with multiple missing maxillary incisors often requires a multidisciplinary treatment approach. The maintenance of the incisors space for their prosthetic replacement by either bridge or implant^[3] or by premolar transplantation^[4,5] and closure of the avulsed incisors space by substituting teeth posterior to incisors^[6] are the various options for the management of such problems. However, existing occlusion, patient's age, number of missing teeth, space conditions, soft tissue profile of the patient, and Bolton's discrepancy are the common factors affecting the choice of the best treatment.^[5,7] Replacing the missing teeth by other teeth is considered as the best treatment option and generally patient satisfactory.^[8] Class I space deficiency and Class II molar relationship cases are ideal for space closure by the mesial movement of the teeth posterior to missing incisors.^[5] This case report highlights the multidisciplinary management of a patient with three maxillary incisors avulsion following trauma.

CASE REPORT

A 15-year male patient reported to the Orthodontic Clinic with a complaint of a gap in the upper front teeth region. He had a history of fall from bicycle and trauma to the maxillary anterior teeth at the age of 10 years causing avulsion of the maxillary right central and lateral incisors and left lateral incisor. On clinical examination, he had an apparently symmetrical face with mild convex profile and competent lips. (Figure-1) Intra-oral examination revealed Class II and end-on molar relationships on right and left side respectively. The maxillary right central and lateral and left lateral incisors were absent and there was approximately 2mm of space distal to maxillary left canine. (Figure-1) In the mandibular arch, there was mild crowding in the anterior region with rotated canines and missing right second premolar and retained primary second molar. (Figure-1) The dental midlines were concordant to each other and the facial midline. Orthopantomogram revealed the absence of three maxillary incisors and congenitally missing all third molars and mandibular right second premolar. Various cephalometric parameters are mentioned in the table-1.

Various treatment options were identified and after considering the problems like missing of multiple permanent teeth, underlying skeletal discrepancy, age of the patient, arch-length discrepancy, and

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morphology of the maxillary canines, a conservative multidisciplinary treatment approach was considered. The treatment objective included partial closure of avulsed incisors spaces in the maxillary anterior region, correction of crowding, and finishing the molars in Class I relationship. The treatment plan involved extraction of the retained primary right second molar and the left second premolar in the mandibular arch for the orthodontic treatment and prosthetic replacement of maxillary right central incisor. On the right side of the maxillary arch, the mesial movement of the canine was planned to substitute lateral incisor and replacement of the right central incisor by a prosthesis. On the left side of the maxillary arch, lateral incisor was substituted by canine and all the posterior teeth were planned to move mesially. A diagnostic set-up (Kesling set-up) was constructed to simulate the occlusal scheme for the patient and found satisfactory.

The treatment was divided into two phases; phase-1 included comprehensive orthodontic treatment and phase-2 included prosthodontic treatment for the replacement of maxillary right central incisor. In 1st phase of the treatment, alignment of the teeth, space management in the maxillary anterior region, sequential reshaping of the maxillary canines (the so-called lateral incisors), and the palatal cusps of the 1st premolars (the so-called canines), and Class II molar corrections were carried out. During the comprehensive orthodontic treatment, a riding pontic was placed in the place of the maxillary right central incisor region to improve the aesthetics of the patient. The comprehensive orthodontic treatment was carried out with a pre-adjusted edgewise appliance (MBT prescription, 0.018" slot) to achieve the orthodontic objectives. Retention involved a flexible spiral wire (FSW) bonded retainer. In addition to FSW retainer in the maxillary arch, a removable retainer cum partial denture was provided to maintain the aesthetics (Figure-2). The duration of treatment was 02 years 08 months. The overall treatment was satisfactory, all the objectives were achieved and the treatment was aesthetically and functionally acceptable to the patient. (Figure-2) Pre-treatment and post-treatment radiographs and cephalometric superimposition showing the treatment changes are shown in figure-3. In the 2nd phase of the treatment, replacement of the missing maxillary right central incisor was carried out by implant prosthesis. (Figure-4) All the dentofacial changes during the treatment are described in table-1.

DISCUSSION

This article describes the multidisciplinary management of a case with multiple avulsed maxillary incisors. There are two treatment options for the management of these cases. In the case of an eventual restoration, the keys during orthodontic treatment are to create the correct amount of space and to leave the alveolar ridge in an ideal condition for a future restoration.^[9] If space would be closed, then the clinician must avoid any

detrimental alteration to the occlusion and the facial profile. Also, various other factors need to be considered while replacing the maxillary central incisors by lateral incisors and canines are substituted in place of lateral incisors. However, treatment complexity, risk of reopening of the space, excessive lateral load on the root of the so-called central incisor, and quality of aesthetic results are the major problems in space closure.^[8] Czochrowska et al.^[8] evaluated the outcome of orthodontic space closure with missing maxillary central incisors and concluded that the replacement of the maxillary central incisors was more time consuming, challenging, difficult in restoring the shape of lateral incisor to central incisor morphology and patients were more concern about the space reopening. But the mesial movement of the lateral incisors to the place of central incisors leads to the formation of new alveolar bone along with attached gingiva and intact interdental papilla.^[8]

In the present case, there was an avulsion of both the maxillary incisors on the right side and lateral incisor on the left side. It was not feasible and acceptable to close all the spaces on the right side, thus it was planned to replace one incisor by substitution of canine and one by an implant. Space closure is a more appropriate option in adolescents because of the permanence of the finished results. In the present case, all the issues related to the optimum aesthetics, static and functional occlusion, restoration, orthodontic mechanics, and retention were followed as described in the literature.^[7]

Various modifications in the fixed orthodontic appliance are necessary for optimum esthetic and functional results. The pre-adjusted edgewise appliance (MBT prescription, 0.018" slot) was used for the orthodontic management of this patient. As per the recommendation of Jena et al.^[7], various appliance individualizations were carried out.

There are various options for the prosthetic replacement of missing maxillary right central incisor. The type of prosthesis depends on the age of the patient and the periodontal health status of the lateral incisors or adjacent teeth. The conventional bridge and inlay-onlay abutment type of restoration are not considered as appropriate in young patients with healthy or non-restored adjacent teeth.^[10] The resin-bonded bridges (Maryland type) are also inappropriate because of the high failure rate.^[11] The osseointegrated implants are becoming the most biologically conservative option for replacing congenitally missing teeth.^[12] Therefore in the present case, the osseointegrated single-tooth implant was considered as a treatment of choice for prosthetic replacement of missing maxillary right central incisor. The final prosthesis was satisfactory to the patient, fulfilled the necessary occlusal and functional requirements and presently he is an icon in fashion modeling.

Table 1: Details of cephalometric parameters at various stages of treatment.

Parameters	Norm	Pre-treatment	Post-treatment
SN length (mm)	65.3±3.00	66	68
Maxilla			
SNA (°)	82±1.8	84	85
Maxillary length (mm)	44	44.5	45.5
N to A point (mm)	-4.46	0	1
Mandible			
SNB (°)	80±1.8	81	84
N to B point (mm)	-11.03	- 3	1
N to Pog (mm)	-10.5	- 3.5	1.5
Mandibular length (mm)	69	66	70

Maxillo-mandibular relationship			
ANB (°)	3.12±1.8	3	1
Wits (mm)	-0.01	-1	-2
APP- BPP (mm)	4.5	6	3
Vertical relationship			
FMA (°)	23.83±2	20	18.5
SN-MP (°)	32±3.02	26	24
Y Axis (°)	59.62±3	57	56
Gonial angle (°)	123±7	128	128
J ratio (%)	62-65	72	75
Upper incisor			
U1:SN (°)	103	114	115
U1:NA (mm)	4.92±2.05	6	6
U1:NA (°)	24.02±5.82	29.5	31
Lower incisor			
IMPA (°)	100.00±6.44	100	90
L1:NB (mm)	6.0±1.7	7	4
L1:NB (°)	27±4.3	28	18
Inter-incisor Angle (°)	128.80±9.76	120	132
Soft-tissue parameter			
E-line:Upper lip (mm)	-2 to -3	-4	-6
E-line:Lower lip (mm)	-1 to -2	0	-2
Nasolabial angle (°)	99.00±8.00	98	95
Inter labial gap (mm)	0	0	0
Lip strain (mm)	0	2	2

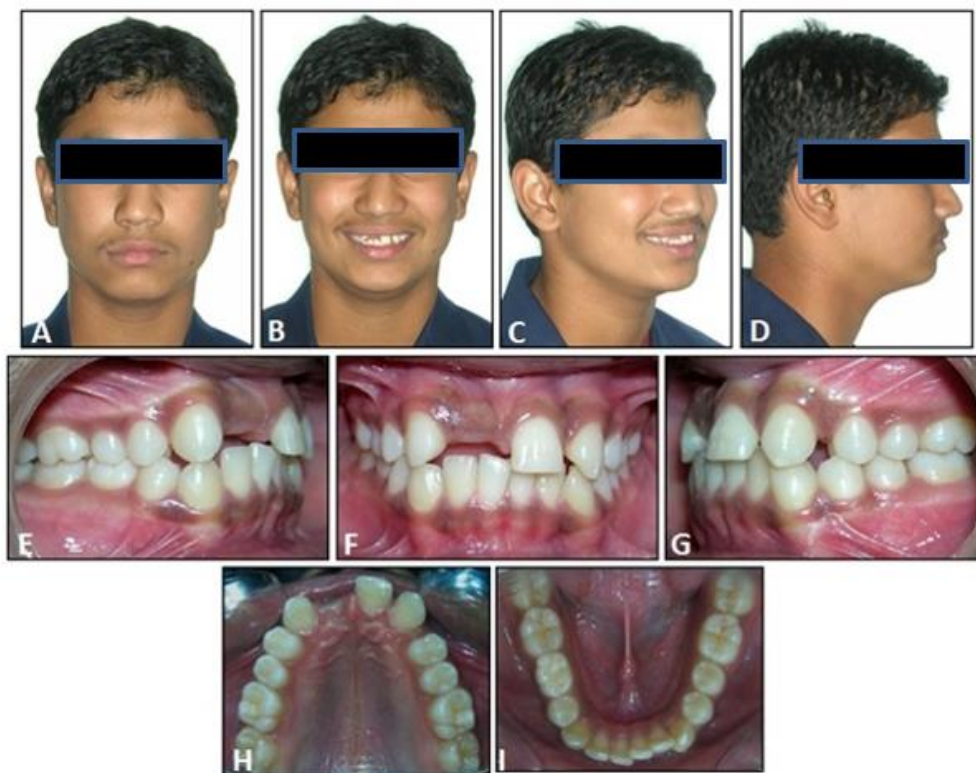


Figure 1: Pre-treatment extra-oral and intra-oral photographs. (A) Extra-oral front view with lips at rest; (B) Extra-oral front view with smile; (C) Extra-oral three quarter view; (D) Extra-oral right lateral view; (E) Intra-oral right lateral view; (F) Intra-oral front view; (G) Intra-oral left lateral view; (H) Intra-oral maxillary occlusal view; (I) Intra-oral mandibular occlusal view.

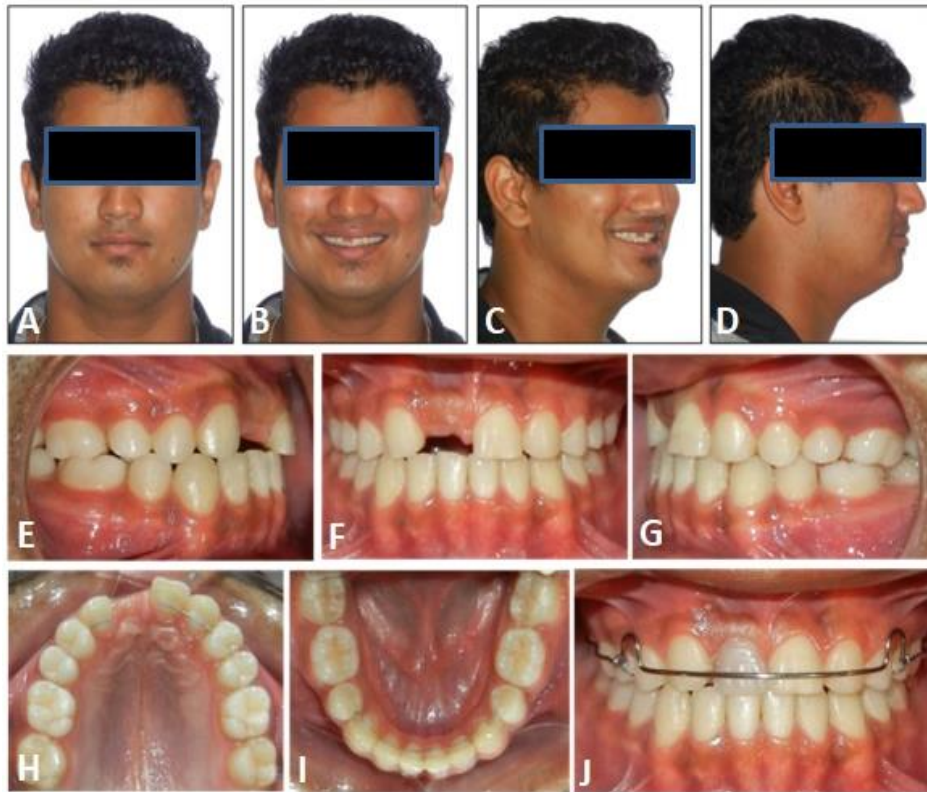


Figure 2: Post-treatment extra-oral and intra-oral photographs. (A) Extra-oral front view with lips at rest; (B) Extra-oral front view with smile; (C) Extra-oral three quarter view; (D) Extra-oral right lateral view; (E) Intra-oral right lateral view; (F) Intra-oral front view; (G) Intra-oral left lateral view; (H) Intra-oral maxillary occlusal view; (I) Intra-oral mandibular occlusal view; (J) Intra-oral front view with removable retainer cum partial denture.

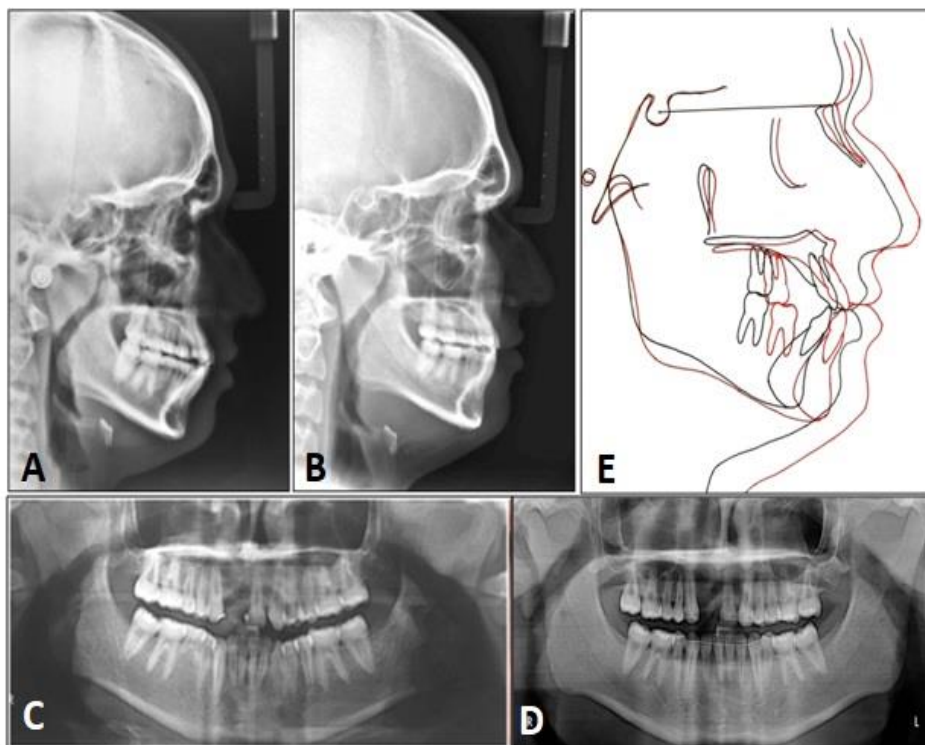


Figure 3: Radiographs and cephalometric superimposition. (A) Pre-treatment lateral cephalogram; (B) Post-treatment lateral cephalogram; (C) Pre-treatment orthopantomogram; (D) Post-treatment orthopantomogram; (E) Cephalometric superimposition showing the skeletal and dento-alveolar changes.

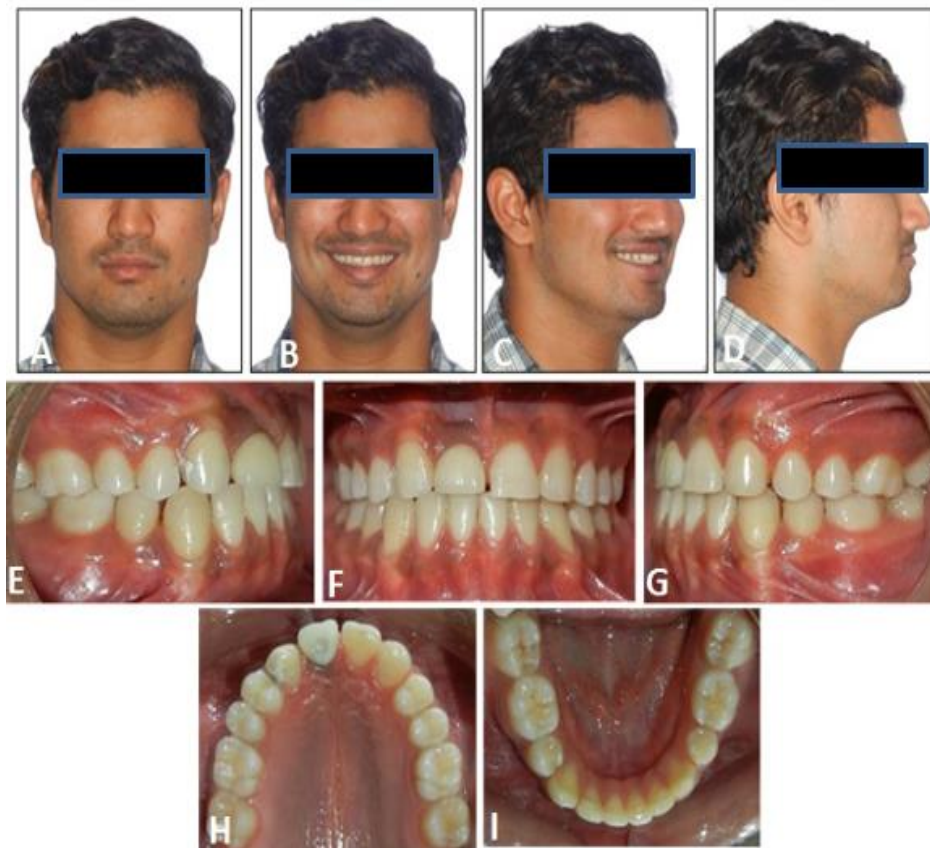


Figure 4: Four year follow-up extra-oral and intra-oral photographs. (A) Extra-oral front view with lips in rest; (B) Extra-oral front view with smile; (C) Extra-oral three quarter view; (D) Extra-oral right lateral view; (E) Intra-oral right lateral view; (F) Intra-oral front view; (G) Intra-oral left lateral view; (H) Intra-oral maxillary occlusal view; (I) Intra-oral mandibular occlusal view.

CONCLUSION

Management of cases with multiple missing maxillary incisors is a clinical challenge to any orthodontist. Such cases often require a multidisciplinary treatment approach. There are no tailor-made treatment protocols for such problems and the best treatment option has to be customized for each patient. Individualization of the orthodontic appliance and proper periodontal and restorative procedures are required for optimum results.

Financial Support

Nil.

Conflict of Interest

The authors declare no conflict of interest.

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