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TREATMENT OF A DENTAL MIDLINE SHIFT AND MISSING CENTRAL INCISOR IN AN ORTHODONTICALLY TREATED PATIENT: A MULTIDISCIPLINARY APPROACH

Anisha Rodrigues, * Kuldeep D'mello, ** Ezaz Ahmad, ***
Syed Akbar Ali, † Syed Rafiuddin, †† Syed Sirajuddin †††

* Assistant Professor, Department Of Prosthodontics, A J Institute of Dental Sciences, Mangalore, Karnataka, India

** Professor & Head, Department Of Orthodontics, Vyas Dental College & Hospital, Jodhpur, Rajasthan, India

*** Assistant Professor, Department Of Orthodontics, Maharana Pratap College of Dentistry, Gwalior, Madhya Pradesh

† Senior Lecture, Department Of Orthodontics, Rishiraj College of Dental Science & Research Center, Bhopal, Madhya Pradesh, India

†† Post Graduate Student, Department Of Orthodontics, Sri Hasanamba Dental College, Hassan, Karnataka, India

††† MDS, Department of Periodontics, Consultant Periodontics, Karnataka, India

ABSTRACT

An unesthetic smile can have a negative impact on the overall well-being of a person. The shift in the dental midline compounded with the loss of a maxillary central incisor can lead to disastrous asymmetries in the smile. This article describes a method of re-treatment in a patient with a missing central incisor and a previous orthodontic treatment which led to unfavorable consequences. Treatment included extraction of the remaining central incisor followed by orthodontic space closure and prosthodontic modification of the laterals and canines. Space closure therefore can be considered a viable alternate treatment option.

KEYWORDS: Missing central incisor; midline shift; orthodontics patient

INTRODUCTION

The maxillary central incisors play a vital role in the esthetics of a smile and the function of the masticatory system. The dental midline is an imaginary vertical line that separates the two central incisors^[1] and is an important component of a smile. It should coincide and be parallel to the facial midline for an esthetically pleasing appearance. A mild shift of upto 2mm in the dental midline is unnoticeable^[2] and considered acceptable. The loss of the central incisors can be due to congenital factors, trauma or therapeutic extraction. This can jeopardize the appearance, personality, and psychological well-being of a person. Timely professional help is required to restore the missing tooth, failure of which can lead to mesial drifting of the central and lateral

incisor resulting in loss of space. Treatment options for this condition include reopening of the space followed by prosthodontic restoration, or single tooth implant, and total orthodontic space closure followed by modification of the adjacent teeth.^[3,4] Reopening space for a prosthodontic restoration or an implant involves space analysis to determine the space required for the missing central incisor and orthodontic site development.^[4] Space closure can be esthetically challenging and involves consideration of a number of factors to achieve a favourable outcome. These include the age of the patient, alveolar bone thickness, facial profile, lip position, gingival display, and size, shape and colour of the adjacent teeth.^[5] This article describes a method of re-treating a case of orthodontic space closure following the loss of a central incisor.

CASE REPORT

A healthy, female patient, aged 22 years presented to the dental office. She had lost her maxillary left central incisor at 8 years of age. She eventually had undergone orthodontic treatment wherein space closure was considered as the line of treatment (Fig. 1). This resulted in a complete shift of the right central incisor towards the left side developing vertical contact with the left lateral incisor. The patient was highly displeased with the result and unhappy with her smile. She also complained of a low self esteem. The facial midline bisected the right central incisor (Fig. 2). There was a mild shift in the mandibular dental midline but was not too obvious and considered acceptable. The patient had an increased overjet and a class II



Fig. 1: Pre-treatment smile of the patient. She had undergone orthodontic space closure following loss of a maxillary central incisor



Fig. 2: A close-up view of the smile. The facial midline bisects the maxillary central incisor. A shift in the mandibular dental midline is seen



Fig. 3: The extracted central incisor is trimmed at the level of the cement enamel junction and repositioned in its place with orthodontic wire



Fig. 4: After 12 months of treatment, the laterals had moved sufficiently towards the midline



Fig. 5: Zirconia based all ceramic crowns on the laterals and canines mimic the centrals and laterals



Fig. 6: Facial view of the patient after cementation. She was extremely pleased with the outcome

molar relationship.

Orthodontic procedure

Oral prophylaxis was done before commencement of the fixed orthodontic procedure. MBT 0.022 mm slot orthodontic brackets were placed on all the maxillary teeth except the right maxillary central incisor which was extracted subsequently. The central incisor brackets were placed on the laterals, the lateral incisor brackets on the canines and canine brackets on the premolars to give them the same torque and tip value of the teeth they would replace. The patient was psychologically conscious of the huge gap due to the extraction of the central incisor. To overcome this problem, the extracted tooth was trimmed at the level of the

cemento enamel junction and ligated in place of the missing tooth with orthodontic wire (Fig. 3). Progressive proximal slicing of this tooth was done on subsequent appointments as the lateral incisors moved closer to each other. After twelve months of orthodontic treatment it was found that the laterals had moved sufficiently towards the midline with mild space between them (Fig. 4). This space would be utilised to accommodate the larger dimensions of the centrals. The overjet was also reduced significantly. The brackets were debanded and upper and lower impressions were made with irreversible hydrocolloid. Casts were poured and wax mock up of the anterior teeth was done. A putty index (Honigum- Putty; DMG,

Hamburg, Germany) of the mock up was done for the fabrication of the provisional crowns and to evaluate esthetics. The shade of the anterior teeth was recorded using the shade guide (VITA 3D-Master® Zahnfabrik, Germany). Tooth preparation of the laterals and canines was done to receive all ceramic crowns. The margins were placed subgingivally for esthetics. Gingival retraction was done followed by impressions with poly vinyl siloxane (Honigum- Putty / Honigum Light; DMG, Hamburg, Germany) impression material. Provisional restorations (Luxatemp® DMG, Hamburg, Germany) were fabricated using the putty index and cemented in place with a temporary cement (RelyX™ Temp NE, 3M ESPE). Zirconia based all ceramic crowns (Lava™ Zirconia, 3M ESPE) were fabricated in the dental laboratory based on the diagnostic wax up. The four anterior crowns were splinted together. The patient was recalled after three days for the delivery of the final restorations. The provisionals were removed and the preparations were cleaned. The final restorations were verified for the fit, margins, aesthetics and occlusion. When found satisfactory, the teeth were cleaned and isolated. The crowns were cemented with a light-cured resin cement (RelyX™ Unicem Self-Adhesive Universal Resin Cement, 3M/ESPE, Seefeld, Germany). Excess cement was removed from the gingival margins and interproximal areas (Fig. 5). The patient was extremely pleased with the final outcome. The smile was greatly enhanced by the form and function of the all ceramic crowns (Fig. 6). No untoward complications were encountered during regular follow ups over a period of one year.

DISCUSSION

Case selection is of utmost importance in space closure. Ideal situations include a balanced or slightly convex facial profile; an Angle class II malocclusion with no mandibular crowding or an Angle class I malocclusion with mandibular crowding necessitating extractions; and small canines that are lighter in color.^[6]

Treatment option involving space closure is distraught with problems^[7] like

1. Discrepancy between the gingival levels of the central, lateral and canine
2. Increased prominence of the canine
3. Visible palatal cusp of the premolar
4. Functional occlusion

5. Retention of the canines in the position of the laterals.

Orthodontic extrusion of the canine moves their gingival levels incisally to match that of the laterals.^[8] This is achieved by placing the brackets on the canines more cervically. Also, a reverse torque is given by inverting the bracket to reduce the canine prominence. Similarly, the laterals are intruded so that their gingival margin matches that of the central incisors by placing the bracket more incisally. A longer root of the lateral makes it easier to over contour it into the shape of a central incisor in the final restoration.^[9] The buccal root of the first premolar is rotated mesio-palataly to create a 'canine' eminence and to hide the palatal cusp. Immediate splinting of the anterior teeth is done after removal of the orthodontic appliance to retain them in their altered positions. The loss of canine guidance during jaw movements can affect the functional occlusion leading to dental wear and TMJ dysfunction. Therefore, guidance between the maxillary first premolars and mandibular canines was obtained by individualized extrusion and crown lingual torque of the upper first premolars. Ishihara *et al.*,^[10] have found that the condylar movement and incisal paths were not affected during maximum mouth opening and closing, lateral excursion, or protrusive excursion after treatment when the maxillary canines were substituted by the first premolars for guidance.

CONCLUSION

A missing central incisor does provide an esthetic challenge to the dental professional. Orthodontic intervention along with a prosthetic camouflage is imperative to develop a harmonious balance between the functional and esthetic needs, and to obtain a predictable outcome.

CONFLICT OF INTEREST & SOURCE OF FUNDING

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426/427, S. V. Road
B/30, 4th Floor
Roop Kamal Society
Kandivali (West)
Mumbai, Maharashtra
India (400067)



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