Managing the severely proclined maxillary anteriors by extracting traumatized right maxillary central incisor

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Abstract

A 14-year-old girl reported with severely proclined anterior teeth with fractured and discolored right maxillary central incisor with questionable prognosis. Autotransplantation of premolar to replace central incisor was considered a risky option as patient was 14-year-old with presence of advanced root development of premolar. The immediate placement of the prosthetic implant was also not possible because of patient’s age. Therefore, it was decided to use the space obtained by extracting questionable maxillary right central incisor for orthodontic purpose and also sacrificing the healthy premolar is invariably an excessive biological cost for a modest functional and aesthetic gain. Hence, the treatment plan for this case includes extraction of right maxillary central incisor and left maxillary first premolar, movement of right maxillary lateral incisor mesially, achieving normal axial inclination of maxillary anteriors with normal overjet and overbite. Mandibular arch was treated nonextraction due to congenitally missing central incisors with presence of normally inclined lower anteriors thereby maintaining Angles class I occlusion. Tipping, usually, seen in Begg mechanotherapy was used for our advantage to correct severely proclined maxillary anteriors with simultaneous bite opening mechanics. Case was completed in 19 months and posttreatment records including photographs, radiographs and study models were made. Begg wrap around the retainer was placed in the maxillary arch allowing natural settling of occlusion.

Keywords: Congenitally missing mandibular central incisors, orthodontic space closure, traumatized maxillary Incisors

Introduction

The treatment of severely proclined anterior teeth, usually, requires a reduction in tooth material in the form of extraction of first premolars to achieve a normal interincisal angle thereby reducing lip incompetency. However, the situation gets complicated when one of the maxillary central incisor is traumatized with questionable prognosis. Hence, there is always a dilemma whether to extract healthy premolar or to use the maxillary central incisor space to achieve optimal results. Extracting premolar and replacing the questionable central incisor with prosthesis/implant is not a good option in the young patient as long-term stability over a 15-20 years is always debatable with involvement of heavy cost.[1,2] Robertsson and Mohlin[3] too in the study concluded that orthodontic space closure produces results that are well accepted by patients, does not impair temporomandibular joint function and encourages periodontal health in comparison with prosthetic replacement. Therefore, using traumatized central incisor space to achieve normal inclination of maxillary anteriors is the ideal treatment option, especially in young children.

However, this approach dictates that lateral incisors take over the functional and esthetic role of central incisors; the canine assumes the same role for the lateral incisors and the first premolars that for the canines, with all the prosthetic camouflage that such positional alterations entail.[4] As a result, interdisciplinary approach is required to achieve desired optimal results.

Case Report

A 14-year-old female patient who due to an accident at the age of 10 years had fractured her right maxillary central incisor reported to the department with the chief complaint of forwardly placed upper front teeth with presence of discolored right maxillary central incisor. Extra-oral examination revealed a leptoprosopic facial type with a triangular facial form. The profile was convex with incompetent lips with acute naso labial angle [Figure 1]. Intraoral examination reveals Angles class I malocclusion with severely proclined anterior teeth with increased overjet of 8 mm having 80% deep bite with a crowding of 3 mm in the upper arch [Figure 1]. Mandibular
central incisors were congenitally missing. The lateral cephalometric tracing revealed ANB angle of 1° indicating a class I skeletal pattern with average growth pattern. The Maxillary incisors were severely proclined and forwardly placed with upper incisor to NA of 43°/17 mm with increased interincisal angle of 111° [Figure 1 and Table 1]. Intra-oral peri-apical radiograph of right maxillary central incisor shows severe internal root resorption with questionable prognosis.

Therefore the treatment plan for this case includes extraction of right maxillary central incisor and left maxillary first premolar, movement of right maxillary lateral incisor mesially, achieving normal axial inclination of maxillary anteriors with normal overjet and overbite. Mandibular arch was treated nonextraction due to congenitally missing central incisors with normally inclined anteriors thereby maintaining Angles class I occlusion. This option seemed to be the most plausible, because the lateral incisors were large mesiodistally, and they could easily be contoured as central incisor. The patient and her parents preferred this option, because fewer teeth would be extracted with minimal cost involved, and the overall esthetics would be easier to manage.[5] The risk of root resorption during tooth movement was taken into consideration and explained to the patients.

Tipping, usually, seen in Begg mechanotherapy was used for our advantage to correct severely proclined maxillary anteriors with presence of simultaneous bite opening. The Begg system generated a rapid mesial tipping of the lateral incisor and was used due to its ability to rapidly close

Table 1: Cephalometric analysis (pre- and post-treatment)

| Cephalometric parameters       | Pre-treatment | Post-treatment |
|-------------------------------|--------------|----------------|
| SNA (degree)                  | 83.3          | 82.0           |
| Maxillary skeletal            | -2.1          | 0.0            |
| (A-Na Prep) (mm)              |               |                |
| Midface length (Co-A) (mm)    | 89.3          | 91.2           |
| SNB (degree)                  | 79.5          | 80.9           |
| Mandibular skeletal           | -9.1          | -4.0           |
| (Pg-Na prep) (mm)             |               |                |
| Facial angle (FH-NPo) (degree)| 85.3          | 88.0           |
| ANB (degree)                  | 3.8           | 1.6            |
| Wits appraisal (mm)           | 3.3           | -1.0           |
| FMA (degree)                  | 28.4          | 24.5           |
| SN-GoGn                       | 29.4          | 32.9           |
| Y-axis                        | 67.4          | 67.0           |
| P-A face height               | 65.3          | 61.0           |
| Lower face height             | 45.5          | 45.0           |
| U1-SN (degree)                | 121.0         | 102.6          |
| U1-NA (mm)                    | 11.7          | 4.3            |
| U1-NA (degree)                | 37.7          | 22.8           |
| L1-NB (degree)                | 26.0          | 25.3           |
| L1-NB (mm)                    | 6.9           | 4.0            |
| L1 to A-Po (degree)           | 24.4          | 22             |
| Interincisal angle            | 112.5         | 130.0          |
| IMPA (degree)                 | 93.5          | 90.0           |
| L1-QP                         | 64.6          | 72.0           |
| Lower lip to E-plane (mm)     | 5.2           | -2.0           |
| Upper lip to E-plane (mm)     | 0.8           | -4.7           |

Contd...
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Table 1: Contd...

| Cephalometric parameters | Pre-treatment | Post-treatment |
|--------------------------|---------------|----------------|
| L1 protrusion (mm)       | 3.7           | 1.0            |
| U-incisor protrusion (mm)| 13.9          | 3.5            |

IMPA: Incisor mandibular plane angle; OP: Occlusal plane; FMA: Frankfort-mandibular plane angle; SNA: Sella-Nasion-Point A; SNB: Sella-Nasion-Point B; ANB: Point A- Nasion- Point B; SN: Sella Nasion

the large and unsightly edentulous space seen between left central and right lateral maxillary incisors. Begg stage I and II were completed in 10 months [Figure 2]. Acrylic right maxillary central incisor was bonded to left central incisor using composite for maintaining esthetic. Acrylic tooth was trimmed every month 1 mm from the distal side till the right maxillary lateral incisor occupied the place of right central incisor. Torquing and uprighting of roots in Begg stage III

Figure 2: Pre-treatment radiographs and Begg stage I photographs

Figure 3: Post-treatment photographs
took 9 months and hence the case was completed in 19 months. Posttreatment records including photographs, radiographs and study models were made [Figures 3 and 4]. Begg wrap around the retainer was placed in the maxillary arch allowing natural settling of occlusion. Patient was advised to get gingival recontouring of right side maxillary anterior teeth for better esthetics, however patient refused to get it done as patient and parents were very happy and highly satisfied with the treatment outcome. Patient was regularly followed up during retention phase and postretention records after 2 years [Figure 5] shows well stable occlusion.

Discussion

One of the most difficult situations in routine clinical orthodontic practice is to decide whether to use existing anterior tooth space for correcting malocclusion or to maintain that space for prosthesis providing optimal function and aesthetics. There are various treatment approaches for handling such cases. Autotransplantation of premolar to replace central incisor was considered a risky option as patient was 14 years old with presence of advanced root development of premolar. The immediate placement of the prosthetic implant was also not possible because of patient’s age. Therefore, it was decided to use space obtained by extracting questionable maxillary right central incisor for orthodontic purpose and also in this case sacrificing the pathology free healthy premolar is invariably an excessive biological cost for a modest functional and aesthetic gain. Following considerations were address while substituting canine as lateral incisor and first premolar as canine (1) parallel or slightly over upright the roots of the lateral incisors towards midline (2) lingually torque the canine roots to reduce canine prominence of the canine eminence (3) rotate the first premolar mesiopalatally to give them a more canine–like appearance and to conceal lingual cusp. Thordarson et al. have demonstrated that extensive cuspal, labial, lingual, and interproximal recontouring by the grinding of young teeth associated with orthodontic treatment can be performed with no discomfort to the patients and with only minor or no long-term clinical and radiographic reactions.

Patient developed mild anterior cross bite at the end of Begg stage II because of Boltons discrepancy (mandibular excess as one central incisor and premolar in the maxillary arch was extracted against congenitally missing lower lateral incisors). Hence, mild class III elastics were used along with proximal stripping in lower anteriors for a month initially in stage III to correct the mild cross bite.

The maxillary right canine was reshaped to appear like the maxillary lateral incisor, and the first premolar lingual cusp was adjusted to the patient’s occlusion. Composite resin restoration was chosen over at end of the treatment
to modify the lateral incisor. Although it may lack the permanency of a laminate veneer or complete crown restoration, composite crown has the advantages of being reversible, conserving tooth structure, allowing the possibility of future incremental addition/removal of material and costing less.\(^{[4,5]}\)

**Conclusion**

Space obtained by extracting questionable maxillary right central incisor; thereby preventing the sacrifice of healthy premolar for orthodontic purpose is invariably a good option to achieve optimal functional and esthetic results.

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