CASE REPORT

Fixed functional space maintainer: novel aesthetic approach for missing maxillary primary anterior teeth

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SUMMARY

The first-line treatment of non-restorable traumatically injured or carious deciduous teeth is extraction which may be a curse for the future dentition as well as social activity of a child. Various therapeutic modalities from removable partial dentures to fixed space maintainer can be used for replacement of such lost teeth. Two types of fixed aesthetic space maintainers for replacing premature loss of maxillary deciduous incisors in 4-year-old children are discussed.

BACKGROUND

Premature loss of teeth due to trauma or dental caries is a common occurrence in children. Aesthetic restoration of such teeth can be challenging. Premature tooth loss has a profound effect on the oral health of the child even after eruption of the permanent teeth, which often tend to cause undesirable tooth movements of primary or permanent teeth including loss of arch length. In case of premature tooth loss in anterior incisal segment, there is minimum space loss and a linguodistal inclination of the teeth, causing a collapse of the anterior lingually, apart from closure of the space and shift of midline (Barber).¹ It can also lead to parafunctional habits² as well as altered behaviour including depression, and increased shyness of a child along with poor friend circle and non-acceptable daily life style. Mahmoud K (2009)³ in a study to identify the negative effects of anterior tooth loss on patient's quality of life and satisfaction with their dentition; he found reduced level of confidence among patients not having anterior teeth.

To maintain a smooth conversion of infant's jaws to the adult form, nature has given two series of dentition. If there is any deviation, then jaw form and overall facial profile along with the psychology of an individual may be altered. Early loss of maxillary incisors due to caries is very common in young children and before two-third of roots of permanent incisors are formed. So, the space should be maintained functionally as well as aesthetically by a suitable space maintainer depending on the dental age of the patient. The space maintainer may be of removable, fixed or semi-fixed, functional or non-functional type. This case report represents a simple functional and aesthetic rehabilitation of missing deciduous incisors with fixed functional space maintainer.

CASE PRESENTATION

Case 1

A 4-year-old boy accompanied by parents reported, with missing teeth. The teeth were extracted 6 months previously owing to pain and decay. The parent gave a history that he does not smile and has a poor peer group relationship. The patient was very calm and did not like to open his mouth even for speech.

On examination, teeth 51 and 61 were missing (figure 1). After thorough clinical evaluation, it is thought that, the altered behaviour of the patient may be due to compromised aesthetics which also affects the peer group relation.

On completion of thorough case evaluation, it was planned to place fixed functional space maintainer replacing 51 and 52. After obtaining written parental consent, preoperative occlusal analysis was performed. Orthodontic bands (0.005 inches thickness and 0.180 inches width) were adapted on teeth 55 and 65 followed by alginate impression to make the working cast. 19-gauge wire was adapted on palatal arch in U form, 0.5 mm above the palatal surface and soldered to the bands. Three small pieces of wire were bent like a hook to form a mesh in the edentulous region after point soldering with the main palatal wire. The acrylic deciduous right central and lateral teeth are then placed and adjusted between the hooks, the occlusion was checked and the teeth was acrylised with tooth coloured cold cure acrylic (figure 2). After trimming, finishing and polishing the fixed space maintainer is cemented on 55 and 65 with luting glass ionomer cement (Fuji I) and occlusion

Figure 1 Preoperative photograph showing missing maxillary primary central incisors.

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Figure 2 Fixed functional space maintainer with bands and acrylic primary teeth.

checked for any premature contact (figure 3). The patient was advised to avoid chewing of hard food and to maintain proper oral hygiene. First recall of patient done after 24 h followed by check-up every 3 months. The patient was satisfied seeing the lost teeth back. The parent was informed that the appliance will be removed by a dentist at an age of approximately 6 years, to prevent interference of erupting permanent successors. The patient was also advised to return immediately in case there was any problem with the space maintainer, including distortion or breakage.

Case 2

A 4-year-old girl reported to our hospital along with her parents with missing anterior teeth. The history revealed the four teeth 51, 52, 61 and 62 were extracted due to failed endodontic treatment. During the clinical dental examination, the child was found to be shy but cooperative. She was wary of long dental treatment procedures. The maxillary four incisor teeth were not present (figure 4). The maxillary primary second molars had preformed stainless crowns on them. She had normal overjet and overbite.

After assessing the present case, the following treatment was planned for the child. Appropriate preformed orthodontic band (Roth 0.22 MBT) were selected for the teeth 55 and 65. The bands were placed on to the teeth and their fit was assured. Upper and lower impressions were made using alginate. The bands were removed from the patient's mouth, transferred to their respective positions on the impression and stabilised using pins. The appropriate shade selection for the teeth was

Figure 3 Postoperative intraoral photograph.

Figure 4 Preoperative photograph showing missing four maxillary primary incisors.

performed under natural light. This entire clinical procedure lasted for 15 min.

The impressions were poured using dental stone and the casts were obtained which had bands on the teeth 55 and 65. Wax spacer was placed on the cast so that the appliance stays out of contact with the palatal tissues. Acrylic maxillary primary anterior teeth were selected for replacing 51, 52, 61 and 62. An 18-gauge stainless steel wire was adapted to the working model as shown. The wire was soldered to the palatal portion of the bands on 55 and 65. Acrylisation was performed using light pink tinted acrylic (figure 5). The appliance was finished and polished.

The patient was recalled for appliance delivery. It was checked before cementation for its fit and aesthetics (figures 6 and 7). Cementation was done using luting glass ionomer cement. The patient and her parents were educated about the care of the appliance. This included vigorous rinsing after every meal and that the food to be chewed only on the molars. Cutting/incising was to be avoided as this appliance had only the cemented molar bands for resistance and stability.

The patient was recalled for evaluation after 24 h and then after 1 month. The child was very cheerful and had a big smile on her face with improved personality. She had maintained good oral hygiene.

The case was followed up till the child reached 7 years of age. Intraoral radiographs were taken to observe erupting maxillary permanent incisors. Then the appliance was discarded as it had served its purpose.

Figure 5 Fixed functional space maintainer on the cast after soldering.

Figure 6 Postoperative intraoral photograph showing appliance in place.

DISCUSSION

Aesthetics and function of the orofacial region are very important aspects of human life which may be affected by tooth loss and impact on the quality of life. The aesthetic rehabilitation of deciduous anterior teeth has a vital psychological impact on recovery of patient's self-esteem. Space created by the early loss of tooth in the dental arch also has a desire to be reduced by the adjacent teeth. After premature loss of deciduous maxillary anterior teeth, the permanent successors may be proclined and thus arch length or perimeter is increased. In case of mandibular cuspid loss an abnormally strong mentalis musculature may cause distal drifting of the lateral incisor and shift of midline, deepening of the bite. Northway (1984) stated that more space was lost in the first year of extraction than in successive years.⁴ Kumari (2006) found that the greatest space closure occurs during the first 4 months of the extraction.⁵

The premature loss of deciduous incisors is usually given little clinical attention unless severe closure of the space is noticed or there is evidence of an aberrant speech pattern and oral habits developing as a result.

Careful consideration should be taken during treatment planning or decision making for placement of any space maintainer in incisor segment. Various types of space maintainers (removable or fixed appliances) are fabricated depending on the child's stage of dental development, dental arch involved, primary teeth missing and which teeth they are.⁶⁻⁸

One of the important functions of the primary tooth is to occupy the physiological space and guide the eruption of its permanent successor. Fixed space maintainers are always acceptable

Figure 7 Postoperative photograph.

in children as they have less desire to wear removable ones.⁹ The removable space maintainers cover large area of oral tissue causing irritation to ulcer. To improve patient acceptance aesthetic functional fixed appliance is reliable. The fixed space maintainer used to replace deciduous central incisor reveal a good success with improvement of aesthetic and function with fewer requirements of patient cooperation and less irritation to the oral tissue.¹⁰

In the present case, minimum amount of palatal coverage is done causing no or less irritation. Banding of molars done for improved strength instead of bonding. Bhasin *et al*,¹¹ in a case, used bonded space maintainer to maintain the space in primary molar area.

Aesthetic space maintainer has been found to have a much wider acceptability and compliance of wearing the appliance by the paediatric dental patients. This is indeed a solution to paediatric anterior edentulous arches with compromised speech, aesthetic and behaviour of the patient including poor social acceptance. In the present study, a successful placement of fixed functional space maintainer is being performed and limitations like long-term follow-up, improper oral hygiene maintenance, frequent breakage can be over-ruled by proper education and motivation of the patient and the parents.

Learning points

- ▶ It is easy to fabricate, more aesthetically pleasing and hygienic.
- ▶ It is a solution to paediatric anterior edentulous arches with compromised speech, aesthetic and behaviour of the patient including poor social acceptance.
- ▶ Consumes less chair side-time.
- ▶ Does not interfere with the growing jaws.
- ▶ Comfortable to the patient.
- ▶ Inexpensive.

Competing interests None.

Patient consent Obtained.

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