

CASE REPORT

Interdisciplinary Approach to correct Maxillary Anterior Single Tooth Crossbite with Fixed Dental Prosthesis

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ABSTRACT

Anterior crossbite is an occlusal problem with functional and esthetic effects. To achieve normal occlusion and to preserve tooth structure, orthodontic appliances are commonly used, but in some clinical settings, a fixed prosthesis can be used as an alternative to the orthodontic appliance. A 33-year-old male came with esthetic concerns related to an anterior crossbite and missing tooth. He was fit and healthy. Intraoral examination revealed missing tooth 11, international caries detection and assessment system (ICDAS) code five mesial caries of tooth 12, anterior crossbite of tooth 22. The radiograph revealed periapical lesion at tooth 22 with a diagnosis of asymptomatic apical periodontitis and anterior crossbite. After discussion with the patient, the definitive treatment plan included oral hygiene instruction, caries control, non-surgical periodontal therapy; root canal treatment, orthodontic treatment for tooth 22 with Z-spring removable appliance due to his financial aspect as well as post and core, followed by four units porcelain-fused-metal bridge involving teeth 12, 21 and 22. Tooth 12 was restored with composite. Tooth 22 was root canal treated. Orthodontic treatment was unsuccessful. Post and core were done, followed by gingivoplasty. Abutment teeth 12, 21 and 22 were prepared and final impressions were taken. Provisional restoration was fabricated according to the diagnostic wax-up. The definitive restoration was assessed and cemented. Oral hygiene instruction and prosthesis home care were given. The patient was satisfied with the esthetic outcome of the treatment. The prognosis is fair. Patient's immediate esthetic demands could be achieved through restorative aspect.

Keywords: Anterior crossbite, Fixed prosthesis, Post and core, Removable appliance.

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INTRODUCTION

Anterior crossbite is an occlusal problem involving lingual positioning of maxillary anterior teeth in relationship to mandibular anterior teeth with functional and aesthetic effects.¹ Anterior crossbite is the term used to define an abnormal labiolingual relationship between one or more maxillary and mandibular incisor teeth.¹⁻³ Crossbite can be of dental or skeletal in origin.⁴ Crossbite of dental origin can be treated using both removable and fixed orthodontic appliances. However, removable appliances require a high level of patient cooperation and take longer time than fixed appliances to correct incisor crossbite. The patient may lose motivation to use it after initial wearing of the appliance. Early correction of crossbite has always been given greater importance and is recommended because it will prevent further complications in malocclusion and also if left untreated would require further comprehensive treatment.^{5,6} Sufficient space and overbite is required to achieve acceptable results in time. Various treatment methods have been proposed for correction of a simple anterior dental crossbite namely lower inclined plane, tongue blade therapy, crowns, Hawley retainer with auxiliary springs, labial and lingual archwires.⁷ This report presents a method of treating anterior single tooth crossbite with a simple fixed partial appliance. Orthodontics appliance is commonly used to achieve normal occlusal relation and to preserve tooth structure. This approach is expensive and time-consuming for the patients most of the time. Thus, a fixed prosthesis can be used instead of the orthodontic appliance in some clinical settings. This article describes a patient whose anterior crossbite was corrected with a fixed prosthesis.

CASE REPORT

A 33-year-old male presented to the university dental clinic with esthetic concerns because of the upper front missing tooth and unpleasant esthetic appearance (Fig. 1). Extraoral examination revealed esthetically unpleasant look due to missing maxillary right central incisor. Intraoral examination revealed missing central incisor (Fig. 2) and single anterior tooth crossbite with tooth 22. Radiographic evaluation revealed optimal bony support (Fig. 3) and the

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Fig. 1: Photograph of the patient's smile before treatment. He was embarrassed of his smile.

periodontal health was within normal limits. Maxillary anterior teeth were asymmetrically distributed giving the esthetically unpleasant appearance (Fig. 2A). Calculus was found in the mandibular anterior teeth (Fig. 2B). The proximal carious lesion was observed on the mesial

surface of 12. The tooth 11 was extracted because of caries 6 months back. The patient was embarrassed while smiling due to awareness of his missing tooth 11.

Diagnoses included asymptomatic apical periodontitis with tooth 22, ICDAS code 5 in mesial of 12 and missing 11. The provisional diagnosis from the orthodontic assessment was maxillary crowding with anterior and posterior crossbite. The following treatment options with advantages and disadvantages were discussed with the patient: (1) Scaling and polishing, composite restoration of 12, root canal treatment for 22 followed by post and composite core, orthodontic treatment (fixed/removable), dental implant placement for 11; (2) Scaling and polishing, composite restoration of 12, root canal treatment for 22, orthodontic treatment (fixed/removable), post and composite core of 22, four unit bridge (all ceramic/porcelain fused to metal) for the teeth 12, 11, 21, 22.³ Scaling and polishing, composite restoration of 12, root canal treatment for 22, post and the composite core of 22,



Figs 2A and B: (A) Intraoral photograph of the dental arches shows missing 11, caries at mesial of 12; (B) Intraoral photograph of dental arches from side view shows displacement of 22 palatally due to maxillary anterior teeth crowding

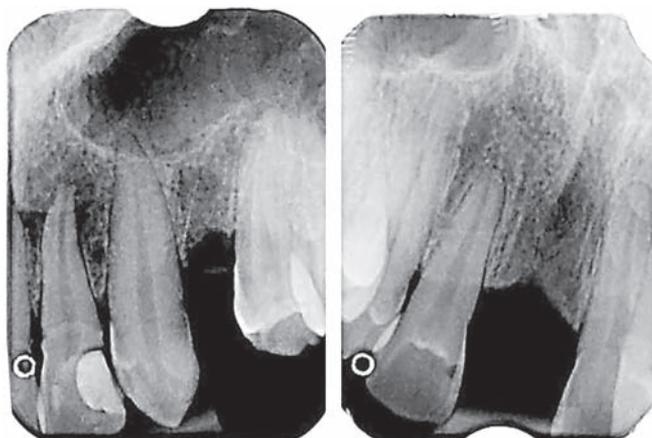


Fig. 3: Radiolucency was seen at mesial aspect of crown suggestive of caries with tooth 12 and missing tooth 21. Radiopacity seen with 22 at distal aspect of crown suggestive of restoration, radiolucency was seen under radiopacity suggestive of secondary caries and periapical radiolucency suggestive of periapical lesion

3 unit bridge for 12, 11, 21.⁴ Scaling and polishing, composite restoration of 12, root canal treatment for 22, post and the composite core of 22, cantilever bridge/removable partial denture for 11. The patient had decided to go with the second option of composite restoration of 12, root canal treatment for 22, orthodontic treatment using a removable appliance, post and composite core of 22, four-unit bridge (porcelain fused metal) for 12, 11, 21, 22.

A diagnostic wax-up was done (Fig. 4A) and was evaluated for the possibility of the labial inclination of the tooth 22 as shown in the schematic line diagram in the Figure 4B. The option of a labial addition of the composite restoration was appeared to be feasible based upon the diagnostic wax-up evaluation. The treatment procedure was started with the root canal treatment with tooth 22 in a conventional manner which included shaping, cleaning, and obturation with gutta percha. Removable orthodontic treatment was planned. Proximal stripping was carried out as

shown in Figure 5A to create the sufficient proximal free space to move tooth 22 labially. Removable appliance with Z-spring and posterior bite plane was fabricated in a conventional manner and delivered to the patient (Fig. 5B). Unfortunately, the orthodontic treatment was unsuccessful because the patient was not compliance with the removable appliance even though adjustment had been made. The patient was further lost interest to further pursuing the orthodontic therapy to correct crossbite. He agreed to continue the treatment plan with composite core build up on 22 to correct the crossbite. Post preparation was prepared using post drills from the manufacturer. The post drill was oriented 15° facially to the long axis of 22 entering from the facial surface of the tooth directing towards the root canal filling as shown in Figure 6A. The gutta-percha was removed by leaving 5 mm of gutta-percha intact apically (Fig. 6B). Rely X fiber post was inserted into the canal using Rely X Unicem as the luting cement. The composite core was build



Fig. 4A: Diagnostic wax-up of 4-unit bridge for teeth 12 to 22

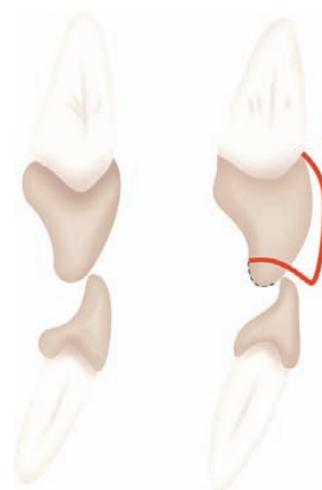


Fig. 4B: Schematic line diagram indicating the thickness of composite core required to correct the anterior single

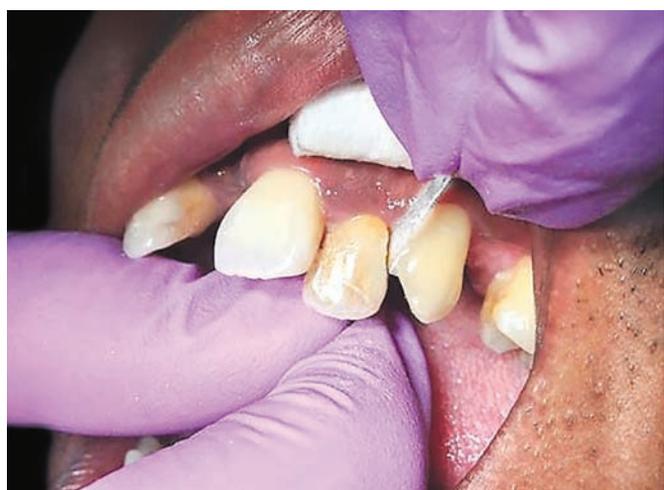


Fig. 5A: Proximal stripping of 0.5 mm at mesial and distal of 22



Fig. 5B: Removable orthodontic appliance with Z-spring and posterior bite plane

up around the post, increasing the thickness of core labially as shown in Figure 6C. Gingivoplasty was carried out to improve the esthetics clinical height of 22 as shown in Figure 7. Using a coarse grit diamond bur, teeth 12, 21 and 22 were prepared to receive the porcelain fused metal bridge using silicon putty as a guide (Fig. 8). The final impression was made using vinyl polysiloxane (Express XT Light Body and Express 2 Heavy Body; 3M ESPE) after removing size '00' retraction cord from the gingival sulcus. A Bis-GMA based temporization material (Protemp 4, Dentsply) was used in a silicone putty to fabricate a provisional bridge. The provisional bridge was used to evaluate the final crown length, shape and phonetics. The details and illustrations were sent to the lab technician. Metal try-in was carried out to examine the accurate fit and sufficient space for porcelain built-up. The final porcelain fused metal bridge was fabricated confirming that the anterior single crossbite on 22 was

corrected (Fig. 9A). The bridge was tried-in to verify internal fit, margins, interproximal contacts, occlusion before cementation. The patient was very satisfied and happy with the look of his new restorations and approved them for final cementation. Self-adhesive resin cement (relyX U200; 3M ESPE) was used to cement the bridge (Figs 9B and 10). Excessive cement was removed in the gel phase after initial curing for 1 to 2 seconds. After clean-up, the bridge was light-cured for another 20 seconds as final light activation of the cement. Bridge hygiene instruction was given, and a regular half-yearly review was implemented.

DISCUSSION

This case report presents with the correction of single tooth anterior crossbite with modification of post-angulation on the labial aspect of the endodontically treated tooth to change its inclination. Interdisciplinary treatment approach including orthodontic, endodontic,



Fig. 6A: Tapered fissure bur was oriented 15° facially to the long axis of 22 at its center during access cavity. Subsequent post-drills oriented in similar manner



Fig. 6B: Intraoral periapical radiograph shows post and composite core of 22



Fig. 6C: Composite core build-up with additional 2-3 mm of thickness on facial surface of 22



Fig. 7: Gingivoplasty performed at distal gingival margin of 22



Fig. 8: Abutment prepared for metal-ceramic bridge on teeth 12, 21 and 22. The brown stain on 12 was affected dentin

periodontic and restorative and prosthodontic treatment approach was sequentially carried out to provide esthetically and functionally satisfactory outcome to the patient. This alternative treatment option was executed after non-compliance of the removable appliance therapy and patient's nonagreement towards fixed orthodontic treatment. However, fixed dental prosthesis treatment has provided satisfactory esthetical and functional needs of the patient. A fixed prosthesis can be an alternative treatment alternative for a patient with an anterior crossbite who is not willing to receive orthodontic treatment. The objective of the treatment should be realistic and procurable, considering function, comfort, effects on speech, longevity as well as cost.



Figs 9A and B: (A) Final metal-ceramic bridge was obtained from the laboratory indicating the corrected anterior crossbite with 22; (B) Posttreatment intraoral view indicating the corrected anterior single crossbite with 22



Fig. 10: Posttreatment extra-oral view of patient while smiling

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