

Correction of an Anterior Crossbite with a Fixed Partial Denture

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“Clinical Showcase” is a series of pictorial essays that focus on the technical art of clinical dentistry. The section features step-by-step case demonstrations of clinical problems encountered in dental practice. If you would like to contribute to this section, contact editor-in-chief Dr. John O’Keefe at jokeefe@cda-adc.ca.

Anterior crossbite is an occlusal problem with functional and esthetic effects. To achieve a normal occlusal relation and to preserve tooth structure, orthodontic appliances are commonly used, but this approach is time-consuming and costly for the patient. In some clinical situations, a fixed partial denture can be used instead of an orthodontic appliance. A fixed partial denture with a labial porcelain veneer is a reasonable treatment alternative for a patient with an anterior crossbite who is unwilling to undergo orthodontic treatment.¹ The goal of treatment should be realistic and achievable and should take into account function, comfort, effects on speech, longevity and cost.² This article describes a patient whose anterior crossbite was treated with a fixed partial denture.

Case Report

Presentation and Examination

A 43-year-old man was referred to the fixed prosthodontics department at a uni-

versity dental clinic with esthetic concerns related to an anterior crossbite. He was seeking a rapid, cheap, durable and esthetically pleasing result.

At the first appointment, graduate students in the department took the patient’s medical and dental history, performed extraoral and intraoral observations and the following auxiliary examinations and activities: extraoral and intraoral photography (Figs. 1 and 2), radiography (Figs. 3 and 4), dental impressions, bite registration and mounting of study models and a wax-up in a semiadjustable articulator.

The intraoral examination revealed the following features:

- Tooth 22 had radicular caries, an unsatisfactory root canal filling, periapical complications and grade 1 mobility. The remaining dental tissue of tooth 22 was considered too weak to support post-and-core reconstruction, because the crown–post ratio was less than 1:1 and because the ferrule effect (envelopment of the tooth



Figure 1: Photograph of the patient’s smile before treatment. The smile type was classified as “low” (< 75% of the maxillary incisor visible³).



Figure 2: Intraoral photograph of the dental arches shows the fixed partial denture on teeth 11 to 13 and the crossbite of tooth 21. Resin reconstruction of tooth 22 affects more than 75% of the crown structure of that tooth.

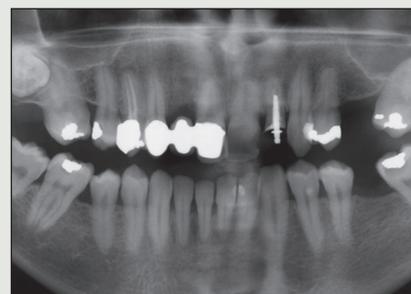


Figure 3: Panoramic radiography shows the fixed partial denture on teeth 11 to 13. The endodontic treatment of tooth 22 was deficient, with extensive destruction and reconstruction with a metal post.



Figure 4: Radiographic image of tooth 22 shows the deficient root canal treatment, as well as periapical and filling complications.



Figure 5: Laboratory image of the wax-up of a fixed partial denture for teeth 21 to 23 and the vacuum-formed matrix (clear thermoforming splint .30", Proline, Keystone Industries, Cherry Hill, N.J.) for tooth reduction control and provisional bridge construction.



Figure 6: The abutment prepared for metal-ceramic crowns on teeth 21 and 23. There is less reduction on the buccal surface of tooth 21 (arrow). Tooth 22 has been extracted. A temporary bridge has been prepared in acrylic resin (Trim II, Harry J. Bosworth Co., Skokie, Ill.) with provisional cementation (Temp-Bond NE, Kerr, Orange, Calif.).

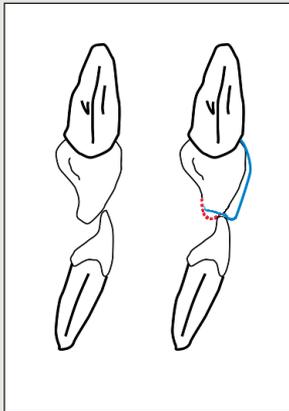


Figure 7: The dental illustration that was sent to the laboratory.



Figure 8: The framework wax-up as prepared in the laboratory, with the characteristics as previously described.



Figure 9: The framework try-in shows adaptation of the cervical margins and correction of the anterior crossbite.

structure by the crown) was inadequate (i.e., there was less than 1.52 mm in height and less than 1 mm in width of tooth crown remaining above the gingival margin, compromising the 2.5-mm biologic width⁴; see Fig. 4).

- Teeth 31, 32 and 33 were in supraocclusion, and tooth 23 had unsatisfactory fillings.

The patient's low lip line was the most important feature of the extraoral examination.

The following treatment options were discussed with the patient:

1. Extraction of tooth 22, orthodontic correction of tooth 21, placement of an implant and

crown for tooth 22, and placement of veneer and crown for tooth 23.

2. Extraction of tooth 22 and placement of a crown for tooth 21 (accompanied by periodontal surgical correction), an implant and crown for tooth 22, and veneer and crown for tooth 23.
3. Extraction of tooth 22, placement of a fixed partial denture (bridge), with a special contoured design, to be supported by teeth 21 and 23, as well as periodontal surgery for the central teeth.

The patient selected the third option, but without the surgery, because of his low lip line.



Figure 10: The fixed partial denture for teeth 21 to 23 was secured with a glass ionomer cement (Ketac Cem Aplicap, 3M). The anterior crossbite has been corrected.



Figure 11: Lateral photograph illustrates the buccal profile of the fixed partial denture on teeth 21 to 23.



Figure 12: Photograph of the patient's smile after cementation of the fixed partial denture on teeth 21 to 23.

Treatment

The following procedures were executed at subsequent appointments:

- *Second appointment:* The abutments of teeth 21 and 23 were prepared, tooth 22 was extracted and a fixed provisional bridge was made with a vacuum-formed matrix (Fig. 5). The incisal edges of teeth 31, 32 and 33 were reduced to correct the anterior occlusal plane (parallel to the bipupilar line).
- *Third appointment:* After healing of the extraction socket (Fig. 6), final impressions were made with an addition elastomer (Elite, Zhermack, Badia Polesine, Italy) using the double-mixture technique, and a dental illustration was sent to the dental technician (Fig. 7) to illustrate the clinical needs.
- *Fourth appointment:* The framework wax-up was placed on a dental cast (Fig. 8), and the patient underwent a framework try-in (Fig. 9).
- *Fifth appointment:* The fixed partial denture was cemented in with a glass ionomer cement (Figs. 10–12). After correction of the occlusal plane, the patient was sent for operative dentistry to replace fillings in the lower incisors.

Discussion

The general concept of dental esthetics combines several principles, including proximity, similarity, continuity and closure,⁵ with “the whole [being] different from the sum of its parts.”⁵ In the

clinical case reported here, the patient presented a functional problem (anterior crossbite) combined with an esthetic issue (which was the patient's main concern).

Because both abutments were vital teeth, a conservative tooth-reduction approach was considered. The palatal surface of tooth 11 was covered with metal only, and the tooth margins were left in a slightly supragingival and asymmetric position because of the patient's low lip line.

Orthodontic treatment to correct the position of tooth 21, followed by creation of a dental bridge, would have been the best option. However, the patient refused this option because of its duration and cost.

The main advantages of a fixed denture included the possibility of correcting the anterior crossbite more quickly and less expensively than would have been the case with orthodontic therapy^{6–8} or placement of an implant with a crown for tooth 22 plus crowns for teeth 21 and 23.

In our opinion, the main disadvantage of this technique is the possibility of greater accumulation of plaque because of the shape and adaptation of the metal–ceramic crown over the gingival contour. The patient must be followed by a dental hygienist to address this concern and also because of his poor oral hygiene. To facilitate the patient's oral hygiene, the final margin of the left central tooth was located in a supragingival position.

This type of treatment plan is supported by other authors, such as Ning,¹ who studied 27 cases of anterior crossbite that were corrected with a specially designed fixed partial denture. In that study, no clinical, functional or esthetic problems were identified during follow-up after 3 years.

Conclusions

The success of treatment with a fixed partial denture depends on the diagnosis, treatment planning by the dentist or prosthodontist and the dental technician or hygienist, and the patient's concerns. In this case, the treatment choice was based on the principles of restoration of endodontically treated teeth, smile esthetics, and the time and cost of treatment. Appropriate evaluation of the patient, prosthetic design and tooth preparation, as well as good oral hygiene, are all required for success.^{1,2,9} ♦

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