

RESTORING AN ANTERIOR TOOTH WITH QUESTIONABLE PROGNOSIS-
A CASE REPORT

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ABSTRACT The most viable treatment option for those with inadequate supragingival tooth structure is post and core. The ferrule effect is the criterion that determines if post and core are successful. If there is no healthy dental structure, the tooth becomes biomechanically weak. Orthodontic extrusion or surgical crown lengthening and endodontic treatment are options for producing the ferrule effect. The interdisciplinary strategy of prosthodontic, periodontic, and orthodontic intervention to restore the maxillary left central incisor fracture is described in this case report. In order to preserve the gingival zenith level, the maxillary labial frenectomy and surgical crown lengthening of teeth 12, 11, 21, and 22 (teeth numbering according to the FDI method) were done in this case report. This was followed by orthodontic extrusion. Following the completion of the necessary ferrule effect, the tooth was rebuilt with a post and core, and then a crown prosthesis.

KEYWORDS : crown lengthening procedure (CLP), post and core, orthodontic extrusion, ferrule effect, multidisciplinary approach.

INTRODUCTION

When treating patients with esthetic expectations, trauma patients have substantial hurdles¹. Prior to beginning therapy, the dentist should assess the biological, functional, and cosmetic components of each case². Several factors are taken into account while designing a treatment plan, including as the patient's smile line, the crown-to-root ratio, the position of the cemento-enamel junction, the thickness and width of keratinized tissue, and the health of the periodontium³.

Crown lengthening is a surgical method used to gain the extent of supragingival tooth structure for restorative or esthetic purposes. It involves placing the gingival edge apically, removing the supporting bone, or doing both at the same time⁴. It is recommended in situations including unequal gingival margin maintenance, short clinical crowns, restorative operations, and increased gingival visibility⁵.

For broken teeth, there are several orthodontic extrusion methods that use fixed mechanotherapy. These methods include gluing brackets and wires or directly bonding stiff wires to nearby teeth and employing them to apply traction force⁶.

When using a post and core, adding a ferrule is an essential part of the tooth preparation process.

For a protective effect, the ferrule must be at least 2 mm in diameter⁶. To secure the restoration to the surviving tooth structure, strengthen the treated tooth, and stop vertical fracture, some form of stabilization is required. To do this, use a post, also known as a dowel, preferably with a core.

This case report details the planned procedures for crown lengthening, maxillary labial frenectomy, prosthetic rehabilitation using a post and core, and Emax zirconia crown.

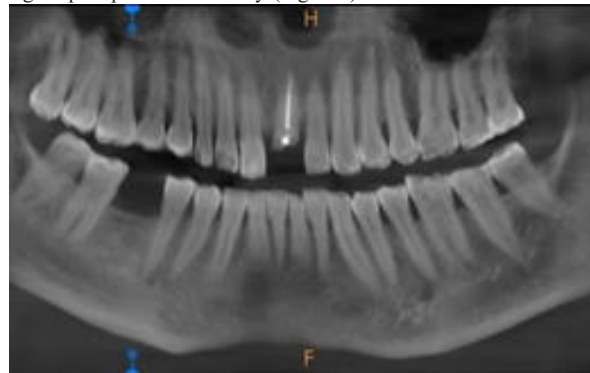
Case Report: A 54-year-old man with a primary complaint of a dislodged prosthesis in the upper front tooth region of his jaw presented to the prosthodontics department. (Figure 1)

The patient had no harmful tobacco use or smoking habits, and there was no contributing medical history. His dental history showed that he had a crown prosthesis placed two years ago to replace a root canal-

treated tooth in the upper front area of his jaw, which became loose 15 days ago. An extraoral check revealed no abnormalities. Upon intraoral examination, a cracked 21 was discovered, along with inadequate ferrule for post and core preparation.



A radiograph of tooth number 21 showed radiopacity in the canal area, indicating that the tooth had received root canal therapy. There was no sign of periapical radiolucency. (Figure 2)



The patient was given information about several treatment options because he preferred to keep the tooth rather than have it extracted and replaced with a fixed or removable prosthetic. Therefore, plans were made for a surgical crown lengthening operation, orthodontic extrusion, post and core, and a lithium disilicate crown (Emax). The

patient was informed about the planned procedure and gave his signed consent. Transgingival probing was done under local anesthetic with 2% lidocaine and 1:80000 epinephrine. William's graded probe was used to mark the bleeding points.

Then an internal bevel incision was made with a 15-number BP knife. (Figure 3)



BP blade number 12 was used to make a crevicular incision. Curettes designed for a particular location helped eliminate tissue tags and full thickness mucoperiosteal flap was elevated. To accomplish the reconstructive osseous surgery with tooth 21, sufficient biologic width was maintained by using a handpiece, a carbide bur, and saline irrigation at a slow speed. (Figure 4)



The flap was stitched back into place with 3-0 nonabsorbable mersilck sutures. Since the maxillary labial frenum connection was gingival, a traditional maxillary labial frenectomy was performed, and 4-0 absorbable vicryl sutures were used to repair the affected area. (Figure 5)



Postsurgical instructions were given to patient and sutures were

removed at 7th postoperative day. (Figure 6)

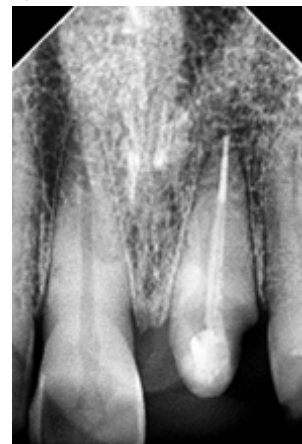
Even after CLP, the necessary length of the crown to achieve the ferrule effect was not met, therefore orthodontic extrusion was carried out using stiff 21x25 stainless steel wire, which was adhered to 14, 13, 12, 11, 22, 23, 24, and 25 using composite resin. An open coil spring was used to maintain the width, and the MBT bracket was bonded to the 21. The red elastics were used to apply the extrusion force. (Figure 7)



The ideal force needed for extrusion was between 20 and 30 gms, which is what was applied. After seven days, an extrusion of around 0.5 mm was achieved after 7 days. Next appointment was planned after 15 days and debonding was done after achieving 1mm of extrusion. (Figure 8)



After achieving the proper crown height, the post space was prepared with a #1 peeso reamer and a #1 fiber post, and Luxacore-Z (DMG) was luted. (Figure 9)



Retraction cable was used to perform gingival retraction with aluminium chloride. (Figure 10)



and elastomeric imprint (Zhermack) was used to create the impression. A temporary cement was used to lute the tooth-colored, cold-cured interim crown for retention. A final prosthesis was created using a lithium disilicate layering (Emax) and layered zirconia crown, which was luted with resin cement (Figure 11).



DISCUSSION

It maintains the gingiva in place because look is the most important factor in the anterior region⁷. It has long had a variety of effects on the treatment of oral diseases⁸.

Treatment options for an anterior tooth with a damaged crown structure are numerous. The most widely utilized one is post and core. A post's planning should take the ferrule effect into account.

A ferrule is nothing more than a collar that encircles the tooth's coronal anatomy. When teeth undergo endodontic therapy, their integrity is improved. Research has shown that the resistance to breakage of teeth replaced without a ferrule is halved when a 1 mm-tall ferrule is introduced.

Crown lengthening is a surgical technique used to extend the supragingival tooth structure for restorative or aesthetic purposes. It may involve apically positioning the gingival boundary, removing the supporting bone, or doing both⁴. Studies show that alveolar bone and restorative margins should be separated by at least 3 mm for periodontal health, with an extra 1 mm for sulcus depth and 2 mm for BW space⁹. For a harmonic, long-lasting restoration, the prosthetic borders and crestal bone should be spaced at least 3 mm apart in order to replicate the biological width¹⁰.

In this instance, osteotomy was done with 21 to preserve the biologic breadth and surgical crown lengthening was done with 11, 12, 21, and 22 using traditional technique because there was insufficient ferrule effect present with 21. Maintaining the gingival zenith level also required crown lengthening of 11, 12, and 22. Since the maxillary frenum attachment was gingival, a traditional frenectomy was also performed to ensure that there would be no frenal pull tension.

Owing to the insufficient crown structure obtained following CLP, further orthodontic extrusion utilizing stiff wire was considered.

Following the completion of core and post space preparation and the achievement of a satisfactory crown root ratio, the provisional crown was cemented. Later, lithium disilicate's final crown prosthesis was cemented.

CONCLUSION

Teeth that would have normally required extraction can be saved with the aid of a multidisciplinary approach. Small clinical crowns with subgingival borders may cause poor retention form after dental trauma, which may result in improper tooth preparation. After a comprehensive evaluation of every case individually, orthodontic extrusion and crown lengthening procedures could be a helpful substitute for treating such issues. In this case study, the anterior tooth was repaired with an aesthetic and functional restoration following the ferrule's creation through a crown lengthening operation, orthodontic extrusion, post and core, and prosthesis.

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