

A New Approach for Management of Carious Premolars. “A Case Report”

Maher Abdullatif Walid

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for Management
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ABSTRACT

With the main goals of retaining natural dentition and harmonic periodontal restorative interrelationship, a second premolar with deep distal caries was managed to expose sufficient tooth structure for further restorative treatment. Using BENEX atraumatic extraction system, the tooth was surgically extruded and stabilized at a required level for three months, followed by its final restoration. The case was followed up to 1 year after extrusion that showed a healthy soft and hard supportive tissues.

Key Words: Premolar, Extrusion, Crown Lengthening, Benex

Citation of Case Report: Walid MA. A New Approach for Management of Carious Premolars. “A Case Report”. Med Forum 2024;35(9):83-86. doi:10.60110/medforum.350918.

INTRODUCTION

With the wide popularity of dental implants as a replacement of badly destroyed teeth, retaining the natural dentition should always be the main goal of dentists in their practices¹.

Insufficient tooth structure to achieve proper tooth preparation may occur due to deep carious lesions, traumatic injuries and iatrogenic factors². Several techniques have been proposed for crown lengthening to expose sufficient tooth structure, improve restoration retention, and achieve biologically accepted prosthetic clinical margin². Some of Crown lengthening techniques includes gingivectomy or apical flap repositioning with or without resective osseous surgery, as well as, forced orthodontic eruption with or without fibrotomy¹. However, these techniques have limitations, and selection of the proper technique has to put into account patient acceptance, esthetic demands, duration/ease of the procedure, and the final stability/restorability of the tooth^{1,2}.

Surgical extrusion is defined as the procedure where the remaining tooth structure is re-positioned supragingivally in the socket¹. The main goal for this procedure is to reestablish the tooth biologic supra crestal structure that is important to create a good restoration¹.

Described steps in this technique are: soft tissue detachment, tooth luxation with periosteum, tooth

extraction with forceps, and tooth fixation to adjacent teeth, and after the healing period, placement of final restoration^{1,3}.

The BENEX atraumatic extraction system is designed to extract extensively damaged teeth by applying a force directed through the tooth long axis, and thus reducing the lateral damaging forces on the lateral wall of the socket^{1,2}. This vertical extrusive force shears the periodontal ligament and moves the tooth in the coronal direction that helps in reestablishing the biologic supra structure of the tooth when the tooth is stabilized for a healing period to start restorative procedure^{1,2}.

In this case report, an upper second premolar with deep subgingival distal caries was endodontically treated. To reestablish the supra crestal structure for adequate restoration, extrusion with BENEX system was performed, and after a 3-month stabilization, a cast post and core and a final PFM crown was completed. And the case was followed for more than 1 year.

PATIENT AND OBSERVATION

2.1. Patient Information:

A 39-year-old male patient who is healthy and non-smoker with high functional and esthetic demands presented for definitive treatment of a maxillary left second premolar. The tooth had a carious lesion extends distally below the gingival margin (Figure1:a).

2.2. Diagnostic assessment:

A CBCT (Dentsply Sirona GALLILIOS 3D, Germany) was completed. Analysis of CBCT images (BlueSkyPlan3.29.28, BlueSkyBio, USA) showed intact buccal plate, extensive caries in the crown, a single root with two canals those merge into a single apex and a small periapical radiolucency (Figure1:a,b). Treatment options included: 1) endo treatment followed by: a: surgical crown lengthening, b: orthodontic extrusion, c: surgical extrusion. 2: extraction followed by: a: 3-unit bridge, b: implant placement with a crown restoration. After a discussion with the patient, endo treatment followed by surgical extrusion, cast post and crown restoration was selected for this case, and an

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Received: January, 2024
Accepted: February, 2024
Printed: September, 2024

informed consent was signed by the patient prior to intervention.

2.3. Therapeutic interventions:

After completing the endodontic treatment for this tooth (Figure1:c,d), the BENEX root extraction system (Helmut ZEPF Medizintechnik, GmbH, Hager & Meisinger GmbH) tray was adapted over the occlusal surfaces of adjacent teeth using impression rubber base (Express TM VPS impression Material, Putty, 3M, USA) and the gingival detachment was completed with a Periotome #1 (Nordent, USA) (Figure1:e). Following sequential drilling with the BENEX rotary burs in the

palatal canal, the corresponding extraction screw was inserted in the canal, and attached to BENEX Extraction devices that got support over the adapted tray (Figure1:f,g,h).

Controlled extrusion of the tooth was performed until the distal margin of the cavity was 1mm over the gingival margin, then the BENEX device was detached and the extruded tooth was stabilized with a rigid composite splint to the adjacent tooth. An out of occlusion GIC restoration was completed to fill the cavity and assure proper sealing during healing period (Figure2:a:b).

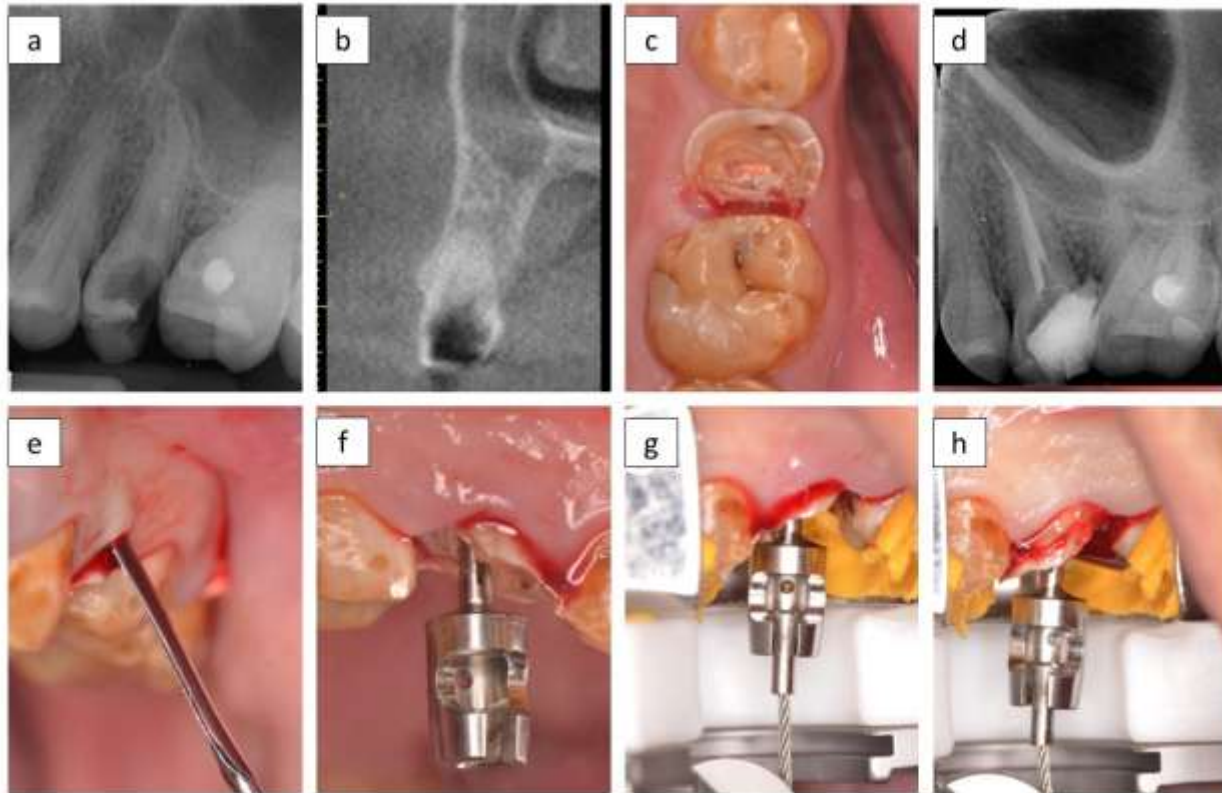


Figure No.1: a: preoperative periapical x-ray for tooth #25 showing the deep distal caries, b: cross-sectional view showing intact buccal bone around tooth, c: completing root canals obturation, d: periapical x-ray following endodontic treatment, e: gingival detachment with periotome #1, f: extraction screw inserted into palatal canal, g: the benex extraction system, h: Surgical extrusion of tooth #25.

2.4. Follow-up and outcome of interventions:

After 3 month the composite splint was removed and the extruded tooth showed no mobility. Impression for a cast post was completed. And after cementation of the post gingivectomy with Diode laser (SiroLaser Blue, Dentsply Sirona, USA) was performed to levelize the gingival margin with adjacent teeth. A PFM crown was fabricated and cemented in place (Figure2:c,d,e,f).

At 1-year recall, the patient reported no problems in the extruded tooth, on clinical examination the tooth was asymptomatic, not tender to percussion and palpation and mobility within physiologic limits. The gingival tissue was healthy with no signs of inflammation and

probing depth were within physiologic limits. Radiographic examination showed stable healed bone and intact buccal bone over the extruded tooth (Figure2:g,h)

DISCUSSION

The basic principle for supra-crestal soft tissue attachment health assures that there should be at least 3 mm between the restoration margin and the bone crest to prevent periodontal breakdown⁴. In order to obtain satisfactory esthetic and functional results, different anatomic and biologic consideration have to be

respected when planning for crown lengthening procedures to preserve soft and hard tissue, especially in the esthetic zone¹. Surgical extrusion aims to reposition the tooth in a more coronal place by severing

the periodontal attachment in order to obtain supragingival sound tooth structure for a physiologically healthy final restoration^{1,5}.

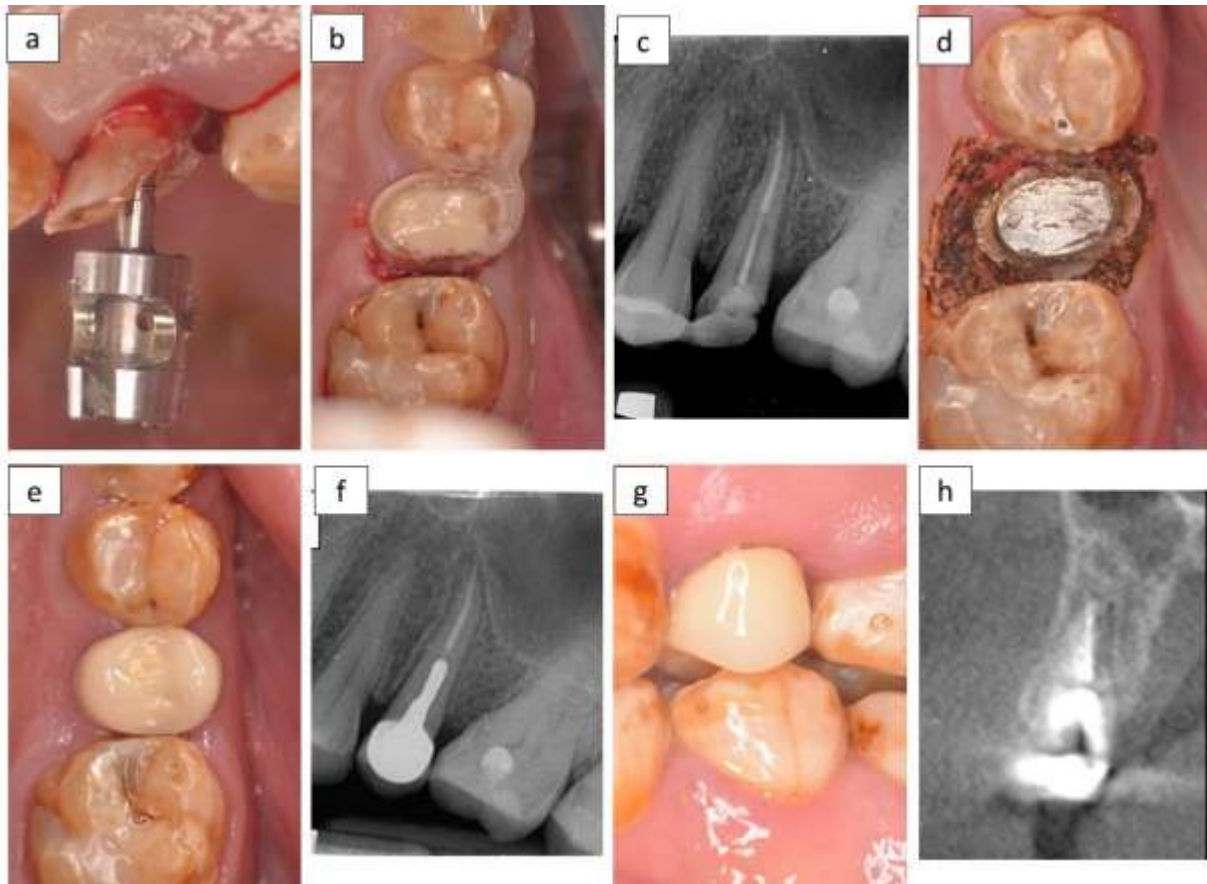


Figure No.2: a: Detachment of BENEX Extraction Device, the distal margin of the cavity is 1 mm supragingival, b: Composite rigid splint with adjacent tooth, c: periapical x-ray 3-month after surgery, d: Cast post cemented in place and Occlusal view of laser gingivectomy, e: Occlusal view of the PFM crown, f: Final (PA) x-ray, g: 1-year recall, h: cross sectional CBCT of 1 year recall showing intact buccal bone around tooth.

The BENEX atraumatic extraction system offers quite a few benefits over the other extrusion techniques by minimizing the trauma to periodontal tissue⁶. By delivering axial extrusive forces over several minutes on the tooth, this system reduces the potential traumatic injuries resulting from lateral forces responsible for increasing the risk of periodontal defects, and thus, maintaining the integrity and stability of the alveolar socket after extrusion⁷.

The present study displayed a favorable outcome after surgical extrusion of a non-restorable tooth. In consistent with earlier studies^{8,9}, the surgical extrusion procedure using an atraumatic extraction device had the advantages of less operative and overall treatment time, a relatively easy procedure with a low cost, and short chair-time of treatment. And in one year recall, the tooth that was badly destroyed was in function with no clinical and radiographical complications. From another

view, possible adverse events associated with surgical extrusion using atraumatic extraction device were reported in other studies^{6,7}, those include root fracture, superficial root resorption, crestal bone resorption and persistence of tooth mobility.

In the presented case, the BENEX system was successfully used as a part of restorative treatment of the badly destroyed maxillary premolar. The conservative means of extrusion showed acceptance by the patient, no complications if any, and good soft and hard tissue healing for up to one year follow up. Since the BENEX system was designed for atraumatic extraction, long term follow-up is required to evaluate whether the outcomes for this approach on soft and hard tissues are achievable compared to alternative surgical crown lengthening techniques.

CONCLUSION

Surgical extrusion using BENEX atraumatic extraction system can be a successful alternative in restorative plans for selected teeth. With the minimal invasive and favorable outcome of this procedure as shown in the case report. Further studies with larger number of teeth and longer-term follow-up are needed to confirm the advantages of this protocol as a treatment option

Conflict of Interest: The study has no conflict of interest to declare by any author.

Source of Funding: None

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