Case Report

Canal Projection Techniques for Pre-Endodontic Buildup of Grossly Mutilated Teeth: Two Case Reports

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Abstract:

Most frequently observed carious teeth are badly mutilated molars which need to be rehabilitated optimally before starting the endodontic treatment. Rubber dam is considered as the gold standard for isolation during endodontic treatment, however grossly decayed teeth are difficult, if not impossible, to isolate using rubber dam. 'Projector Endodontic Instrument Guidance System' (PEIGS) is an innovative concept that can be used in badly mutilated molars to project the canal orifices from pulpal floor to cavosurface. These projections provide an easy access to the respective root canals. The technique of 'Projector Endodontic Instrument Guidance System utilizes hollow metallic needles, hypodermic needles and greater taper gutta percha as sleeves to project the orifices of the canals. In this article, two case reports are presented wherein the technique of 'Projector Endodontic Instrument Guidance System' (PEIGS) was used to rehabilitate badly mutilated molars before starting the endodontic treatment.

Keywords:

Canal projection technique, Hollow metallic needle, Greater taper gutta percha, Pre- endodontic restoration, Root canal treatment.

Introduction:

Access cavity preparation is the first and most important phase in endodontic therapy done to locate and identify root canals and remove diseased pulp. A well-prepared endodontic access cavity yields good treatment outcome. Adequate access is a prerequisite to straight-line access to all the canals and maintenance of their patency throughout the endodontic treatment procedure. Rubber dam isolation of severely mutilated teeth often poses a difficulty to the endodontist in rubber-dam clamp placement.[2,10]

A bonded coronal restoration of grossly mutilated tooth prior to endodontic treatment not only will simplify the procedure but also strengthen the tooth structure. Therefore, placing a restoration without hampering canal patency prior to commencing chemo-mechanical preparation is important in management of grossly decayed tooth. This can be effectively achieved by an innovative technique as suggested by Gerald N Glickman and Robert Pileggi also known as "Projector Endodontic Instrument Guidance System (PEIGS)" wherein hollow plastic sleeves were used to project the root canal from orifice to cavosurface margin so as to provide accessibility to the canal and maintain it's patency.[1]

This article describes effective management of badly mutilated teeth restored before endodontic treatment using canal projection technique for management. In the case reports described in following sections, hypodermic needles and greater taper gutta percha were used as projector sleeves. This technique is a simple, quick and predictable way of restoring grossly carious teeth and allows for proper rubber dam isolation while maintaining access to the root canal system.

Case Report-1

An adult male patient of 28-years old visited the department with a complain of pain in lower right posterior region for last 10-15 days. A thorough case history was taken prior to clinical examination. No relevant medical history was observed. Clinical examination revealed a grossly carious lower right second molar (47) with pulpal exposure and

tenderness to percussion (Fig.1). Radiographically initial apical changes were seen (Fig. 2). The case was diagnosed as irreversible apical periodontitis and root canal treatment (RCT) was advised. The treatment procedure was explained to the patient. Written consent was obtained before commencement of treatment.

Fig.1 Preoperative photograph

Fig.2 Preoperative radiograph

Coronal access cavity was prepared, three canal orifices (mesiobuccal, mesiolingual and distal) were located and size 10 K file (Mani, inc, Japan) was used to confirm the canal patency. Initial wall buildup with packable composite was done by placing Tofflemire matrix band and retainer (GDC, Hoshiarpur). Preflaring of the coronal 3mm of root canals was done with orifice opener i.e PROTAPER Sx (Dentsply Sirona, U.S) (Fig. 3,4,5). Hypodermic needle cut at the hub, was inserted into each root canal passively, without any pressure, till the middle third of the canal (Fig. 6). The needles were coated with separating medium for easy retrieval after the composite buildup.

Fig.3 Coronal Access Preparation

Fig.4 Coronal Preflaring

Fig.5 Pre-endo composite buidup

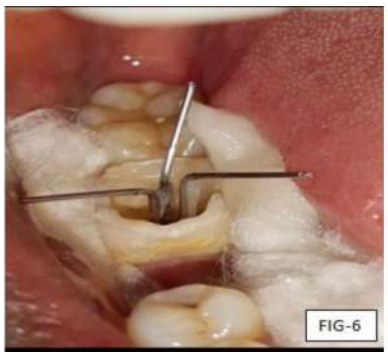

Fig.6 Hypodermic needles in the canals

The crown surface was acid-etched for 15 seconds and rinsed. Bonding agent (3M ESPE, U.S) was applied to the etched surface and light cured for 20 seconds. The cavity within the built-up wall and around the hypodermic needles was filled with flowable composite, light cured for 40 seconds (3M ESPE,U.S) (Fig. 7). The restoration was done upto the level of cavosurface margins. The projectors i.e. hypodermic needles were now removed. The projectors offered visualization and straight-line access to the canal orifices, making the instrumentation convenient (Fig. 8). This composite built-up also provided a strong core, coronal seal and effective rubber dam placement (Coltene, Brazil).

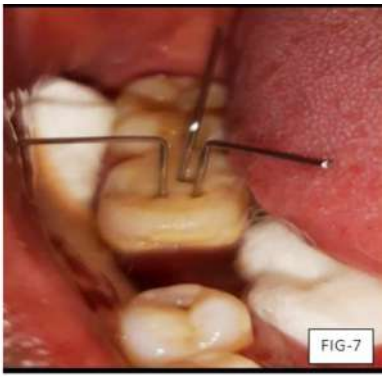

Fig.7 Access cavity filled with composite resin

Fig.8 Hypodermic needles removed from the canals

The endodontic treatment was further continued by placing rubber dam. An electronic apex locator (Eighteeth, China) and radiograph were used to determine the working length. Chemo-mechanical instrumentation was done upto the F1 (PROTAPER) with intermittent sodium hypochlorite irrigation (Septodont, India) (Fig. 9 to 13). Obturation was completed using gutta-percha and Sealapex root canal sealer (Kerr, U.S). The gutta percha was sealed off at the original orifices and the remaining projected space restored with composite (Fig. 14).Integrity of composite build up was maintained throughout the treatment.

Fig.9 Sodium Hypochlorite placed in projected canals

Fig.10 Instruments in the canals for the working length

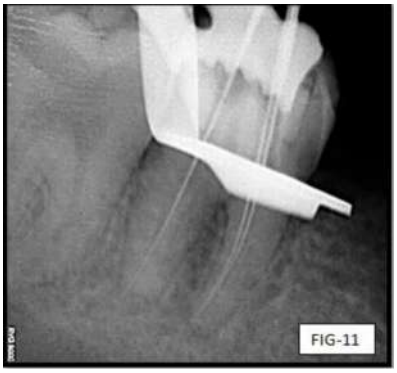

Fig.11 Working length radiograph

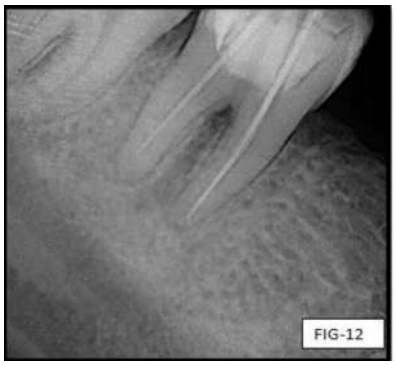

Fig.12 Master cone radiograph

Fig.13 Post-obturation radiograph

Fig.14 Post-obturation restoration

Case Report-2

A 18-year-old male patient visited the department with a complain of pain in lower left posterior region of jaw for last 7-8 days. Pain was severe in the night. A thorough case history was taken prior to clinical examination. No relevant medical history was observed. Clinical examination revealed a grossly carious lower left first molar (36) with pulpal exposure and tenderness to percussion (Fig.A). Radiographically initial apical changes were seen (Fig. B). Irreversible apical periodontitis was diagnosed and root canal treatment (RCT) was advised. The treatment procedure was explained to the patient. Written consent was obtained before commencement of treatment.

Fig.A Preoperative photograph

Fig.B Preoperative radiograph

Coronal access cavity was prepared, three canal orifices (mesiobuccal, mesiolingual and distal) were located and and size 10 K file (Mani, inc, Japan) was used to confirm the canal patency (Fig. C). Initial wall buildup with packable composite was done by placing Tofflemire matrix band and retainer (Fig. D). Preflaring of the coronal 3mm of root canals was done with orifice opener i.e ProTaper Sx (Dentsply Sirona,U.S). Unlike in first case report, instead of hypodermic needles, Greater taper gutta-percha points (#40) were used for projection (Fig. E). The gutta-percha points were inserted into each root canal passively, without any pressure, till the middle third of the canal. The gutta-percha points were coated with separating medium for easy retrieval after the composite buildup.

Fig.C Coronal Access Preparation

Fig.D Pre-endo buildup and Coronal Preflaring

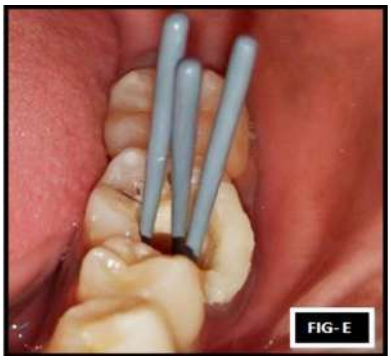

Fig.E Grater Taper Gutta percha in the canals

Pre-endodontic restoration with composite buildup was done following the standard steps of acid-etching and bonding (prime and bond).The walls were built up first with packable composite and the cavity within the built-up wall and around the gutta-percha points was filled with flowable composite (Fig. F). The restoration was done up to the level of cavosurface margins. The projectors i.e. Greater taper gutta-percha points were removed. The projectors offered visualization and straight-line access to the canal orifices, making the instrumentation convenient (Fig. G). This composite built-up also provided a strong core, coronal seal and effective rubber dam placement.

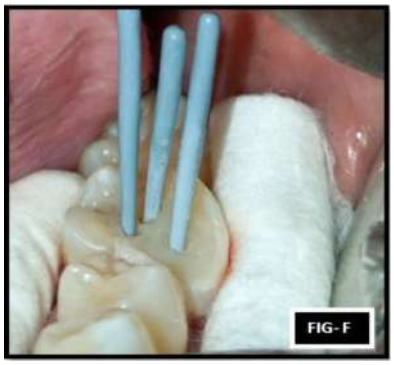

Fig.F Access cavity filled with composite resin

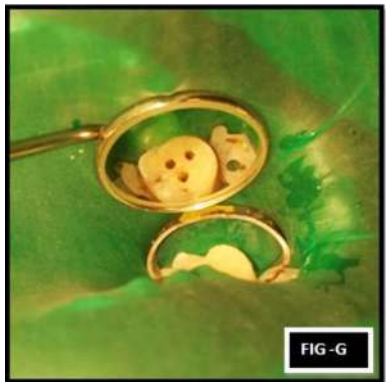

Fig.G Gutta percha removed from the canals

The endodontic treatment was further continued by placing rubber dam (Fig. H). Working length was determined using electronic apex locator and radiograph (Fig. I,J). Chemo-mechanical instrumentation was done upto the F1 (ProTaper) with intermittent sodium hypochlorite irrigation. During master cone selection, the apical part of master cone gutta-percha got separated. Attempts were made to retrieve but were not successful hence bypassing the broken gutta-percha was attempted successfully. Obturation was completed using gutta-percha and Sealapex root canal sealer (Fig. K,L). The gutta percha was seared off at the original orifices and the remaining projected space restored with composite (Fig. M). Integrity of composite build up was maintained throughout the treatment.

Fig.H Sodium Hypochlorite placed in projected canals

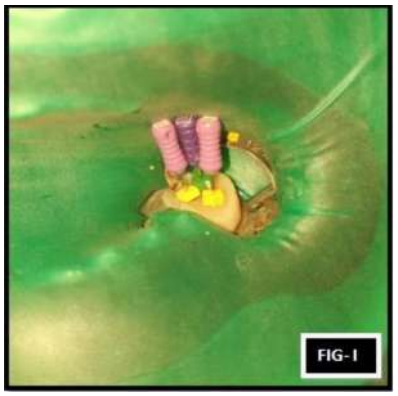

Fig.I Instruments in the canals for the working length

Fig.J Working length radiograph
(the projecter gutta percha seperated in mesiobuccal canal)

Fig.K Master cone radiograph

Fig.L Post-obturation radiograph

Fig.M Post-obturation restoration

Discussion:

Grossly mutilated teeth can be salvaged by rendering endodontic treatment. Root canal treatment is preferred treatment option for such teeth over tooth extraction and replacement.[5] The treatment procedure must be done under rubber dam isolation since it reduces aerosol contamination and cross infection by up to 98.5%.[6]

Coronal leakage is one of the major contributors to endodontic failure[7]. Pre-endodontic composite restoration prior to endodontic treatment with open root canal orifices at times, may block the orifices as some amount of resin may get unintentionally infilterated into the root canals. Isolating a badly mutilated tooth requiring endodntic treatment for successful rehabilitation is often challenging. Reinforcement of the coronal tooth structure following endodontic treatment has been addressed quite often but very less focus is drawn on the bonded core build up prior to endodontic phase.[3]

Pre endodontic rehabilitation of a badly mutilated teeth can be done successfully using canal projection technique ("Projector Endodontic Instrument Guidance System") as described by Gerald N Glickmann and Robert Pileggi. The technique uses plastic sleeves for canal orifice projection. Due to limited availability of these sleeves in market and cost effectiveness, alternatives such as Hypodermic needles and greater taper gutta percha points were tried with similar effective outcomes.

This technique offers many advantages like (i) ease in endodontic procedure by bringing the canal orifice to the cavosurface margin for easy visualization; (ii) provides straight line access with proper orientation; (iii) better sealing of the pulp chamber;(iv) effective rubber dam clamp placement[8,9]and (v) the chamber acts as a reservoir for the irrigant during instrumentation[4]. In addition to simplifying the endodontic phase, the procedure strengthens the tooth structure, avoiding further damage to the tooth during and post treatment. The canal projector provides isolation of the individual canals by surrounding them with bonded core, thereby reducing the coronal leakage during and following the endodontic treatment. Another advantage it offers is that after post endodontic restoration if operator wishes to place post in canal immediately, this technique simplifies the placement by providing proper orientation and preventing misdirection of post.[5]

Our experience with the clinical cases indicates that the canal projection technique may have limitations in rectifying endodontic procedural errors as in second case presented in this article had separated gutta-percha point which could not be retrieved. We feel that the restricted canal opening may have hindered removal of gutta-percha. However, to gain expertise over this technique one needs to do large number of cases.

Conclusion:

Endodontic management of grossly decayed teeth poses challenges in rubber dam isolation. Rubber dam clamp placement in such cases becomes difficult if not impossible, due to minimal supra-gingival structure. The canal projection technique can be a solution to this problem as it can provide (i) perfect isolation, (ii) easier orientation to the canals, (iii) serves as a good foundation restoration, (iv) reconstruction of the lost walls and floors becomes easy and (v) it acts as "hydraulic chamber" of each canal. In these case reports, hypodermic needles and greater taper gutta-percha points were used successfully as canal projectors. Hence they can be

used as an effective alternatives to 'Projector Endodontic Instrument Guidance System' (PEIGS).

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