e-ISSN:2320-7949
p-ISSN:2322-0090
RESEARCH AND REVIEWS: JOURNAL OF DENTAL SCIENCES

A Multidisciplinary Treatment Approach of a Maxillary Lateral Incisor with a Large Defective Restoration.

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Case Report

Received: 09/01/2014
Revised: 23/01/2014
Accepted: 26/01/2014

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Keywords: Root canal treatment, restoration, biologic width, ferrule effect, multidisciplinary treatment

ABSTRACT

The outcome of root canal treatment depend not only on the efficiency of every endodontic procedure but also on subsequent coronal restoration which should be in harmonious relationship with contiguous hard and soft tissues. Teeth having large defective coronal restorations requiring root canal treatment pose difficulties not only during rubber dam application but also during subsequent restorative procedures. In this article, one such case of endodontically involved maxillary lateral incisor having extensive restoration is presented in which a multidisciplinary treatment approach was carried out in a sequential manner for functional and esthetic rehabilitation of the tooth.

INTRODUCTION

Long-term clinical success of endodontically treated teeth requires skilled integration of both endodontic and restorative disciplines. Teeth having large defective restorations scheduled for root canal treatment usually present several challenges during the entire treatment procedures. In such cases, substantial tooth structure may be lost making the placement of the rubber dam rather difficult thus compromising the clinical outcomes[1]. In addition, the margins of future restoration may approximate the alveolar crest, thus violating the biologic width space. Placing the restorative margin within the biologic width will lead to gingival inflammation, clinical attachment loss and bone loss due to destructive inflammatory response induced by microbial plaque located at the deeply placed restorative margin[2]. Moreover if a crown is constructed in such cases, the margins of the crown will engage the core restoration instead of axial walls of the prepared tooth[3]. This will lead to failure in obtaining ferrule effect and decrease the fracture resistance [4].

Whenever dental practitioners face such challenging clinical situations, the amount and location of remaining sound tooth structure, position of the tooth, occlusal forces as well as restorative and esthetic requirements should be assessed carefully before selecting the most appropriate treatment approach. This article aims to present a case of endodontically involved maxillary lateral incisor having a large defective restoration extending subgingivally in which a multidisciplinary treatment was carried out in a sequential manner for functional and esthetic rehabilitation of the offended tooth.

e-ISSN:2320-7949
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Case report

A 22-year-old female patient reported to the Department of Conservative Dentistry and Endodontics complaining of a dull, mild intermittent pain in the maxillary anterior region for 2 months. Intra-oral examination revealed the presence of an extensive resin composite restoration with secondary carious lesion in maxillary left lateral incisor i.e. 22(Fig 1a, 1b).

Pulp sensibility testing elicited a negative response. The preoperative radiograph revealed that the radiolucency below the restoration was involving pulp and also with radiolucency at the periapical area (Fig 1c). A diagnosis of pulpal necrosis and chronic apical periodontitis was made.

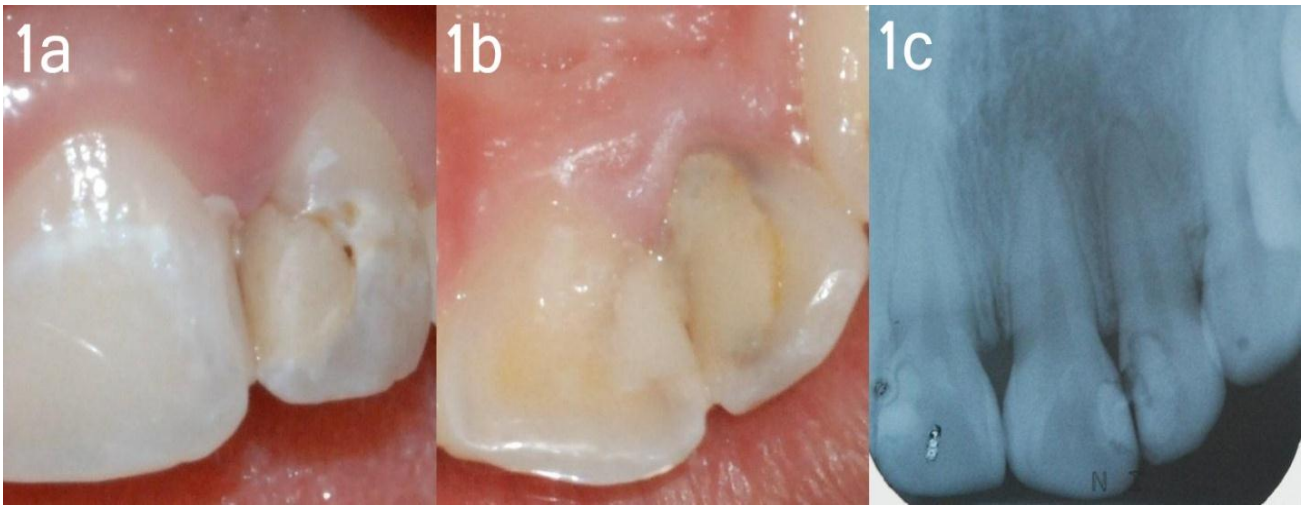

Figure 1: Pre-operative clinical picture of 22

Fig 1a: labial view showing large discoloured composite restoration with secondary caries
Fig 1b: palatal view showing large defective composite restoration with margins extending deep subgingivally
Fig 1c: Intraoral periapical radiograph reveals secondary caries approximating pulp; widening of periodontal ligament space

Pre-endodontic restorative procedure

After consideration of medical and dental history of patient, local anesthesia was administered. All caries and previous restoration with marginal leakage was removed until sound tooth structure (Fig 2a) Preparation of access to the canal orifice was done (Fig 2b) and the coronal necrotic pulp tissue was removed. A snugly fitting fiber post (Polydentia GF posts 1.5 mm) was selected to prevent blockage of the root canal (Fig. 2c). The remaining tooth structure was etched with Adper scotch bond etchant gel (3M ESPE, USA) for 20 seconds, rinsed and dried with blotting paper followed by application of Adper single bond plus (3M ESPE, USA) bonding agent and light cured for 20 seconds. A separating medium like vaseline was used to coat the entire length of the post to facilitate its retrieval after restoring the coronal portion of the tooth using Filtek supreme plus flowable restorative (3M ESPE, USA) and Filtek Z250 universal restorative (3M ESPE, USA) composite (Fig 2d). After the build-up, the post was carefully removed (Fig 2e).

Endodontic Phase

The tooth 22 was isolated using the rubber dam (Fig 2f). Working length was determined radiographically using Ingle's technique (Fig 2g), and the root canal was instrumented via step back method using 0.02 taper stainless steel K-files. The coronal third of the root canal was shaped with Gates-glidden burs. Glyde (Dentsply, USA) was used as lubricant and the canal was irrigated with 3 % NaOCl using 27 gauge needles during all stages of cleaning and shaping. The root canal was obturated with 0.02 taper gutta percha cones and AH Plus sealer (Dentsply, USA) via cold lateral condensation technique (Fig 2h). Access cavity was then sealed with Filtek Z250 universal restorative (3M ESPE, USA) composite.

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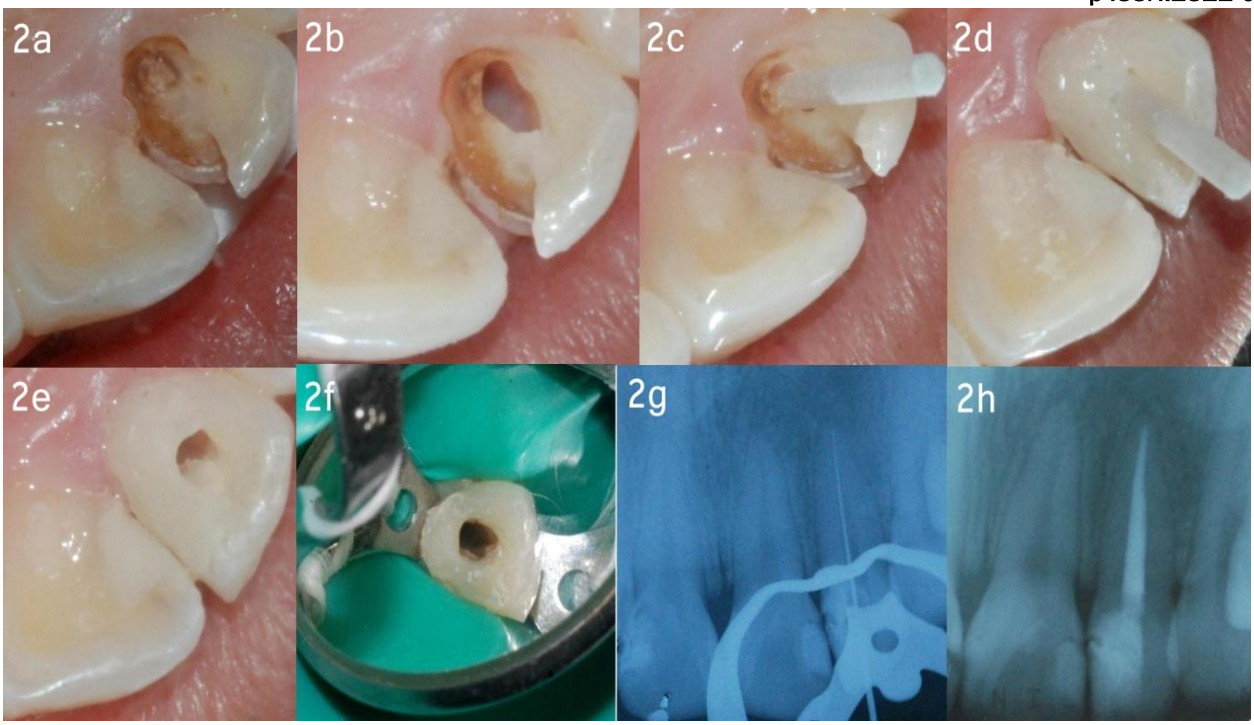

Figure 2: Endodontic phase

Fig 2a: Removal of old restoration
Fig 2b: Removal of secondary caries and access preparation to root canal
Fig 2c: Selection of fiber post which snugly fits in the root canal space which was then coated with a separating medium
Fig 2d: Composite build around the post
Fig 2e: careful removal of fibre post
Fig 2f: Rubber dam application and modification of access using gates glidden burs
Fig 2g: Working length determination using Ingle's method
Fig 2h: Post-operative radiograph

Periodontal Phase

Surgical crown lengthening procedures was planned to achieve retention form without violation of biologic width and to adjust gingival levels for aesthetics[2].

Pre–surgical Evaluation

The patients consent for surgical procedure was obtained after briefing in detail about the expected outcome after surgery and also the need for the surgical intervention. The gingival structures in the surgical site appeared healthy. Transgingival probing was done under local anesthesia using Williams periodontal probe to record the topography of the crestal bone and to measure the distance from the crest of marginal gingiva to the crest of the alveolar bone. The distance from the gingival margin to the underlying alveolar crest was 4mm.

Surgical procedure

Apically repositioned flap procedure along with osseous resection was performed for this patient. On elevation of the flap, the distance from the apical extent of the cavity margin to the underlying nearest crestal margin was found to be around 2.0 mm. 2.5 mm of the crestal bone were removed resulting in a total distance of 5 mm from the cavity margin to the osseous crestal margin. The flap was apically repositioned and sutured 0.5 mm coronal to the crest of the underlying alveolar bone. Suturing was done using 5-0 silk and sling suturing method (Fig. 3c).

Re – evaluation of surgical therapy

The surgical site was clinically re – evaluated after 4 weeks (Fig. 3d). On achieving the required clinical crown height with adequate biologic width, the tooth was then subjected for prosthodontic management.

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Figure 3 Periodontal phase

Figure 3a: Pre surgical palatal aspect of 22
Figure 3b: Full thickness flap is elevated and osseous recontouring done
Figure 3c: Suture placement
Figure 4: Follow up after 4 weeks

Prosthetic phase

The patient was re - called six weeks after the suture removal. A porcelain fused to metal crown was constructed to restore the form and function of the tooth (Fig 4).

Figure 4: Prosthetic phase

Fig 4a: Tooth preparation for PFM crown
Fig 4b: Post operative clinical picture-labial view
Fig 4c: Post operative clinical picture-palatal view

DISCUSSION

Clinicians in their routine dental practice will often have to treat endodontically involved teeth having large defective restorations. Careful planning and execution of high quality root canal treatment and restorative procedures are prerequisites to ensure long-term success of such teeth.

Before starting root canal treatment it is imperative to remove carious lesions and defective restorations. In such cases there is substantial loss of tooth structure leading to a number of clinical challenges such as difficulty in placing the rubber dam assembly, loss of inter appointment restoration and fracture of corono-radicular tooth structure[5]. Pre-endodontic procedures are required in these instances to overcome the above-mentioned problems. Castelluci[6] categorized these pre-endodontic procedures into restorative or prosthetic, periodontal or orthodontic procedures. Clinicians can use a single technique or combine two or more methods for reconstructing the tooth, before commencing root canal treatmen[1].

Invasion of the biologic width either due to existing restorations or future restoration could result in inconsistent crestal bone loss, gingival recession with localized bone loss, localized gingival hyperplasia with minimal bone loss, or a combination of the three[7]. Clinical crown lengthening has to be performed in order to expose greater amount of sound tooth structure, achieve margins on sound tooth structure, maintenance of the biologic width, access for impression techniques, and esthetics[8].

Crown lengthening will not only establish proper biologic width but also provide vertical height of tooth structure that will be grasped by future prosthetic crown, which is necessary to allow for a ferrule effect to the future prosthetic crown[3]. This has shown to significantly reduce the incidence of fracture in endodontically treated teeth[9]. Crown lengthening can be achieved by orthodontic extrusion or by surgical means. In this case surgical

e-ISSN:2320-7949
p-ISSN:2322-0090
crown lengthening was performed as the site indicated was on the palatal aspect of 22, therefore esthetically not compromised and favourable results can be achieved fast.

CONCLUSION

Management of endodontically involved teeth having large defective restorations may pose significant challenges during root canal treatment and its subsequent restoration. In such cases, coronal leakage, isolation complexities and risk of coronal-radicular tooth fracture may be major contributors to endodontic failure; whereas biologic width violation and inability to obtain ferrule effect may lead to restorative failure. Clinicians should give careful attention to detail and execute a multidisciplinary treatment plan which includes endodontic, periodontal and prosthetic procedures for the long term success.

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