Interdisciplinary Approach in the Management of Acid-induced Noncarious Lesions

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ABSTRACT

With increased awareness about dental esthetics, multidisciplinary therapy has begun to gain momentum. Management of acid induced noncarious teeth is a challenging situation and is dealt with an interdisciplinary approach. In such cases, the crown height is drastically reduced in some cases up to the gingival level. This might require a contribution from the disciplines of endodontics, periodontics and prosthodontics for predictable results. This case report helps us to understand the roles of various disciplines in producing an esthetic make over, with the most conservative and biologically sound interdisciplinary treatment plan possible. A correct diagnosis and the development of an appropriate treatment plan are key factors in predictable outcomes.

Keywords: Biologic width, Crown lengthening, Dental esthetics, Interdisciplinary dentistry, Noncarious lesions.

INTRODUCTION

In today’s dentistry, awareness of saving grossly decayed and mutilated tooth had made esthetic dentistry to gain its momentum. Smile design with proper treatment planning has become an integral component of the esthetic armamentarium. This has lead to the development of Inter-disciplinary approach for such treatment.

In cases where teeth are severely decayed, endodontic treatment and placement of intracanal posts become necessary before crown restoration. Posts may be constructed of a variety of materials, including resin composite, metal and biologic material.

In recent years, various types of fiber reinforcement have come into widespread use as an alternative to cast or prefabricated metal posts in the restoration of endodontically treated teeth. The advantages of using reinforced fiber to construct an intracanal post include resin composite crown reinforcement, translucency and relative ease of manipulation.

Clinical crown of the tooth is the distance from the gingival margin to incisal edge or occlusal surface of the tooth. A short clinical crown is defined as any tooth with less than 2 mm of sound, opposing parallel walls remaining after occlusal and axial reduction. The common causes of short clinical crown include caries, erosion, tooth malformation, fracture, attrition, excessive tooth reduction, eruption disharmony, exostosis, genetic variation, amelogenesis imperfecta and gummy smile. The treatment modalities advised for short clinical crown are crown lengthening given by Cohen, which includes gingivectomy, apically repositioned flap or apically repositioned flap with osseous recontouring. It can also be done by the procedure like forced tooth eruption.

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A band of 2 to 3 mm of attached gingiva is preferable to maintain the restored tooth successfully. Since, the resecting nature of this procedure, there is a risk of reducing the width of attached gingiva. For this reason, it is important to diagnose and to evaluate the attached gingiva when planning surgical crown lengthening procedure.

This clinical report demonstrates the treatment sequence for the smile makeover which includes the root canal treatment, the restorations, the crown lengthening procedure, post and core followed by final prosthesis placement.

CASE REPORT

A 16 years old female patient reported to the Department of Conservative Dentistry and Endodontics, Institute of Dental Sciences, Bareilly, with a chief complaint of the broken and mutilated anterior teeth from past 3 years. A detailed medical and dental history was obtained from the patient. Patient gave history of acid ingestion due to which she had undergone the gastric lavage followed by esophageal surgery. On clinical examination, various carious lesions in the posterior region along with acid...
induced demineralized and noncarious lesions in anterior regions were found (Figs 1 to 3). Complete radiographic examination was done and accordingly treatment was planned (Fig. 4). Radiographic examination showed no bone loss.

Root canal treatment was performed wrt 16, 14, 13, 12, 11, 21, 22, 23, 36, 45 and 46 (Fig. 5). Postpreparation was done wrt 13, 12, 11, 21 and 22 (Fig. 6). All the carious lesions of maxillary and mandibular arch were restored.

An average of 2 mm of the clinical crown and 2 mm of biologic width was required to place the subgingival margins of the crown for which surgical crown lengthening was planned. On probing, a generalized depth of 1 mm was observed with 4 to 5 mm of attached gingiva. Before the surgical procedure, complete scaling and root planning was performed. On the day of surgery, after giving anesthesia, crevicular incision along with vertical incision were planned extending from 13 to 22 (Fig. 7). After incision placement, mucoperiosteal flap was raised (Fig. 8). Apically displaced flap surgery with osseous recontouring was performed on labial side to increase the clinical crown length and to maintain the biologic width. On palatal surface, gingivectomy was performed to obtain the desired crown height (Fig. 9). The scalloping of the flap was performed anticipating
the final underlying osseous contour. Flaps were sutured apically using sling sutures (Fig. 10). Coe-pak was then placed (Fig. 11). Routine postoperative instructions were given. The medications prescribed were amoxicillin 500 mg tid for 5 days, metronidazole 400 mg tid for 5 days and paracetamol bd for 3 days.

Patient was recalled after 1 week for suture removal (Fig. 12) and after 1 month for re-evaluation (Fig. 13). After 3 months of follow-up of periodontal surgery, patient was asymptomatic and possess sufficient tooth structure for post and core build up. Fiber post were placed wrt 11, 12, 13, 21 and 22 (Fig. 14). Composite build up was done wrt mandibular anteriors (Fig. 15). Core built up was done and impressions were taken. Casts were poured from the elastomeric impressions. Wax patterns for the fabrication of porcelain fused to metal (PFM) restorations were made and were casted with metal. In case of maxillary incisors, labial ceramic facing with palatal metal backing was planned. Metal try-in was done to check the fit of the crowns on the natural teeth (Figs 16 and 17). After the fabrication of PFM crowns, refining of occlusion was done and the final prosthesis was placed (Fig. 18).

DISCUSSION

Esthetic restoration of mutilated teeth has long been a special challenge to dentists. An accurate diagnostic and interdisciplinary approach is necessary for obtaining improved, conservative and predictable results in esthetically sensitive areas, like the anterior maxillary and mandibular dentition.
Fig. 10: Osteotomy done with sling suture placement

Fig. 11: Coe-pak given wrt 11, 12, 13, 14, 21, 22, 23 and 24

Fig. 12: After 7 days postsurgery

Fig. 13: One month follow-up

Fig. 14: Core build up and crown preparation

Fig. 15: Composite build up wrt mandibular anteriors

Fig. 16: Try-in wrt maxillary anteriors
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Periodontal health is of paramount importance for all teeth for any restoration. Thus, the periodontal procedure, as an adjunct to a restorative treatment, can produce predictable results while ensuring good esthetics and maintaining periodontal health. The surgical procedure is aimed at re-establishing the biological width. Average biologic width consists of the epithelial attachment (0.97 mm) plus connective tissue attachment (1.07 mm). This gives an average value of 2.04 mm. When this biologic width is violated by a restoration as a defense mechanism, inflammatory response accelerates bone loss to provide space for new connective tissue attachment, which results in increased pocket depth. Therefore, impingement of a restoration on the biologic width will trigger loss of bone, connective tissue and epithelial attachment.

To have a harmonious and successful long-term restoration, a 3 mm sound supracrestal tooth structure between bone and prosthetic margins, which allows for the reformation of the biological width plus sulcus depth is advocated. This can be achieved surgically by crown lengthening, orthodontically by forced tooth eruption or by a combination of both.

The amount of tooth structure that is exposed above the osseous crest must be above 4 mm which is enough to provide for a stable dentogingival complex and biological width to permit proper tooth preparation and account for an adequate margin placement. It was found that margins of fixed prosthesis significantly compromise the gingival health if placed below the gingival margin.

After the procedure, it is customary to wait for 6 to 8 weeks before cementing the final restoration. This reduces chances of gingival recession after prosthetic crown insertion. After 2 to 3 weeks postsurgery period, temporary crowns may be used until there has been full healing and the gingival margin is in a stable position.

When there is severe loss of coronal tooth structure, the use of posts placed inside the canal after endodontic treatment will give retention, provide stability to the reconstructed crown, and withstand masticatory forces in function. There are a variety of root posts used in restorative dentistry. Prefabricated posts are fast, cheap, and easy to use, but they do not take into account the individual shape of the root canal. Although metal posts are indicated for mutilated teeth but because of their color metal post do not meet the esthetic requirement.

The development of the fiber-reinforced composite technology has brought a new material into the realm of metal-free adhesive esthetic dentistry. Different fiber types, such as glass fibers, carbon fibers, Kevlar fibers, vectran fibers, and polyethylene fibers have been added to composite materials. Carbon fibers prevent fatigue fracture and strengthen composite materials, but they have a dark color, which is undesirable esthetically. Kevlar fibers made of an aromatic polyamide increase the impact strength of composites but are unesthetic, and, hence, their use is limited. Vectran fibers are synthetic fibers made of aromatic polyesters. They show a good resistance to abrasion and impact strength, but they are expensive and not easily wielded. Polyethylene fibers are esthetic but their flexural strength is less as compared to glass fiber-reinforced composite posts.

The properties of fiber-reinforced posts are dependent on the nature of the matrix, fibers, interface strength, and geometry of reinforcement. The advantages of glass reinforced material over the older fibers are greater flexural strength (1280 MPa), and over 650 MPa of the older fibers, greater ease of handling, can be used in high stress-bearing areas and can be bonded to any type of composites. Scanning electron microscopic (SEM) evaluation has shown clearly the formation of a hybrid layer, resin tags, and an adhesive lateral branch. Successful bonding minimizes the wedging effect of the post within the root canal, requires less dentin removal to accommodate a shorter and thinner post, and leads to lower susceptibility to tooth fracture. When compared to other fibers, they are almost invisible in resinous composites.
due to these reasons, they are the most appropriate and the best esthetic strengtheners of composite materials.\textsuperscript{14}

**CONCLUSION**

Proper treatment plan should be established before any clinical procedures. With the aim of it, a thorough examination including clinical examination, radiographic assessment and diagnostic wax up are essential. In this case report, visualization of the desired results has guaranteed the outstanding surgical, restorative and prosthodontic outcomes. In addition, the treatment modality was determined and every effort was exerted on fabricating properly designed prosthesis that distributes occlusal forces evenly.

**REFERENCES**

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