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DENTAL DEFECTS WITH SUBGINGIVAL EXTENSION: A RESTORATIVE CONUNDRUM

Dental Science

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ABSTRACT

There are situations where the subgingival margin of the restoration are unavoidable such as subgingival caries, fractures and resorption. The subgingival cavity margin creates various challenges during operative procedure and can affect periodontal health .Several restorative materials have been tried to restore cavities with subgingival margin. This paper will review the current approaches to the treatment of teeth involving root surfaces with caries, fractures, resorption and developmental defect with an objective to discuss clinical problems associated with deep subgingival margins and to have clear strategies of treatment approach in such situations.

KEYWORDS

INTRODUCTION:

The radicular defects involving the cervical third affects the marginal periodontium. The subgingival defects triggers the inflammation in the periodontium and subsequently loss of attachment forming periodontal pocket. A periodontal pocket may form depending on the crestal bone level and the degree of destruction in the region. As there is loss of alveolar bone, there is formation of granulation tissue which may fills the tooth through the defect[1]. There is increased accumulation of plaque which will also leads to gingival inflammation, bone loss , increased probing depth and bleeding on probing . Various researchers have also studied the crevicular fluid composition, microbiological changes occurring in subgingival flora, presence of inflammatory markers (IL-1beta,IL-4,IL-6,IL-10) after placement of well subgingival restoration[2,3].

The previous studies have shown good subgingival restoration done with proper isolation , good adaptation to dentin and with smooth surface were well tolerated by the periodontium[4]. Thus these subgingival cavities needs proper attention and management. Many studies have shown difficulties in their clinical management. There are problems with isolation, absence of a margin in enamel, difficulty in matrix band placement and removal of excess material and requires increased chairside time. There are also issues in taking impression which do not reproduce gingival margins accurately[5].

Despite difficulty in restoring teeth with subgingival margins ,there are many advantages of preserving them as it provides preservation of natural tooth structure , provides optimal shape, size, colour and alignment, are biocompactible , cost effective and can be used as interim restoration to postpone extraction[6].

It is also well known that restorative margin placed coronal to the gingival tissue provides better prognosis than the margins placed below it with regards to gingival health[7,8]. However in unavoidable situation the subgingival restoration becomes necessary. In such incidents, the materials used for subgingival restoration should be devoid of cytotoxic constituents, provides chemotactic stimulus , assist the migration and attachment of the cells[9]. The materials should be biocompactible, dual cure, have adhesiveness, fluoride release and are radioopaque, and compact.They should also have adequate surface hardness and should be insoluble in oral fluids to prevent microleakage. These prerequisite requirements provides proper healing of the pulp and the surrounding soft tissues . However none of the existing materials available provides all of these properties[10].

This paper will review the current approaches in the management of teeth defects with subgingival extension such as caries, fractures, resorption and developmental defects.

Dental Caries (Fig.1)

The dental caries with subgingival extension more frequently violates the junctional epithelium and supracrestal connective tissue and presents a clinical challenge. There are two ways by which these can be treated. Surgical approach displacing the supporting tissues apically and restorative approach by elevating the margin supragingivally.

Surgical lengthening of the crown can be done depending on the extent of involvement which may include either gingivectomy only , apical position flap or apical position flap with osteotomy [11].The apical displacement of tissue leads to attachment loss and anatomical problems such as proximity to root concavities or furcation[11,12].

The deep margin elevation technique can be used in restoring subgingival caries by elevating the margin supragingivally. The studies have reported the use of surgical approach that assisted in caries excavation and restorative procedure and placement of supragingival margin and a new biological width[13]. In a randomized clinical trial, it was found that deep margin elevation technique was well tolerated than crown lengthening by the periodontium with regards to clinical attachment level, clinical inflammatory response and periodontal probing depth[14].

The resin modified GIC, glass ionomer and composites were generally used in the restoration of subgingival cavities. The lesions can be located either on the buccal or proximal aspects of the tooth surface. The restoration on the buccal aspects of the root surfaces were easier to restore and polish than on the interproximal regions due to their accessibility and visibility[15].

Crown Root Fracture/Cusp Fracture (Fig.2)

Crown root fracture or Cusp fracture with subgingival oblique extension presents treatment dilemma[16].The management depends on the extent and pattern of fracture, restorability of remaining tooth structure, fractured fragment availability and extent of damage to the periodontium[17].The cusp fracture involves either the buccal or lingual groove and the mesial or distal marginal ridge. The fracture may involve buccal or lingual cusps of posterior teeth but were more frequent in lingual cusps[18]. Usually a single cusp is affected and has both the mesiodistal and buccolingual involvement of fracture line extending below the CEJ[19].The fractured segment may become mobile and remain attached to the gingival tissues[16].The fracture occurs either due to caries or due to large restoration that resulted in undermining of tooth structure or it can occurs as a result of trauma causing fracture[19].

The clinical management of subgingival fracture depends on the extent of the fracture[20]. The fracture line when lies within the biologic width, the management strategies can be surgical mucogingival flap or orthodontic crown lengthening procedure and crown. The fracture line extending to alveolar crest within 0.5 to 1.5mm, it can be managed by the surgical flap ostectomy or orthodontic crown lengthening procedure and crown . The fracture line extending to alveolar crest below 2 to 3mm, the choice of treatment can be either surgical,orthodontic extrusion, intentional replantation or tooth extraction[20].

External Cervical Resorption (Fig.3)

Root resorption is a nonbacterial loss of the cementum or dentine as a result of interaction between clastic cells and dental structure. It is comparatively uncommon form and may occur in any of the permanent teeth . Due to the presence of unmineralised organic precementum, the roots do not undergo resorption in normal condition[21]. The subgingival resorption is a form of external cervical resorption. These are localized resorption which involves the surface of the root above or below the epithelial attachment and coronal to the supporting alveolar bone in the

region of connective tissue attachment[22]. The resorptive defect above the attachment level have better prognosis and can be easily restored . There is no definite radiographic appearance of these lesion and may appears as well defined or have irregular margins[23].The management of these resorptive defects depends on the location, extent,severity and restorability of the teeth[25] .In severe cases these resorption may perforates the root canal. It can be managed by external repair of resorptive defect with or without internal repair and root canal treatment. In cases of untreatable teeth periodic review and extraction is advised[23,25].

The materials required to fill the resorptive cavity are GIC,Composite resin and biodentine where there is communication with oral cavity[24].

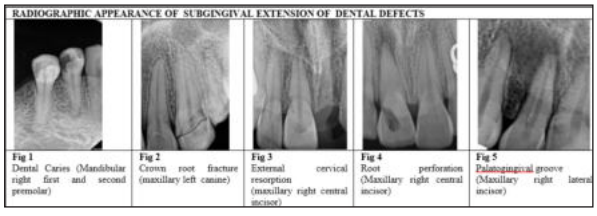
Root Perforation (Fig.4)

The perforation in the subgingival region of the root is caused either as a result of mechanical or pathological reasons which leads to communication between the supporting periodontal tissue and root canal system(AAE glossary 2003).The subgingival perforations are critical as there is bacterial contamination from oral environment through gingival sulcus. There can be apical migration of epithelial attachment forming periodontal defect. The periodontal defect leads to continuous ingress of irritants resulting in persistent inflammation of the site[25]. However the success of a perforation repair depends on the time interval between its occurrence and repair, size and the site of the perforation[26]. The management goal in perforation repair is to control the inflammatory process to prevent further loss of tissue attachment , preservation of healthy tissue at the site of perforation and its repair. Subgingival perforations can be treated by nonsurgical method if it is small and accessed easily or by surgical approach if it is large and cannot be accessed or when the perforation fails to heal by nonsurgical method. Perforations may occur either on the buccal,proximal or lingual aspect of root surface. The buccal perforations are easier to repair because of the ease of access[27].

The calcium silicate based materials are used for perforation repair. These materials are biocompactible, provides tight seal, and promotes regeneration of cementum and periodontal tissues. The resin ionomer are also used, are biocompactible to both soft and hard tissues[29]. The fluoride release leads to altered carbohydrate metabolism with changes in bacterial plaque biochemistry [29,30] and decreases localized gingival inflammation[28] .

Palatogingival development defect (Fig.5)

The palatogingival groove is a developmental defect which develops as a result of alteration in the growth of inner enamel epithelium and hertwig's root sheath. Maxillary lateral incisors are most frequently affected by this malformation[31]. The groove begins from the central fossa on the palatal surface passes from the cingulum apically at or beyond the cementoenamel junction onto the root surface. The defect serve as a site of bacterial accumulation which is difficult to access by normal oral hygiene procedures and predisposes to periodontal pocket and bone loss. The diagnosis of these groove is difficult as they cannot be recognized easily on radiograph[32].Majority of the cases associated with palatogingival groove shows no evidence of caries or discoloration and reveals no traumatic history .The pulp may or may not be involved depending on the extent of the PGG. The management of PGG depends on the extent, location and depth of the PGG. The treatment includes root canal treatment in pulpless teeth followed by gingivectomy and apical positioned flap , removal of granulation tissue and irritants, elimination and restoration of defect. In severe cases intentional replantation may be attempted[33].Various materials has been used for repair of the defect such as glass ionomer cement,composite resin and calcium silicate based cement[33].



CONCLUSION

Teeth with subgingival involvement are difficult to manage. Understanding the problems in dealing with such situation will help in treatment planning and preserving the natural dentition. Exposure of sound tooth structure by surgical intervention aids in restoration of compromised teeth and enhances the longitivity of teeth and better outcomes with periodontium.

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