Obliteration Of Furcation Defects With Glass Ionomer Cements- A Literature Review

M Mittal, R Mishra

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Abstract

Over the years, various modalities have been used to treat furcation involvement in periodontal disease. These have traditionally included scaling and root planing, furcationplasty, root resection, hemisection, tunneling, bone grafting, guided tissue regeneration and apically repositioned flaps. The following article reviews the literature regarding the use of glass ionomer cements in the management of furcation defects.

INTRODUCTION

Periodontal disease results in the formation of various osseous defects, involvement of furcation areas of multi rooted teeth being one of them. These defects are often associated with tooth mobility and recession, further complicating treatment and maintenance. According to Moreira et al[15] the most often adopted criteria to indicate the extraction of periodontally affected teeth were the presence of mobility (37.5%), severity of attachment loss (24.3%) and radiographic bone loss greater than 50% (21.2%). The results of their study demonstrated the difficulties faced by dentists to indicate the extraction of teeth with severe attachment loss, in addition to the establishment of an adequate prognosis.

Glass ionomer cement (GIC) was introduced by Wilson and kent[19] as a restorative material in dentistry. GIC is derived from an acid-base reaction in which the basic component is a calcium aluminosilicate glass containing fluoride, while the acidic component is a copolymer or homopolymer of alkenoic acids[20]. GIC has found application in restorations, cementation, core buildup and as a liner and base[13]. Resin ionomers have a dual setting reaction (light cured and chemically cured). They are superior to conventional glass ionomers in that they have a longer working time, insolubility in oral fluids, increased adhesion to tooth structure, better control of setting time, improved aesthetics and low coefficient of thermal expansion[16].

BIOCOMPATIBILITY OF GLASS IONOMER CEMENTS

The biocompatibility of glass ionomer cements varies with their chemical composition, and is affected by compounds that can be leached out of them, such as fluoride and aluminium ions and polyacids[9]. Resin ionomers, even when properly cured according to manufacturer's instructions; release the monomer HEMA (2-hydroxethyl methacrylate). HEMA has a multitude of biologically toxic properties, ranging from pulpal inflammation to allergic contact dermatitis. Therefore, resin-modified glass-ionomers cannot be considered biocompatible to nearly the same extent as conventional glass-ionomers; although the clinical results with these materials that have been reported to date are generally positive.[17]

In one study, either a composite resin or a resin modified GIC were used to restore artificially created defects in dogs. The dogs were euthanized after ninety days and histomorphometric analysis revealed apical migration of epithelial tissue onto the restorative materials. The control group (un-restored) presented significantly longer connective tissue attachment than the resin modified GIC and composite resin groups and significantly greater bone regeneration compared to the resin ionomer group. The restorative materials used exhibited biocompatibility; however, both materials interfered with the development of new bone and the connective tissue attachment[12].

Leyhausen et al[11] compared three light cured GICs with a conventional GIC regarding their compatibility with human primary fibroblasts of the attached epithelium. It was concluded that two resin modified light cured GICs as well as the conventional GIC exhibited good biocompatibility, however one of the light cured materials was found to be highly cytotoxic.

Garcia et al[8] compared the gingival crevicular fluid flow and gingival index in patients with well finished GIC cervical restorations with unrestored cervical abrasion lesions and found that GIC restorations did not adversely affect the depth of sulcus as well as GCF flow.

Dragoo[5,6] conducted a study on 25 patients with a total of 50 subgingival restorations using two resin ionomer and one hybrid ionomer restorative materials. There was a reduction in probing depth and gain in clinical attachment with all the three materials tested. Histological analysis demonstrated epithelial and connective tissue attachment to resin ionomer restorative materials, thus confirming their biocompatibility.

Paolantonio et al[18] utilized dental amalgam, GIC and composite resin for subgingival restorations. Clinical and microbial analysis was performed in the mid buccal aspect of each experimental tooth to be restored, as well as in an untreated adjacent control tooth. After one year, the clinical parameters did not differ significantly between experimental and control teeth. However, there was a significant increase in total bacterial counts and a microbial shift towards Gram –ve anaerobic microflora in the restored areas.

Miranda et al[14] evaluated the healing of surgically produced grade II furcation defects treated with: either an experimental barrier of resin-modified glass-ionomer cement (GIC), or a polylactic acid barrier, or flap surgery alone in beagle dogs. After 120 days, both the GIC and polylactic acid barrier prevented epithelial migration and promoted the formation of new periodontal tissues in experimentally induced class II furcation defects in dogs.

Alkan et al[2] used a subepithelial connective tissue graft on a resin ionomer-restored root surface to treat gingival recession. At 3-, 6-, and 9-month follow-ups, probing depths were reduced and gain in attachment level was obtained with no clinical signs of inflammation in gingiva. Periodontal examination revealed that creeping attachment had occurred on the restoration during the follow-up periods.

GLASS IONOMERS IN THE TREATMENT OF FURCATION DEFECTS

The treatment of furcation involvement of multirooted teeth has conventionally comprised of scaling and root planing, flap surgery with or without bone grafting, guided tissue regeneration, root resection and hemisection and tunneling, with varying degrees of success. The use of GIC in the furcation area has the advantage of easy placement and bacteriostatic property, as well as occlusion of furcation and formation of epithelial and connective tissue attachment[3,4].

Abitbol[1] et al used a resin ionomer for guided tissue regeneration (GTR) either alone as a barrier or to lute an e-PTFE membrane in place, in furcation defects. These cases provided preliminary clinical evidence that a resin-ionomer could be used subgingivally for guided tissue regeneration.

Lagou[10] used a resin ionomer to fill 11 furcation defects in ten patients after surgical flap reflection. Eight furcation defects were treated conventionally and served as unrestored controls. Both groups exhibited improvement in clinical parameters three months after treatment. The glass ionomer restorative material exhibited good biocompatibility and clinically healthy contiguous tissues, indicating that GIC could be used successfully to fill furcation defects.

Fowler and Breault[7] used resin ionomer to seal a furcation defect in a molar in a patient with advanced periodontitis. Initial healing was good but suppuration appeared buccally in the restored area at 11 weeks. Nine months after the surgery the tooth had to be finally extracted, showing failure of the material to treat furcation defect in this case.

Anderegg and Metzler[3] treated seventeen adult periodontal patients with Class III furcation defects using an open flap procedure and placing a resin-ionomer into furcation defects. The patients were placed on quarterly maintenance appointments and the teeth evaluated up to one year. All the teeth had poor to hopeless prognosis initially, however at one year, fifteen of these teeth survived with reduction in bleeding on probing, probing depth and mobility. Sealing decreased the surface area of the furca and simplified future maintenance. He concluded that molar teeth with hopeless prognosis might be retained when furcation areas were sealed by a resin ionomer.

CONCLUSION

Periodontal disease commonly results in furcation involvement of multirooted teeth, complicating treatment and prognosis. The resin ionomer cements have demonstrated biocompatibility to both soft and hard tissues of the periodontium. The relative dearth of studies in the literature regarding GIC as a treatment modality for furcation defects precludes its widespread use over more conventional treatment options. However, glass ionomers may be used in cases that are deemed to have a poor to hopeless prognosis based on conventional treatment modalities, or where the clinician finds them appropriate. Also, there is also a need for more well designed studies investigating the potential of these materials in the management of furcation defects.

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Author Information

Manoj Mittal, MDS
Professor, Dept of Periodontics, Mauras Dental College and Oral Research Institute

Rahul Mishra, MDS
Reader, Dept of Periodontics, Seema Dental College and Hospital