The Use of Hybrid Ionomer-composite Geristore in Restaurations

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In adult patients, as a result of gingival recession and root surface exposure under an improper oral hygiene, the tooth decay appears frequently on the root at the cemento - enamel junction or at the cervical level of the crown. This study included a number of 27 patients with deep cervical lesions, in total 45 lesions. They where treated following the same procedure. Local anesthesia and a full thickness flap were performed at the cervical level of the teeth. The fillings with Geristore were done after caries exeresis. Once set, the material was finished with fine diamonds bores under water spray. The flap was sutured in its initial position. Postoperatory, the patients developed no sensitiity or pains. The suture was then removed after ten days. The marginal integrity of the fillings and the existence of gingival inflammation signs where checked every 6 months.

Keywords: geristore, caries, restorative, inflammation

Tooth decay is one of the most common of all disorders all over the world, second only to the common cold. It usually occurs in children and young adults but can affect any person at any age. It is a common cause of tooth loss in younger people. Bacteria and fermentable carbohydrate are involved in root caries. A strong clinical association between Streptococcus mutans, Lactobacillus, and root caries has been established [1]. Demineralization results from acid secretion of Streptococcus mutans and Lactobacillus on the tooth after eating a diet high in fermentable carbohydrates [2]. The acids produced from the bacteria during this process diffuse within the plaque to the cementum or dentin, covering the root surface, and slowly dissolve the root surface. The tooth reacts to this invasion by forming sclerotic hypermineralized dentin to slow the process of the bacteria toward the pulp. Demineralization begins at a certain pH level called the critical pH.

The critical pH for demineralization of enamel is 5.5 and for dentin is 6.2 to 6.4. [2]. Demineralization is approximately twice as rapid on root surface as on enamel because the root has half as much mineral as enamel and demineralization occurs at a higher pH [3]. As demineralization proceeds, mineral is lost, exposing collagen. Enzyme generated by bacterial plaque [2] degrade the collagen, forming a cavitated lesion. Active lesions are rapidly progressing and tend to be brown or yellow.

In early childhood most caries appear on the occlusal surface. In adult patients, most caries develop in the interproximal and cervical area. As a result of gingival recession and root surface exposure under an improper oral hygiene, the decay appears frequently on the root at the cemento - enamel junction or at the cervical level of the crown.

Although well known as a material with many contraindications, dental amalgam is still used in some cases in class V restorations and in root cavities (especially in rural areas) but its retention is based strictly to macromechanical containment in the undercut cavity. Nowadays most of the dentists are interested in adhesion-active filling materials including ionomer cements and the composite resins.

Experimental parts

Material and methods

The requirements for an acceptable cavity filling material are many, but one of the most important is the biocompatibility. In addition to certain biological requirements, such as cariostatic properties, lack of pulp irritability or systemic toxicity, a filling material should possess low water absorption and should not dissolve in the oral fluids [4].

In this study we have decided to use Geristore, a hybrid ionomer - composite that combines the best properties of both types of materials. While it is an self - adhesive material, there is no need for retentive cavity preparation. Thus, the practician saves chair time and conserves healthy tooth structure. Speed can help ensure success with pediatric and geriatric patients. According to manufacturers, the applications of this material are: class V restorations, cavity lining and base material, base material for cervical abrasion and erosion lesions, small class I and class II restorations, root caries lesions, cement for metal/PFM restorations, pulp capping for mechnical pulp exposure, restoring deciduous teeth, restoring and sealing overdenture abutments, subgingival restorative for fractured roots and resorption lesions, retrograde filling and root perforations.

The resin ionomer Geristore (USA) is a hydrophilic, nonaqueous, polyacid-modified composite resin composed of fluoride releasing glass, mainly barium fluorosilicate, and a polymerisable organic matrix (modified Bis-GMA, including 2-hydroxyethyl-methacrylate (2-HEMA) combined with a photoinitiator [5]. An easier to dispense version; Geristore Syringeable, is also available. Reported advantages of resin ionomers include insolubility...
in oral fluids, increased adhesion to tooth structure, dual cure capabilities, low cure shrinkage, low coefficient of thermal expansion, radiopacity, fluoride release and biocompatibility [6]. In addition to the toxicity of Bis-GMA mentioned earlier, HEMA has also been reported to be a biologically toxic material [7]. The cytotoxicity of polyacrylic modified composite resins was found to vary considerably depending on the product tested [8]. However, some studies have indicated the biocompatibility of Geristore [6, 9] and clinical success in repair of subgingival and subosseous defects, and in guided tissue regeneration [10, 11]. The structures and the abbreviations for Bis-GMA and Hema are shown in table 1.

A number of 27 patients with deep cervical lesions where treated in the same way during a period of a year and checked every 6 months, during the next 18 months. We treated in total a number of 45 subgingival lesions. In the following, we will describe one of the cases, a 33 year-old female patient, who presented herself in the clinic. Following the examination, cervical lesions at the level of the teeth 35, 36, 37 were identified. The teeth responded positively to vitality test. After local anesthesia (Ubistezin forte 4%, 3 M ESPE, Seefeld, Germany), sulcular incision was performed (Surgical blades 15c, Carl Martin, Germany). A full thickness flap was raised. The exeresis of the cervical lesion was effect. The resulting cavities were isolated and carefully cleaned.

Tenure Multi-Purpoise Bond System was applied before Geristore. The adequate colour was chosen and combined with 50 – 50 % Geristore A and B, using a mixing plastic stick until a homogenous paste was obtained. This ratio provides the suitable color. It was applied into cavities and then light cured. Once set, the material was finished with a fine diamond bore (Edenta C 850.010, Switzerland) under water spray. Afterwards, the flap was set into its initial position and sutured. Postoperatory, the patient was administered 1 tablet of 400 mg Ibuprofen, and at home clorhexidina solution 0.2%, twice a day, for 15 days.

Every 6 months when the patient returned in the clinic for a routine control, we checked the periodontium aspect and integrity. The tissues surrounding, supporting, and attaching to the teeth could be affected by the toxicity of bacterial plaque. In order to evaluate the attachment of periodontal ligament fibroblasts and gingival fibroblasts to the root-filling material, we examined the sulcular depth using a periodontal probe. We obtained values between 1 and 2 mm in all cases, demonstrating a healthy junctional epithelium at the base of the gingival sulcus. In all cases there was no marginal infiltration and the fibroblasts where well attached on Geristore. We also checked gingival sulcus saliva ph using pH paper tests (CRT buffer, Ivoclar Vivadent) and all were above 7, indicating an optimal pH for sulcus saliva and a absence of inflammatory process (fig. 1).

In order to measure and control the effectiveness of toothbrushing, we used dental plaque index. In this case: the PI developed by Silness and Loe assessing the thickness of plaque at the cervical margin of the tooth (closest to the gum). Four areas: distal, facial (buccal), mesial, and lingual (palatal), were examined. Each tooth was dried and examined visually using a mirror, an explorer, and adequate light. The explorer was passed over the cervical third to test for the presence of plaque. Each area of each tooth is assigned a score from 0 to 3. Scores for each tooth were totaled and divided by the four surfaces scored. To determine a total PI for an individual, the scores for each tooth were totaled and divided by the number of teeth examined. We obtained rating between 0 and 0.9; that means an excellent dental hygiene (rating 0) and in some cases a good dental hygiene (rating 0.1-0.9). This results demonstrate once again that this material offers restorative options for traditionally difficult-to-treat, clinical problems.

Results and discussions

Integrity maintenance of natural teeth is of utmost importance for dental function and aesthetics. Restorative therapy plays a significant part in reaching this goal. Different kinds of materials have been used for restoring cervical lesions, being furtheron a main concern in identifying the „ideal” material in this respect. Some materials may have side effects either by direct contact or by their chemical compounds released in the parodontal tissue of the alveolar bone [8].

Resin glass ionomer has to meet several criteria: to be insoluble in oral fluids, to present a high adhesion to tooth surface, to show low cure shrinkage, to expose a dual cure capability, to have a low thermal coefficient, to be radiopaque, to be compatible, to release fluoride, providing a beneficial effect upon the tissues in the cement proximity. Geristore is biocompatible as to bone and connective tissue, fulfills the necessary criteria, a fact that makes it be indicated in cervical restorations [6, 12].

Conclusions

The treatment of cervical caries and even root caries can be achieved successfully by combining minimal surgical procedures with restorative therapy. Geristore is a resin-ionomer material, successfully used as well in supragingival and in subgingival restorations, meeting the necessary requirements to be recommended in this respect. After application, fibroblasts are well attached on Geristore, remodeling its morphology. It is a biocompatible filling material with years of clinically proven safety, especially subgingivally. Several clinical studies have demonstrated Geristore could repair subgingival and
subosseous defects and could be used as a barrier for
guided tissue regeneration [9], 13 - 18].

References
1. ZAMBON JJ, KASPRZAK SA., The microbiology and histopathology
2. *** Featherstone JDB. Fluoride, remineralization and root caries.
4. EBERHARD W, MIZRAHI N, MIZRAHI E. Bonding Materials and
Techniques in Dentistry. Cap.49. Copyright 2003 by Taylor & Francis
Group, LLC
5. AL-SABEK F, SHOSTAD S, KIRKWOOD KL, Preferential attachment
of human gingival fibroblasts to the resin ionomer Geristore. J Endod
6. GEURTSEN W, SPAHL W, LEYHAUSEN G., Residual monomer/additive
release and variability in cytotoxicity of light-curing glass-ionomer
7. BECHER R, KOPPERUD HM, AL RH et al. Pattern of cell death after
in vitro exposure to GDMA, TEGDMA, HEMA and two componer
8. RATANASATHIEN S, WATAHA JC, HANKS CT, DENNISON JB. Cytotoxic
interactive effects of dentin bonding components on mouse
9. SCHERER W, DRAGOO MR.. New subgingival restorative procedures
with Geristore resin ionomer. Pract Periodontics Aesthet Dent 1995; 7
(1 Suppl): 1-4.
10. DRAGOO MR., Resin-ionomer and hybrid-ionomer cements:
part I. Comparison of three materials for the treatment of subgingival
11. BEHNIA A, STRASSLER HE, CAMPBELL R., Repairing iatrogenic
13. DRAGGOO MR. Resin-ionomer and hybrid-ionomer cements: part
II. Human clinical and histologic wound healing responses in specific
87.
14. RESILLEZ-URIOSTE F, SANANDAJT K, DAVIDSON RM., Use of a
resin-ionomer in the treatment of mechanical root perforation: report
15. SHUMAN IE., Repair of a root perforation with a resin-ionomer
16. ABITBOL T, SANTI E, SCHERER W., Use of a resin-ionomer in
17. ABITBOL T, SANTI E, SCHERER W, PALAT M., Using a resin-ionomer
in guided tissue regenerative procedures: technique and application—
18. BEHNIA A, STRASSLER HE, CAMPBELL R., Repairing iatrogenic

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