Fluoride reservoir for partially edentulous patients

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ABSTRACT:
The proportion of geriatric patients wearing removable partial denture is increasing at the same time 57% of prevalence of root caries among this type patient is noted. A recently developed resin composite containing a filler of surface pre-reacted glass-ionomer (S-PRG) has the valuable property of being fluoride rechargeable which help to reduce caries. The aim of this study to examine clinically, removable partial denture wearing patients containing Giomer with S-PRG filler in RPD, in terms of both the initial fluoride release and the fluoride release after recharging with fluoride, which act as fluoride reservoir in oral cavity to reducing root caries.

Key words: Fluoride releasing and recharging, Surface pre-reacted glass-ionomer filler

INTRODUCTION
The proportion of geriatric patients wearing removable partial dentures is increasing\(^1\). At the same time, the prevalence of root caries accompanied by gingival recession is increasing\(^2,3\). Abutment teeth in particular are more likely to be affected by caries and periodontal disease than any other teeth\(^4\). Because abutment teeth anchoring removable partial dentures tend to be inadequately cleaned, preventing root caries in these teeth is crucial. A variety of vehicles can deliver fluoride into the oral cavity, including fluoride mouth-rinse, fluoride dentifrice, topical fluoride, and fluoride-releasing restorative materials, all of which effectively prevent root caries and suppress recurrent caries\(^5-9\).

A recently developed resin composite containing a filler of surface pre-reacted glass-ionomer (S-PRG) has the valuable property of being fluoride rechargeable. Recent studies of this resin composite have revealed some aspects of its clinical value\(^9-12\).

The purpose of our study was to examine an experimental removable partial denture containing S-PRG filler in terms of both the initial fluoride release and the fluoride release after recharging with fluoride solution. We suggest that the development of a fluoride rechargeable removable partial denture will make a significant contribution to reducing root caries in the abutment teeth.

MATERIALS AND METHODS
Patients were reported to the Department of Prosthodontics Crown, Bridge and Implantology, A.M.E’s dental college and hospital for replacement of missing teeth. On examination these are partially edentulous patients and for them treatment plan is to replace missing teeth by removable partial denture.

A preliminary impression of the maxillary and mandibular arches were made with alginate (DENTSPLY) and impressions were poured with dental stone and the casts were retrieved. Denture base and occlusal rims were fabricated on master cast. Tentative jaw relation was recorded and
transferred on to the articulator. After that the routine procedures - teeth arrangement, try in, wax up, flanking, processing, finishing, and polishing were done as usual. Insertion was done, allow patient to adept with removable partial denture for a week. On day of insertion sample of saliva collected from patient to analysis fluoride content in saliva using Spectrophotometric method\textsuperscript{13}.

Recall patient after one week for insertion of resin composite (Beautifil) containing a filler of surface pre-reacted glass-ionomer (S-PRG). To insertion of resin composite, 2mm x 2mm x2mm space created on teeth in removable partial denture adjacent to abutment tooth. (Fig 1) After that space will fill with resin composite (Beautifil) containing a filler of surface pre-reacted glass-ionomer (S-PRG) and curing done for bonding of resin composite with acrylic tooth in removable partial denture. finishing, and polishing were done as usual. Insertion was done. (Fig 2) Recall patient after 7 days, 14 day and 21 days for collection of saliva for fluoride analysis. After 14 days it was recharge with fluoride solution and analysis fluoride.

RESULT
In this study we analyses 15 patient for fluoride and we got result using standard graph in Table no 1,2.

Table no 1

<table>
<thead>
<tr>
<th>Number of patients</th>
<th>Increased</th>
<th>Decreased</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>12</td>
<td>3</td>
</tr>
</tbody>
</table>

Table no 2

<table>
<thead>
<tr>
<th>Increased</th>
<th>Till 7 days</th>
<th>Till 14 days</th>
<th>Till 21 days(after recharge with fluoride solution)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pt saliva before inserting (0.3 ppm to 0.6 ppm per day)</td>
<td>0.8 ppm to 1.2 ppm per day</td>
<td>0.4 ppm to 0.6 ppm per day</td>
<td>0.8 ppm to 1.1 ppm per day</td>
</tr>
<tr>
<td>Decreased</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pt saliva before inserting (1.5 ppm to 1.7 ppm)</td>
<td>1.2 ppm to 1.6 ppm per day</td>
<td>0.9 ppm to 1.3 ppm per day</td>
<td>0.7 ppm to 1.1 ppm per day</td>
</tr>
</tbody>
</table>
Fig. 1. Removeable partial denture with 2mm x 2mm x 2mm space for resin composite (Beautifil)

Fig. 2. After restored resin composite (Beautifil) in to removeable partial denture
DISCUSSION

Many dental professionals recognize that restorative resin composite containing S-PRG filler have excellent fluoride release and recharge ability\(^9\)\(^-\)\(^12\). Han et al.\(^9\) reported that resin composite containing S-PRG filler released \(9.32 \mu g/cm^2\) fluoride on day 1 and continued to release fluoride for over 60 days. The differences in the results between the present and the Han’s study is likely to may be due to the filler content.

Studies into the anticariogenic effects of fluoride releasing restorative materials have shown that fluoride is released from glass-ionomer cements\(^14\)\(^-\)\(^20\), resin modified glass-ionomer cements\(^17\)\(^-\)\(^21\) and resin composite\(^20\)\(^-\)\(^25\). According to studies comparing the fluoride release and recharge properties of conventional glass ionomers and more recently developed fluoride-containing resin composite\(^20\)\(^-\)\(^25\), the amount of fluoride released from both these restorative materials was high during the first few days after immersion in DW, but dropped immediately thereafter\(^19\)\(^-\)\(^21\). In addition, Xu et al.\(^18\) reported that fluoride releasing ability could be restored by applying topical fluoride, and that materials with a high initial fluoride release rate were the easiest to recharge. According to Shaw et al.\(^22\), the initial amount of fluoride release by a conventional glass ionomer was \(105 \mu g/cm^2\) on day 1 and \(33 \mu g/cm^2\) on day 10, after which it gradually decreased. In compomers, fluoride release decreased from \(8 \mu g/cm^2\) on day 1 to \(5 \mu g/cm^2\) on day 10 in the same study. In the present study approximately 1ppm of fluoride maintain in mouth saliva on a day1.

According to ten Cate et al.\(^26\)\(^,\)\(^27\), demineralization inhibition depends on fluoride concentration, and microradiographic data \textit{in vitro} showed that 2 ppm fluoride in artificial saliva containing calcium and phosphate at pH 4.5 inhibited demineralization of enamel lesions, while dentin demineralization was inhibited in clinically relevant percentages (40\%) at fluoride levels above 1 ppm. However, these fluoride concentrations would be toxic in clinical situations\(^28\).

In our study approximately 1ppm of fluoride maintain in mouth saliva on a day, These levels are sufficient to prevent dentin lesion formation in the narrow space between dentures and abutment teeth without causing toxicity.

CONCLUSION

Experimental removable partial denture containing S-PRG filler releases significant amounts of fluoride can act as a fluoride reservoir in the oral cavity.

REFERENCES


