A Novel Approach to Improve Repair Bond Strength of Repaired Acrylic Resin: An in-Vitro Study on the Shear Bond Strength
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Introduction
Denture bases are subjected to fracture if dropped or stressed beyond their fracture strength. Therefore, denture repair is needed sometimes. Many mechanical and chemical factors affect the repair strength. The aim of the study was to introduce a new approach that increases the bond strength at denture base resin/repair resin interface. This study evaluated the effect of mechanical surface treatments with intermediate material applications (alumina blasting + silane coupling agent [SCA] or methyl methacrylate [MMA]) on the shear bond strength (SBS) of repaired denture base material. It also evaluated the combined effect of nano-ZrO2 and surface treatments on the SBS of repaired acrylic denture base and compared the values with those of unreinforced PMMA resin. In addition, the treated surfaces were characterized by means of scanning electron microscope (SEM).

Materials & Methods
Heat-polymerized acrylic resin was used to fabricate 130 cylindrical blocks 15 mm in diameter. Specimens were divided into different groups according to surface treatment and NZ concentration (Figure 1). Repair resin was mixed and applied to the bonding area and polymerized at 37°C for 10 minutes. SBS (MPa) testing was performed using universal testing machine (Figure 2). Scanning electron microscopy (SEM) was used. Statistical analysis was done using ANOVA and Tukey post-hoc test at α = 0.05.

Results
The mean bond strength value of repair resin to alumina blasted denture base specimens with application of intermediate agents was significantly higher in comparison to control group (P<0.05). For surface treatment, alumina blasting followed by SCA application, showed the highest SBS values (15.42±1.98MPa). Nano-ZrO2 addition resulted in statistically significant increase (p<0.05) except for AB, and AB+MA repaired with 5% and 7.5% nano-ZrO2 (P>0.05) (Figure 3). SEM showed that alumina blasting produced rougher and porous surface, while SCA and MA application reduced the irregularities and deep pits (Figure 4).

Conclusions
Within the limitations of the study, following conclusions were drawn:
• Mechanical surface treatment using alumina abrasive air-particles improved the shear bond strength.
• SCA and Methyl methacrylate based composite bonding agent application to mechanically treated repair surfaces improved the repair bond strength and could be used as a new adhesive technique for denture repair.
• Application of SCA in combination with Nano-ZrO2 reinforced repair material enhanced the repair bond strength.

References
Introduction

Failure of normal tooth eruption, due to various factors, is referred to as impaction. The most common impacted teeth are mandibular third molars. It is difficult to treat and it is indicated to be removed without delay to avoid caries development in the neighboring second molar and loss of both teeth. Extraction of the third molar results in less complications and better dental health, improved gum health in the area adjacent to the second molar.

Materials and methods:

A total of 100 Orthopantomograms (OPGs) of patients reporting to RAKCDS over a period of three years were screened and randomly selected according to inclusion and exclusion criteria. The data was collected and cross checked for any discrepancies and entered into excel spread sheet. Descriptive analysis of the data was done and results were displayed as graphs.

Results:

According to this study, 20% cases show distal caries on mandibular second molars and 80% cases show healthy second molars. There was no relation between gender and impaction, but when studied independently, it showed that mesial impaction was more common in males, and horizontal impaction was more common in females. Age wise, there was no relation between age and cavity existence.

Conclusion:

A total of 80% of the patients with impacted third molars had no distal caries on mandibular second molar. It was found that there is no relation between gender and impaction, and that there are equal chances of caries existence regardless of age or gender.

REFERENCES

Determining Stages Of Non-Cavitated Fissure Caries Using Optical Coherence Tomography (OCT)

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The objective of study was to assess the performance of OCT in determining stages of NCFC using OCT backscatter intensity profile (A-scan).

MATERIALS AND METHODS

1. Sample selection
2. 3D OCT imaging
3. Sectioning and imaging
4. Final cohort selection
5. Selection of OCT B-scan
6. Data extraction and analysis
7. Mean A-scan

INTRODUCTION

The international Caries Detection and Assessment System (ICDAS) has been proven to have good accuracy and reproducibility [2]. However, such systems require training and calibration with a reference examiner [2] and can be time consuming [3]. It also falls short of true quantification as it uses qualitative assessment. Optical Coherence Tomography (OCT) is a non-invasive, non-radiative, high resolution cross sectional imaging modality that utilizes near-infrared light operating at 1300 nm.

OBJECTIVE

The objective of study was to assess the performance of OCT in determining stages of NCFC using OCT backscatter intensity profile (A-scan).

RESULTS

An overall mean A-scan for each Ek code was computed. Total Area-under-the-curve (AUC) between physical depths of 0–150µm subsurface (blue dotted lines) was computed for each Ek code.

CONCLUSION

OCT has potential to differentiate NCFC using OCT backscatter intensity profile (A-scan). Such quantitative measurements can be useful for monitoring the state of early lesions and enable timely remineralization.

Post hoc Dunnet T3 test comparing for Ek code 1 and 2

<table>
<thead>
<tr>
<th>I</th>
<th>J</th>
<th>Mean Difference (I-J)</th>
<th>Sig</th>
<th>95% Confidence Interval</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>-1.57E10*</td>
<td>&lt;0.05</td>
<td>-30.37E9</td>
<td>-1.04E9</td>
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</tr>
</tbody>
</table>

Total area under the curve [AUC], *p<0.05

SN, SP, AUROC values for differentiating Ek code 1 and 2

\begin{align*}
\text{Outcome measures} & & \text{SN} & & \text{SP} & & \text{AUROC} & & \text{P-value} & & \text{Cut-off} \\
\text{AUC}_1 & & 0.61 & & 0.73 & & 0.66 & & <0.05 & & 7.031E+10 \ (4.3) \\
\end{align*}

Total area under the curve [AUC]. Sensitivity (SN), Specificity (SP), Area under Receiver operating characteristics (AUROC).

References:


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