

BONE DEGRADATION DUE TO THE TENSIONS GENERATED BY FIXED PARTIAL PROSTHESIS. A THREE-DIMENSIONAL PHOTOELASTIC APPROACH.

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INTRODUCTION: Photoelastic stress analysis is based on the property of some transparent materials to exhibit colorful patterns when viewed in polarized light. These patterns occur as the result of alteration of the polarized light by the internal stresses into two waves that travel at different velocities. These patterns are formed as the result of alteration of the polarized light by the internal stresses developed in two waves with different velocities. This model, made from a transparent material capable of exhibiting a photoelastic response, is subjected to loads representative for functionally applied forces. The stresses that develop in the model as the result of the applied loads can then be visualized by examining the model with polarizing filters.

METHODS: The aim of this study is to identify the tensions that appear in the prosthetic field while inserting a fixed partial prosthesis. The dispersions of these tensions in the remaining teeth and also in the width of the maxillary bone of the edentation area are also considered. The three dimensional photo elastic methods were used. The materials used in the study were DINOX 010P resin. The actual photo elastic study was made using a horizontal polariscop. For this experiment we used a titanium fixed partial bridge put it on a maxillary model made from photoelastic material. The occlusal loading was made by a dedicated devices. After the fixed partial bridge was loaded the whole assembly was put in an oven for a termic treatment. During this treatment the load was maintained on the titanium fixed partial bridge by the dedicated device mentioned above. After the termic treatment, the maxillary model was cut into three slices in the zone of interest. The cutting direction followed a mesial-distal plane. Each slice was analyzed in order to obtain the tension dispersion in that part of the bone.

RESULTS: The results of this study are the tensions that were registered in the three space

coordinates according to which the real tensions of the prosthetic filed structure were calculated. For the photoelastic analysis we used the horizontal polariscop. The dispersion tensions in the bone images were uploaded in a dedicated soft (SIGMA SCAN PRO). This soft allows to evaluate the real tensions in every point of interest from the maxillary model.

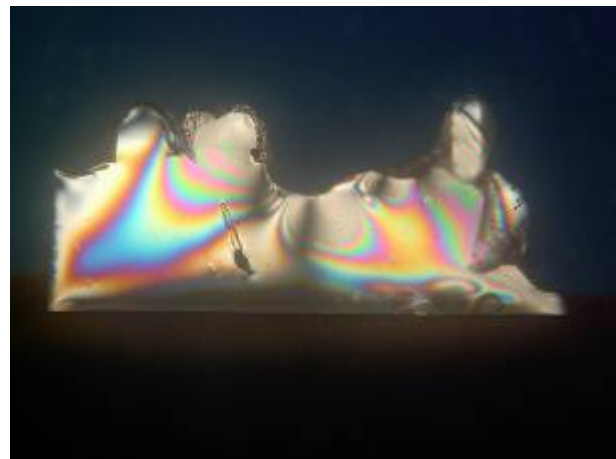


Fig. 1: Effect of stress in the bone after the occlusal loading on titanium fixed partial bridge.

DISCUSSION & CONCLUSIONS: The conclusion of this study is that the tension experimentally determined on the photo elastic model corresponds to the prototype's one. The photo elastic method is one of the election methods in determining the real tensions obtained in the investigated structure. The overloading of the fixed partial bridge will lead to periodontium trauma and to bone resorbtion, as this method indicated.

REFERENCES: ¹C.P.Fernandes, P.O.Glantz K.Nilner (2003).- On the accuracy of some in vitro models for mechanical studies of maxillary removable partial dentures in *Dental Materials* (Volume 19, Issue 2). ²C.P.Fernandes, P.O.Glantz K. Nilner (2003)- Reflection photoelasticity: a new method for studies of clinical mechanics in prosthetic dentistry in *Dental Materials* (Volume 19, Issue 2).