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"A COMPARITIVE EVALUTION OF MARGINAL FIT OF IMPLANT ABUTMENT COPINGS MADE BY DIRECT AND INDIRECT IMPRESSION TECHNIQUES AND FABRICATED BY CONVENTIONAL CASTING AND LASER SINTERING"

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ABSTRACT

Background and Objectives: Implant units, unlike natural teeth cushioned in their alveoli by periodontal fibers, are somewhat intolerant of movement in their adaptation to the demands of the metal supporting structure. The slight mobility of osseointegrated implants is ascribed to the "elasticity" of the investing bone.

Impression materials and techniques are fundamental in the precision of fit and passivity of implant-supported FDPs. It is imperative for the impression to accurately register and transfer to the master cast the 3-dimensional position of the osseointegrated implants. Two impression methods are commonly used in implantology, namely indirect and direct methods. The indirect method uses tapered transfer copings and a closed tray. The direct technique uses square transfer copings, connected to the implants with screws that projects above the height of the copings and through openings in a customized impression tray.

Base metal alloys are often preferred over noble alloys for conventional and implant-supported fixed dental prostheses (FDPs) because of their higher elastic modulus, hardness, fracture strength, and lower cost (4-6). However, the casting of base metals may be more difficult and unpredictable in terms of accuracy. Direct Metal Laser Sintering (DMLS) is a promising new technology that may avoid the distortions inherent to casting procedures. DMLS machines employ a high power laser source, such as a carbon dioxide laser, that fuses small particles of a powder alloy into a mass.

Thus, the purpose of the study was to compare and evaluate the marginal fit of the implant abutment coping by direct and indirect impression techniques fabricated by conventional casting and laser sintering.

Materials and method: A single implant was mounted on an acrylic model. Impressions were made by two techniques.

Group I – Direct impression technique

Group II – Indirect impression technique

In direct impression technique, light body impression material was injected to surround the abutment. The tray was then filled with the impression material and seated over the abutment.

In indirect impression technique, light body impression material was injected to surround the transfer copings. The tray was then filled with the impression material and delivered over the transfer copings. After the material sets, the tray was removed and abutment analogs were inserted into the transfer coping, embedded in the impression.

The impressions were poured with high strength type IV dental stone to obtain a die. 24 wax copings were made on each type IV stone cast. The study samples were divided into four groups.

The metal copings were fabricated by two techniques

Subgroup a - Conventional Casting

Subgroup b - Laser Sintering.

The samples were divided into four groups with 12 in each.

Group Ia - The metal copings were fabricated by direct impression technique and conventional casting.

Group Ib – The metal copings were fabricated by direct impression technique and laser sintering.

Group IIa - The metal copings were fabricated by indirect impression technique and conventional casting.

Group IIb – The metal copings were fabricated by indirect impression technique and laser sintering.

Marginal fit of the metal copings were measured using stereo microscope.

The collected data was then statistically analyzed.

Results: The impression techniques and fabrication techniques affected the marginal fit of the copings with $p < 0.005$. Interaction between the two factors were significant ($p = 0.000$). For each impression technique, LS samples exhibited better marginal fit.

Conclusion: From this study it can be concluded that, the direct impression technique and laser sintered crowns give better marginal fit of implant abutment copings.

Keywords: implant, direct impression technique, indirect impression technique, conventional casting, laser sintering, marginal fit.