Assessment of Marginal Adaptation, Fracture Resistance and Cytotoxicity of Implant-Supported Provisional Restoration

Thesis submitted for partial fulfillment of Doctor Degree requirements in fixed prosthodontics , faculty of dentistry, Ain Shams University.

By

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Dedication

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This work is dedicated to

Souls of the martyrs of the glorious revolution of the 17th of February.

my father,
My dear mother,
the light that leads the way

My Family, for their great care, support and guidance all the way in my life.

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INTRODUCTION

Provisional restorations play several roles during the implant integration period. They maintain the position of the adjacent and opposing teeth and optimize the health of hard and soft tissues surrounding the implant. In addition such provisional allow evaluation of esthetic parameters before treatment is finalized and play an important role in immediate and early loading protocols[93].

Immediate provisionalization of implants at the time of placement can provide the patient with a tooth-like restoration. that preoperative fabrication of the implant abutment and provisional restoration can provide successful immediate provisionalization of implants, if specific diagnostic criteria are used for patient selection[17].

According to the Glossary of Prosthodontic Terms, provisional or interim prosthesis or restoration is a fixed or removable dental or maxillofacial prosthesis designed to enhance esthetics, stabilization and/or function for a limited period of time, after which it is to be replaced by a definitive dental or maxillofacial prosthesis [120].

Provisional crowns and fixed partial dentures are an integral part of the prosthodontic treatment. They must meet esthetic, mechanical, and biological requirements especially when they are placed in the oral environment for a relatively long period of time such as during an extensive prosthodontic treatment or during the assessment of the results of periodontal and endodontic therapies [72, 153].

The terms *provisional*, *interim*, or *transitional* have been routinely used interchangeably in the dental literature. The use of the term *temporary*, on the other hand, is controversial and is considered inappropriate by some authors because provisional restorations serve many functions, and "temporary" treatment may be interpreted as one of lesser importance or value [(26)].

The interim treatment focuses on protecting pulpal and periodontal health, promoting guided tissue healing in order to achieve an acceptable emergence profile, evaluating hygiene procedures, preventing migration of the abutments, providing adequate occlusal scheme, and evaluating maxillomandibular relationships [(173)].

There are many resin materials available to perform these functions such as 1- Polymethyl methacrylate resin , 2- Bis-acrylic composite, 3- Mono methacrylate resin [(177)].

Provisional crowns and fixed partial dentures are subjected to heavy and consistent loading by mastication, and mechanical failure of the provisional restoration frequently occurs. Of the most common failure modes of the restorations which may lead to severe economic loss and patient discomfort are fracture marginal discrepancy and cytotoxicity. The materials used for temporary restorations must have adequate strength and open margin of the restoration particularly for long term service inside the oral cavity. [(82, 18)].

Three main routes of systemic intake of chemical substances released by resin-based restorations have been postulated; the first is through ingestion of released compounds in the gastro-intestinal tract, the second is through

diffusion to the pulp through the dentinal tubules to the blood stream, and the third is via uptake of volatile components in the lungs. The last route is of special importance for the dental practitioner and the dental personnel, while the first and second routes are more relevant for the patient [37-39].

It was claimed that HEMA and TEGDMA monomers when administered by different routes (oral, subcutaneously or intravenously) are almost completely eliminated 24 hours after administration. The main routes of excretion in animal studies are via the lungs and to a lesser extend via the faeces or the urine [47, 23, 164, 79, 173, 22, 65].

The implies that the concentration of these monomers in different tissues is below those known to cause toxic effects. However, it was reported that sub-cytotoxic concentrations of these monomers are able to alter cell function [135].

Although several researches are reported to assess marginal adaptation, fracture resistance and cytotoxicity of implant supported provisional restorations, yet there still more investigations are needed specially for the newly introduced materials.

Review of Literature