CANDIDAL GROWTH ON SOFT LINED VERSUS LIQUID SUPPORTED DENTURES

Thesis

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Presented by

Helmy Hassan Abd El-Hafiz

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Ain Shams University

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Under Supervision

OF

Dr. Magdy Eid Mohammed

Ass. Professor of Prosthodontics

Faculty of Dentistry

Ain Shams University

Dr.Rami Maher Ghali

Ass. Professor of Prosthodontics.

Faculty of dentistry,

Ain Shams University

Dr. Shereen El-Sayed Mohammed Taha

Lecturer of medical Microbiology and immunology

Faculty of Medicine, Ain Shams University

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Introduction

Preservation of the supporting structures is one of the greatest challenges in prosthetic dentistry as the loss of the denture support usually results in denture failure.[1]

Since the dimensions of residual alveolar ridge are not stable due to bone resorption, mucosal changes and tissue irritation, an ideal denture should be flexible and continuously adapt itself to the mucosa. However, it also has to be rigid to support the teeth during actual use.[2]

These properties are difficult to be combined in one material, but can be obtained by using a combination of materials and techniques.[2] In the mid twentieth century, Chase[3] reported the application of an elastic material on the mucosal side of the rigid denture base to relieve the traumatized soft tissues. Since then, a variety of tissue-conditioning materials have been used.

Another group of materials called soft liners has been used to relieve denture-sore mouths. They differ from tissue conditioners because they are plastic and flow continuously under masticatory pressures.[2]On the other hand the cushioning effect of soft liners has been evaluated, all were found to reduce the impact forces compared to denture base resin.[4]

Conventional mouth-cured soft liners are used for periods to improve the comfort and fit of an old denture until it can be remade or permanently relined.[5] But unfortunately after several weeks the added plasticizer gradually diffuse onto the surface of the resin and leach out by the saliva, resulting in a liner that will gradually harden. Moreover, their surface becomes roughened and hence, becomes contaminated with food debris which enhances the growth of fungi such as Candida Albicans, leading to the formation of fungul colonies.[4]

Silicone-resilient denture liners themselves do not support mycotic growth. It is the debris that accumulates in the pores of the resilient lining material that provides nutrients to support mycotic growth.[6,7] Adherence of Candida to the resilient denture liner may be enhanced by patient's carbohydrate-rich diet. In addition, some species of Candida produce pseudohyphae that allow them to obtain more nutrients and colonize larger areas.[7]

A Liquid-Supported Denture is a denture design which allows continued adaptation of the denture to the mucosa in the resting and functional states.[2]

The denture is designed so that the base is covered with a pre-shaped; close fitting, flexible foil containing a thin film of high viscosity liquid. This technique allows continued adaptation and eliminates the main disadvantages of the

denture designs based on the application of tissue conditioners and soft liners. The foil remains elastic and preserves plasticity of the liquid, and hence, providing proper retention, stability, support and comfort to the patient. The design will act as a continuous reline for the denture.[8]

Apart from the combined benefits of the tissue conditioners and soft liners, such a denture will have optimal stress distribution during masticatory functions. Load from biting forces and even bruxism will be distributed over a far larger surface. Thus pressure spots and overloading of the supporting tissues may be reduced. In case of vertically directed loads they will be also distributed in other directions by the liquid, which minimizes local stressing of the supporting tissues. [8]

Moreover, the denture surface texture of the foil has another advantage, as it protects the denture from contamination of Candida Albicans and another micro-organisms, thus protecting mucosa from bacterial or biochemical irritation, often observed with existing soft liners and tissue conditioning materials.[2]

Review of literature

Acrylic Resin Denture Bases

Acrylic resin denture base is the part of the denture that rests on the foundation tissues and to which teeth are attached. [9]

Denture bases are made of either metal or non metallic materials or a combination of both; Metal bases are usually made of type IV gold alloy or chromium cobalt alloy. Non metallic base materials include vulcanite. bakelite or more commonly acrylic Resin.[10]

Vulcanite, nitrocellulose, phenol formaldehyde and vinyl plastics were previously used for denture base construction but they proved to be unsatisfactory. [11] Nowadays, acrylic resin is the most commonly used denture base material. About 99% of all fabricated complete dentures are made of acrylic resin.[9]

Resin is a broad term used to describe natural or organic substances that form plastic materials after polymerization. They are named according to their chemical composition, physical structure and means of activation for polymerization. [12]

Acrylic resin polymer in the form of polymethy1-methacrylate (PMM) has been introduced as a denture base

material since 1937. It is most extensively used because it exhibits several favorable properties. These properties include good color, and tissue compatibility. The possibility of repair and rebase are also important privileges of acrylic resin. Also, the low cost of the material is among the economic advantages of acrylic resin. Another favorable property of polymethyl methacrylate resin is its ability to bond to new resin, even after complete polymerization[13,14].

Pure PMM is a colorless, transparent material. When used in dental applications, the polymer may be tinted to provide any shade and degree of translucency. The color and optical properties of PMM polymer remain stable under normal intra oral conditions [9].

Regarding denture base contours for functional tongue and cheek contact, acrylic resin bases could be contoured to provide ideal polished surfaces that contribute to denture retention and prevent the accumulation of food at denture surfaces and border.[15]

Requirements of denture base resin

The essential requirements of denture base resin include adequate mechanical properties, sufficient esthetics, easy handling of resin and minimal release of residual compounds as residual monomer. However, acrylic resin material is not ideal in every respect but is a combination of virtues rather

than one single desirable property which accounts for its popularity. Despite of its ability in satisfying esthetic demands acrylic resin is still far from ideal in fulfilling the mechanical requirements of removable prostheses. [16]

A clinically acceptable denture base material should fulfill several criteria, which include Strength and durability, satisfactory thermal properties, processing accuracy and dimensional stability, chemical stability, insolubility and low sorption in oral fluids, absence of taste and odor, biocompatibility, natural appearance, color stability, adhesion to plastics. Metals and porcelain, easy in fabrication and repair and moderate cost. [17]

The strength of acrylic resin denture base material may considerably depending on the composition of the resin, the processing technique and subsequent environment of dentures. [18]

It was stated that, the lower the degree of polymerization of the solid polymer, the less would be its strength. In this respect, the polymerization cycle employed with heat cure resin bases is important in determining its strength. The heat produced from the polishing wheel during polishing of the denture may cause warpage of the denture by release of processing stresses. Excessive heat occurring during polishing or abrading may cause depolymerization and decrease in strength and rigidity of the denture base. [19]

Conventional heat cured acrylic resin

Heat cured acrylic resin is the most widely used polymeric denture base material as it is non toxic, non irritant if properly manipulated. The material is insoluble in the oral fluids and shows a small degree of water absorption. However the mechanical properties are not ideal concerning impact and fatigue properties. Although the material can take good polish, its abrasion resistance is week. One of the chief merits is that it can be easily repaired whenever it is fractured. [20]It is supplied in the form of powder and liquid, the powder contains a co-polymer of polymethylmethacrylate in the form of spheres or beads to which benzoy1 peroxide is added. The liquid is methylmethacrylate monomer with a cross linking agent and a small amount of inhibitor. [21]

Limitations of Acrylic Resin as Denture Base Material

Conventional acrylic resin denture is a rigid unyielding prosthesis that doesn't simulate the natural demands of the oral structures. This results in discomfort for complete denture wearers especially denture cripples who are unable to accommodate and rehabituate on wearing dentures. [22]

Being rigid and non resilient, acrylic dentures cannot be easily inserted in the presence of residual ridges exhibiting

multiple or deep undercuts without causing trauma to the denture foundation tissues. [22]

The hard fitting surface of acrylic resin dentures is traumatic to residual ridges with an extended thin mucosal covering. Also, to denture bearing tissues with recurrent stomatitis or tissues predisposed to changes from disease, medication or even radiotherapy. [15]

One of the important limitations of acrylic resin is the low impact strength which results in denture fracture. Dentures may fracture if falling accidentally. This seems to be a disaster for an edentulous patient. It may fall during routine cleaning or even during storage. Fracture may also occur inside the patient's mouth due to fatigue failure. [23]

The causes of facture of acrylic dentures also include processing errors. Denture fracture has been attributed to presence of porosity, residual monomer, or cracks. Also, poor adaptation of the prosthesis to the residual ridge is among the causes resulting in denture fracture. [24]

It was reported that acrylic resin may cause hyper sensitivity to some patients due to the residual monomer content. Hypoallergic denture base materials were thus introduced as an alternative to PMMA to minimize the risk of adverse tissue reactions induced by residual monomer. The PMM has thus been replaced by presumably hypoallergic