Assessment of Thermoelastic Retainer on the Abutment Supporting Structure in Bilateral Distal Extension Cases

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INTRODUCTION

Removable Partial Dentures (RPDs) are provided to restore facial form and masticatory function after tooth loss. Cobalt chromium (Co-Cr) alloy has been traditionally used as the material of choice in the fabrication of definitive cast RPDs, since 1929 However, in the Kennedy class I partially edentulous condition, the use of metal alloys together with the design considerations pose unique challenges to the esthetic and biological acceptance of the restoration.

Special clasp designs and stress breakers have been employed to avoid traumatizing the supporting tissues. However the cast clasps are unsightly and pose problems in bilateral undercuts, along with difficulty in reline and repair procedures.

Recent advances of thermoelastic resins are promising as an alternative material which could overcome the challenges posed by the cast metal RPDs. They have been introduced as thermoplastic acetal and super polyamide in which the resin polymers are reinforced with glass fillers or aramid fibers to produce a material which is much more stable in nature and provides resistance to polymer unzipping.[(1)]

These materials are claimed to have higher creep resistance, flexibility, fatigue endurance, dimensional stability, wear characteristics and solvent resistance, they also matches tooth and tissue color, is light weight and heat resistant. Cast Chromium Cobalt alloy has been the material of choice for fabricating Removable Partial Dentures (RPDs) but has certain drawbacks.

Newer materials like thermoplastic acetal and flexible Nylon based Super Polyamide, have been introduced to overcome these drawbacks & improves esthetics [(2)]

REVIEW OF LITERATURE

Causes and sequel of partial edentulism:

Oral health environment has been found to influence general health, quality of life and economic. Edentulism (partial or complete) is a key indicator of the oral health of a population. An edentulous space in the dental arch is normally formed by one or multiple missing tooth. (2)

Tooth loss has been reported to be mainly due to dental caries and periodontal disease. History of high tobacco consumption is also a risk factor for tooth loss in addition it has been documented that age and tooth loss show a positive relation. (3)

Partial edentulism is more common in maxilla than in the mandible, and anterior tooth loss following posterior tooth loss. According to Hoover and McDermount the prevalence of edentulism is higher in males than females. (4)

Classification of partially edentulous arches helps to identify the relation of the remaining teeth to the edentulous ridges and facilitates communication, discussion, and comprehension of the suggested prosthetic treatment among dentists, students and technicians. As of its simplicity, application to all semi-dentate situations, immediate visualization of the type of partially edentulous arch being considered and differentiation between tooth borne and tooth tissue borne prosthesis, Kennedy's classification is the most widely used and accepted.(5)

Removable partial denture (RPDs) rehabilitating distal extension edentulous areas are defined as "RPDs supported and retained by natural teeth at one end of the denture base and in which portion of the function and load is carried by the residual ridge. (6)

RPD restoring a bilateral distal extension edentulous span is the most common clinical situation and is more frequently encountered in the mandible. [7]

Treatment with distal extension RPD necessitates precise framework and partial denture design following biomechanical principles and considerations. [8]

Problems of restoring distal extension

Distal extension RPD derives its support from two different types of tissues, the tooth representing a relatively immovable support and the soft displaceable tissues overlying the bone of the edentulous ridge .These two tissues differ in the degree of compressibility. [9]

When pressure is applied to the denture base, an axis of rotation is created around the most distal abutments causing torque. Dentures will thus tend to rock under occlusal forces. [10]

Lack of posterior abutment is a major problem in distal extension cases. The denture tends to rotate around the fulcrum line passing through the tips of direct retainers. [11]

Rotation of the denture causes lever action on abutment teeth .The potential of lever action is increased with the longer edentulous area. [12]

Movement of the prosthesis during function should not result in unfavorable forces directed to the dentoalveolar segment. [13]

The ability of the segments to bear the applied forces must be evaluated and designs which maximize mucco-osseous support and which equitably distribute the forces between the segments are recommended.

The edentulous ridge of free end saddle cases usually bears some part of the masticatory load; hence, ridge resorption is likely to occur. (8)

Direct pressure beyond the physiological tolerance of bone may lead to interference with the blood supply leading to bone resorption and sometimes may lead to bone necrosis. (14)

An increase in the mobility of abutment teeth is a sequel of the dual support of distal extension bases, excessive loading of distal extension bases, and the use of rigid clasping. (15)

Lack of posterior retention in bilateral distal extension bases makes the distal end of these bases free and subjected to vertical forces acting occlusally .Tissue away forces occurs due to the action of muscles ,gravity or sticky food.(16)

- ***Stress control can be achieved through:***

A. Reduction of the load

The total load applied to RPD is affected by the number of artificial teeth, their occlusal surface width, and their cutting efficiency. Reducing the number of the teeth with reduction of their occlusal width lead to reduction of the vertical and horizontal forces acting on the partial denture and stresses transmitted to the abutment teeth and supporting tissues (17).

B. Load distribution between teeth and ridge

Distribution of load between abutment teeth and residual ridges can be achieved by varying the connection between the clasp and the saddle through using stress breaking device that allow movement between the saddle and the retainer.