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دراسة مقارنة بين أنواع مختلفة من لواصق الاطقم الصناعية فى تحسين النطق لمستخدمى الاطقم الصناعية الكاملة

رسالة مقدمة الى كلية طب الفم والأسنان جامعة القاهرة للحصول على

درجة الماجستير فى الإستعاضة الصناعية

مقدمة من

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الملخص العربى

تم إجراء هذة الدراسة للتحقق من كفاءة المواد الاصقة لأطقم الأسنان فى تحسين النطق للمرضى مستخدمى أطقم الأسنان الكاملة وللمقارنة بين ثلاث أنواع مختلفة كميائياً من هذه اللواصق .

وقد شارك خمسة عشرشخص بدون أسنان تماماً ممن يعانون من تآكل عظمى متقدم فى الفك السفلى وقد تم عمل طقم أسنان كامل لكل مريض .

تم تقييم النطق بالطريقتين التاليتين :

- الإدراك الحسى السمعى .
- التحليل الصوتى بإستخدام برنامج (سبكتروجراف) .

تمت المقارنة بين خمسة مراحل لكل شخص وهى :

- المرحلة الأولى: تقييم النطق للمريض وهو بدون أسنان وقبل عمل طقم الاسنان .
- المرحلة الثانية: تقييم النطق للمريض بعد مرور أسبوعين لتسلمه طقم الاسنان .
- المرحلة الثالثة: تقييم النطق للمريض بعد مرور ساعتين من استعمال المادة الاصقة الأولى فى الطقم السفلى .
- المرحلة الرابعة: تقييم النطق للمريض بعد مرور ساعتين من استعمال المادة الاصقة الثانية فى الطقم السفلى .
- المرحلة الخامسة: تقييم الكلام للمريض بعد مرور ساعتين من استعمال المادة الاصقة الثالثة فى الطقم السفلى .

وقد اثبت التحليل الإحصائى وجود تحسن ملموس فى النطق عند اضافة اى من الثلاث مواد الاصقة الى الطقم السفلى وقد بلغ التحسن أقصاه بإستخدام النوع الثالث من المواد الاصقة (fixodent).

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INTRODUCTION

Retention as a factor influencing adequate speech ability is one of the fundamental requests of prosthodontic treatment, this may present a trouble in cases of advanced ridge resorbtion, especially the mandibular ridge which is considered a challenging problem . Advanced mandibular ridge resorption can occur in any edentulous patient which is unfortunately an irreversible process. Causes of alveolar ridge resorbtion may be biologic, metabolic, anatomic and /or functional prosthetic factors. [1]

Compromised retention and the resultant improper speech in cases of severely resorbed ridge could be treated surgically by vestibuloplasty, ridge augmentation or by prosthetic management through the use of dental implants which presents an evolution in prosthetic dentistry. However, there are some limitations in using dental implants such as systemic contraindications, anatomical contraindications as well as financial limitations. [2-6]

Due to these limitations another prosthetic management may be used utilizing a specific impression technique for flat ridge which should provide maximum extension without muscles impingement, Intimate contact with the underlying tissues, Proper border form as well as Proper relief of hard and sensitive areas. The most popular impression techniques for flat ridge cases are mucocompressive, butterfly and dynamic impression techniques. [7]

The use of denture adhesives as an aid in complete denture retention has gained a great attention among prosthodontists allover the world, especially in cases of advanced ridge

resorbtion when dental implant treatment is contraindicated or the patient cannot afford for it. Many types of denture adhesives have been introduced to the market in the last years. They differ in their chemical composition. Some of them are based on polymethylvinylether-maliec structure plus carboxymethyl cellulose others are based on carboxymethyl cellulose alone. Evaluation of denture adhesives to improve complete denture retention was done through objective methods such as gnathometer and spectrophotometer, however some subjective investigations were also used as patients and professional operators' questionnaires. [8-21]

In this study, comparison between three chemically different types of denture adhesives for the improvement of mandibular complete denture retention in flat lower ridge cases using the computerized speech lap (CSL) was performed. [22]

Review of literature

Bone loss is considered a continuous process that starts after tooth extraction and continues after prosthetic replacement. This process is called residual ridge resorption (RRR). It is considered a major oral disease. It was concluded that despite of careful prosthetic handling aggressive bone reduction may occur. [23]

Residual ridge resorption (RRR):

Atwood suggested that localized pathological osteoporosis may occur due to Para functional habits as grinding and clenching. [24]

Activation of osteoclasts occurs whenever there is a pressure on bone especially on non stress bearing areas. Continuous pressure as in patients who wear complete dentures overnight explains rapid RRR. RRR is clearly observed in areas of buccal side of the maxilla and the lingual side of the mandible. [25]

Loss of the activity of both osteoblasts and osteoclasts increases with age this explains that why the degree of alveolar ridge resorption depends on the time of edentulousness rather than the patient age. [26]

Resorption is found to be more rapid in the first 6 months after extraction then progresses at a slower rate till 12 months after extraction.RRR is about 2-3 mm in maxilla and 4-5 mm in mandible during the first year after extraction, Later the loss is about 0.1 to 0.2 mm annually in the mandible and it is four times less in the maxilla. This may be due to that the contact area between the maxillary denture and the underlying tissues is three times greater than the contact area between the mandibular

denture and the underlying tissues which mean that the force per unit area is three time greater on the mandible which increases resorption respectively. [25, 26]

It was documented that there is no correlation between systemic osteoporosis and ridge resorption. [23]

However several studies proved that RRR is more pronounced in females due to osteoporotic Changes. [27, 28]

Henri et al, [29] declared that mandibular ridge atrophy could occur without presence of generalized bone disease and with normal blood level of calcium, phosphorus and alkaline phosphates.

Whinnery [30] pointed out that decreased PH and inflammation of the underlying muccoperiostium increase the rate of ridge resorption. This was in accordance with a study done by Picton et al, [31] which clarified that inspite of presence of viscoelastic muccoperiostem through which the forces are transmitted inflammation causes accelerated RRR.

It was pointed out that resorption may occur due to decreased blood supply and changes of the capillary wall thickness. [32]

Michael and Barnom [33] suggested that pre-extraction periodontal disease, traumatic extraction and unequal pressure from ill fitting denture may increase resorption rate.

As a result of RRR the sulcus depth is decreased, complete sulcus obliteration may occur which dramatically affects the retentive quality of the removable prosthesis. [25]

Other Complications arise from ridge resorption include mental or inferior alveolar nerve dehiscence, prominent tubercles, and/or fibrous flappy ridge which will affect clearly the denture stability as well as denture retention. [34,35]

Sequlae of residual ridge resorption:

One of the most undesirable effects of residual ridge resorption is compromised denture retention which is considered a real challenge in complete denture therapy. There is always questions asked by the patients even in there own minds when they are seeking a prosthetic therapy which is "Is this denture going to be retentive?" Patients are asking for retention during the whole day activities talking, laughing, speaking, and for sure eating regardless the condition of their remaining tissues "alveolar ridge height and soft tissue condition". [36-38]

Complete denture retention depends on different factors such as interfacial forces,adhesion,cohesion,oral and facial musculature, atmospheric pressure,undercuts,insertion paths, parallel walls and gravity. [39]

Methods to enhance denture retention:

Improving retention in cases of advanced residual ridge resorption could be achieved via either surgical and /or prosthetic treatment.

Surgical management:

Surgical treatment may be in the form of ridge augmentation with freely grafted bone, sandwich osteotomy with freely grafted bone, vascular pedicle grafts with micro vascular anastomosis, distraction osteogenesis. [40]

Freely grafted bone augmentation of the whole alveolar process may produce many complications as dehiscence of the overlying

mucosa, infection and increased post surgical resorption with prolonged time needed for remodeling the grafted bone to a new vital bone. Sandwich osteotomy technique shows minimal post surgical resorption but it requires more than one phase surgery. Grafts with microvasular anastomosis are technique sensitive showing difficulty of the graft to be shaped to the desired shape. Lowering the floor of the mouth or sulcus deepening can't be applied to severely resorped ridge as it requires adequate ridge height and width [41]

Distraction osteogenesis is considered one of the successful methods to regenerate bone but it requires long time. It can be used in cases of excessive bone resorption as in Atwood class IV and V. [42,43]

Vestibuloplasty as well as dental implants either endosseus, subperiosteal or trasmandibular implants are also considered useful surgical techniques to mange RRR.[2,3] Many types of dental implants are available now in the market either mini implants midi or traditional ones Dental implants could be used in cases of moderate resorption Atwood class II and III. [44]

Cronin et al, [45] and Thilander et al, [46] said that placing an implant requires good healing capability, completed jaw growth except in certain circumstances as in orthodontic reasons which was declared by Bergendal et al, [47] and Wehrbein et al. [48]

General medical contra indications for dental implant treatment could be classified into two groups:

1- High risk patients:

As patients with serious systemic diseases like osteomalacia, osteogenesis imperfecta and rheumatoid arthritis. [49,50] immunocomprimised patients are also considered high risk for implant placement due to low healing capacity as patients under corticosteroid therapy, immunosuppressive drugs or

chemotherapy. [51] Of course alcoholic patients, drug abusers and patients with psychological disorders are highly contra indicated

for implants treatment as they are considered uncooperative Ones. [52]

2- Risk patients which include radiotherapy as it can induce vascular thrombosis and fibrosis resulting in healing difficulty [53,54], so adequate time have to be taken after radiotherapy [55-57], uncontrolled diabetic patients especially the juvenile type [58,59], bleeding disorders and heavy smokers are also included in this group. [60-65]

Due to the possible surgical hazards, high cost, underlying systemic condition of the patient and of course fear plus time factors all of the previous surgical managements can't be easily applied ,so prosthetic management could be the only solution especially in cases of moderate ridge resorption.

Prosthetic management:

a- Via modification of the impression technique:

Maximum tissue coverage and special impression techniques are to be considered to decrease the force per unit area without interference with muscle function. Sublingual fold space extended from premolar of one side to the other side was recorded during elevation of the tongue by Fish long time ago. [66]

Nairn [67] used retromylohyoid fossa via distolingual flange extended via both mylohyoid ridge and muscle during its elevation.

Brill [68] used viscoelastic gel to record space between cheek, tongue and denture borders in order to have border and facial seal.

Lindstorm et al, [7] pointed out that accurate impression will decrease the thickness of the salivary film and maintain border seal.

Culver and watt [69] declared that patients require enough time to train there muscles on the new denture to enhance denture retention.

Shepperd [70] clarified that the concave design of the polished surface will enhance denture stabilization on facing functional pressure exerted by the surrounding muscles.

Keeping adequate tongue space improves stability, mastication and phonation as well Fish, Beresin and Schiesser. [72]

b-Via the use of denture adhesives:

Denture adhesives had been used to aid in complete denture retention long time ago. By 1939 there were many manufacturers of denture adhesives. [8,14,73,74]

Stafford [75] said that 88 tons of denture adhesives were brought to Britain in 1965.

Another study showed that 15% of patients who wear complete dentures used denture adhesives. [76]

Bates and Murphy [77] found that 12%of females and 10% of males of the edentulous population in Wales used or had used denture adhesives.

Wilson et al, [78] reported that 30% of the patients wearing dentures in their survey used or had used denture adhesives.

Shay [79] said that industry estimates for market size for adhesives varied from 15-33% of the denture wearing populations.

In Sweden the costs of denture adhesives consumption reached approximately 1.7 million American dollars in 1989. [80]

It was reported that 55 million unit s of denture adhesives were sold in the United States between 1996 and 1997. [81]

Another study declared that of the 20% of the adult population in US who wear dentures at least 22% used denture adhesives. [82,83]

Slaughter et al, [10] reported that denture adhesives are considered suitable, adjunctive and effective treatment modality in removable prosthodontics.

Composition of denture adhesives:

Denture adhesives are commonly composed of three main components: [75,79,84]

a - basic adhesive substance such as:

karaya gum which was used befor1960 as it was reported as highly allergic substance, tragacanth, acacia, xanthan, pectin, gelatin, methyl cellulose, sodium carboxy methyl cellulose, hydroy methyl cellulose and synthetic polymers such as polyethylene oxide ,acrylamides and polyvinyl methyl ether Maleic Anhydride.

b- Antimicrobial agent:

As hexachlorophene, sodium borate, ethanol and sodium tetraborate.

c- Preservatives, flavouring agents, wetting agents and plasticizers.

Mechanism of action:

Shay [79] as well as Stafford [75] described the mechanism of action of denture adhesives. He said that adhesion results from swelling of the adhesive materials which reaches from 50 to 150 percent by volume in the presence of water, which fills the space between the prosthesis and the underlying covered tissue area. He also declared that as the adhesive agents absorb water anions are formed and become attached to the cations in the underlying mucous membrane proteins producing stickiness.

Stefan [14] showed that the force required to pull two plates apart is directly proportional to the viscosity of the liquid between them. So presence of thin of saliva increases the viscosity of the adhesive material, so the physical force of the adhesive is increased. Subsequently the force required to separate the prosthesis from the underlying tissues increases. Physical force of the adhesive materials is increased in modern adhesives by the use of materials that provide strong bio adhesive and cohesive forces via the use of ingredients containing carboxyl group. While the adhesive material hydrates free carboxyl groups result in electrovalent bonds that cause the stickness.

Poly methyl vinyl ether maleic anhydride (PMV-MA) copolymer is a synthetic material which is used in denture adhesives because it contains high level of carboxyl groups (Fixodent).

Sodium carboxymethylcellulose (CMC) is a naturally derived adhesive ingredient that used in fabrication of denture adhesives due to high content of carboxyl groups (Supercorega).

Another combination between Sodium carboxy methyl celluloseand polyvinyl acetate was introduced to the market. (Fittydent)