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BEING UNCONVENTIONAL IN COMPLETE DENTURES: A REVIEW

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ABSTRACT:
Complete dentures have been and continue to be the standard treatment for edentulous patients, despite the fact that they cannot be considered a replacement for natural teeth. The majority of them seem to have benefited from complete denture therapy and claim that their use has improved their oral and masticatory function. Every case of edentulism, cannot be treated with conventional methods in fabrication of dentures. There is a need for modification in impression procedure or designing the prosthesis to achieve better results in case of compromised situations. This article aims to illustrate clinically important complete denture prosthesis modifications that should be held in mind when such cases arise in everyday practice.

INTRODUCTION:

Complete loss of teeth leads to significant psychological trauma, loss of masticatory efficiency, loss of the supporting alveolar bone, reduced vertical dimension, lack of support for the facial musculature, and altered jaw functions. Advancing age can lead to exaggerated tissue folds and tissue atrophy, loss of tissue support, increase in the number of creases and folds on the face and loss of tonicity of the muscles and skin.[1]

These changes lead to reduced vertical dimension with a collapsed lower third of the face and affects the overall esthetics of the patient. The external appearance of a complete denture patient is characterized by the presence of deep nasolabial folds, lack of lip support as indicated by the loss of vermilion border and dropping of the corner of the lips.[2]

Complete dentures made in conventional manner proves satisfactory in most of the patients, but in some of the compromised patient's conventional method brings with certain disadvantages. Transforming conventional into unconventional approach is a characteristic feature of ever-growing prosthodontic branch. The increasing demand of patients and revolutionary thought of prosthodontists have led to the outcome of the special, i.e., the unconventional approach for fabricating complete dentures. So, starring new techniques based on same old fundamentals of prosthodontics is known as the unconventional complete dentures, a manifestation of new vision in prosthesis construction.[3]

The conventional approach may not fulfill the basic principles of complete denture like retention, stability, support, esthetics and preservation of supporting structures which are of utmost importance for the complete satisfaction of the patient.[3] Hence, it is ideal to use unconventional methods in fabrication of prosthesis. This article aimed to describe a simple, effective and noninvasive treatment alternative to the classical conventional technique in a completely edentulous patient, such as Reinforced complete dentures, Hinged and sectional complete dentures, Liquid supported dentures, Hollow dentures, Salivary reservoir dentures, Cheek plumper's, Modified flange dentures, Labeled dentures, Characterized dentures and Duplicate dentures.

Reinforced Complete Denture:

Acrylic resins (polymethyl methacrylate [PMMA]) are the most commonly used denture base materials since early 1940's. The properties such as excellent appearance, ease in processing and ease in repair contribute to its success as a denture base material. However, the acrylic resins have the disadvantages like poor strength characteristics which include low impact strength and low fatigue resistance. The fatigue failure occurs when the denture base deforms repeatedly through occlusal forces and impact failure occurs when the dentures are accidentally dropped on a hard surface. Hence, the dentures tend to break during usage in the due course of time. In order to improve the strength of the material, various methods have been proposed like:

- Using Polycarbonates and polyamides as substitutes for PMMA.
- Chemical modification of PMMA by the addition of rubber in the form of butadiene styrene.
- The incorporation of fibers or metal inserts into the denture bases.[4]

Indications:

- Include high frenal attachment, deep palatal vault, prominent residual ridges, when additional strength is needed because stresses are concentrated over small parts of denture, shallow flat palates and mentally compromised patients who may drop their denture.

Reinforcement of maxillary complete dentures showed a significant increase in impact strength when compared to unreinforced dentures (Figure 1). By using pre impregnated glass and polyethylene fibers in woven form, (prepregs) the impact strength of the denture bases can be increased effectively.[4]

According to Luciana MG et al.,[5] Pre-impregnated E-glass fiber nets and polymer pre-impregnated E-glass unidirectional fibers are useful in reinforcing acrylic resin complete dentures especially where heavy occlusal forces are involved.

Figure 1

Hinged and Sectional Complete Dentures:

Limited mouth opening in patients is a common occurrence in prosthodontic practice. Prosthetic rehabilitation of patients with restricted mouth opening due to a variety of factors poses challenges at every point, from preliminary impressions to prosthesis insertion.

Indications:

- Microstomia can occur as a result of scleroderma, oral submucous fibrosis, sequalae of burns, surgical resection of facial and oral neoplasms and temporomandibular joint disorders.

Sectional impression techniques can be used in patients with microstomia for fabrication of sectional dentures (Figure 2). Press buttons and mandibular molar bands are easily available and are easy to use in fabrication of sectional dentures.[6]

After processing, the dentures in conventional method the dentures were retrieved, finished, and polished and then sectioned from the midline with the help of thin disk bur.

For maxillary denture, two mandibular molar tubes and for mandibular denture one molar tube, with 1-mm stainless steel wire is used to form a hinge assembly for the maxillary and mandibular sectional dentures so that the dentures can collapse at the midline.

Kumar CS et al.,[7] had a novel approach of rehabilitation of a microstomia patient with sectional hinged dentures and used two stainless steel butt hinges of 0.5-mm thickness and 5-mm width in the maxillary denture in the midline and in the mandibular denture, a hinge of 0.5-mm thickness and 2.5-mm width of stainless steel hinge was placed in the anterior part of the lingual surface, and concluded that modified impression techniques and modified design of prosthesis can facilitate the rehabilitation in microstomic patients while providing better function, esthetics, health, and on the whole, the well-being of the patient.

Figure 2

Liquid Supported Denture:

A 'flabby' or 'fibrous' ridge is a superficial region of mobile soft tissue that affects the alveolar ridges of the maxillary or mandibular teeth. It is a common finding, particularly in long-term denture wearers, when hyperplastic soft tissue replaces the alveolar bone. Trauma from denture bases has been confirmed to cause such ridges. It is more generally found in the anterior region in edentulous patients.

In these patients, prosthetic rehabilitation can be difficult. Loss of stability and poor denture retention are two major issues that these patients face.

Indications:

- Flabby ridges.

Liquid supported denture (Figure 3) is based on the theory that when the force applied on the denture is absent, the base assumes its pre shaped form that is the one during processing. But under masticatory load, the base adapts to the modified form of mucosa due to hydrodynamics of the liquid improving support, retention and stability. There will also be optimal stress distribution of masticatory forces over a larger area which reduces tissue overloading.[8]

Sasirekha K et al.,[9] in their case report described a new technique to manage flabby ridge explained that a custom tray was fabricated leaving the flabby tissue area, over which a clear vacuum heat-pressed hard polyethylene sheet of 1mm thickness was adapted and three holes are made over the sheet over the flabby tissue area. The special window technique allows for controlled application of low viscosity materials in addition to the minimal exertion of pressure to the flabby ridges due to the presence of vents. The visibility from the clear tray helps clinicians to see the adaptation of impression material to the flabby tissue. Thus, this technique can be a better alternative to the conventional window techniques.

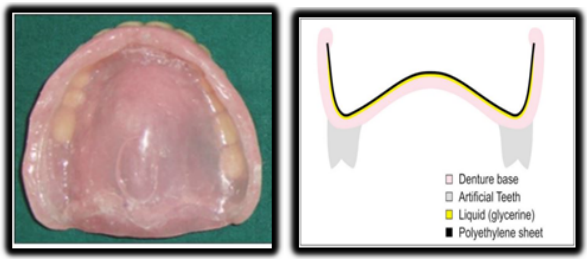

Figure 3

Hollow Dentures:

Extreme resorption of either ridge will result in a reduced denture-bearing area, which in turn will affect the retention, stability and support of the complete denture. Excessive ridge resorption also results in a large restorative space between the residual ridges. Prosthetic rehabilitation in such scenarios often results in increased height and weight of the prosthesis, overloading the residual ridges and further compromising the retention and stability of the prosthesis.

Indications:

- Severely resorbed ridges
- Large maxillofacial defect

Fabrication of hollow dentures has been tried to decrease the weight of the prosthesis which in turn increases the retention and stability (Figure 4). During laboratory manufacturing, a solid three-dimensional spacer was used to exclude denture base material from the intended hollow cavity of the prosthesis, which included cellophane wrapped asbestos, silicone putty, light-body coated gauze, thermocol, dental stone, play dough, and salt.[10]

Anchal Q et al.,[10] suggested An Innovative and Simple Technique of Hollow Maxillary Complete Denture Fabrication by using glycerin soap spacer in fabrication of hollow denture. The glycerin soap spacer has the advantages of easy retrievability, ease of carving and it doesn't adhere to acrylic resin. The single flask technique

eliminates the requirement of two identical flasks and the extra step of fabrication of a permanent record base. Hence, it's a simple, economical, time-saving and a predictable technique.

Figure 4

Salivary Reservoir Denture:

Xerostomia, often referred to as reduced salivary flow is the subjective feeling of dryness in the mouth. Individuals usually find that they have a "dry mouth" when the flow of saliva decreases to approximately half the normal unstimulated rate of around 0.3 ml/min.[11]

Causes of xerostomia are anxiety, Sjogren's syndrome, diabetes mellitus, salivary gland diseases, drug induced side effects, sequelae to head and neck radiation. Patients with xerostomia can experience difficulties with normal oral and oropharyngeal functions such as eating, speaking, and swallowing, in addition to a dry mouth. Denture wearers often express their dissatisfaction with their dentures.[12]

Indication:

- Xerostomia

Salivary reservoir dentures are the best treatment option for complete denture patients with severe xerostomia (Figure 5). Case selection is also extremely important. Cutting reservoirs into the denture weakens its structure, so only cases with no bony undercuts and sufficient vertical dimension, and thickness are suitable.

Kamal V et al.,[13] on Salivary reservoir denture's, suggested a split denture technique which helps in ready access to the reservoir. The use of clear acrylic for the base section permits the patient to clearly visualize the levels of salivary substitute within the chamber.

Figure 5

Cheek Plumper's:

Facial esthetics play an important role in a person's professional and social life. The soft tissues and muscles covering the teeth, contour of the jaw bones and underlying teeth decide the shape of the lower half of the face. Because of tissue laxity, tooth loss is accompanied by resorption of the alveolar ridge and a loss of muscle tone, resulting in a hollowed-out, sunken appearance and exaggeration of wrinkles.[1]

Indication:

- Slumped or hollow cheeks

Cheek plumper's are simple to make and provide a noninvasive and cost-effective treatment choice for patients with sunken cheeks who want to enhance their appearance (Figure 6). Esthetics and the psychological well-being of patients can be improved with the help of this treatment. The use of detachable cheek plumper's improves patient satisfaction, resulting in greater acceptance of the prosthesis. In patients with sunken cheeks who are unable to obtain the ideal cheek muscle draping, mandibular cheek plumper's may be successfully inserted in addition to maxillary cheek plumper's to enhance the overall facial appearance.[14]

There are two types of cheek plumper's

- A conventional cheek plumper is a single-unit prosthesis with an extension near the premolar-molar region that supports the cheeks. Such prostheses are an integral part of the contour of maxillary denture flanges designed by over contouring denture flanges in the mediolateral and anteroposterior directions within physiologic limits (Figure 6).
- Another type of cheek plumper's are those that are separate components attached to the denture flange (Figure 7).

Aggarwal P et al.,[15] suggested an Innovative Technique to Improve Complete Denture Aesthetics Using Cheek Plumper Appliance by using push buttons. They also stated that Clinical magnets being expensive, push button attachments are the most affordable means to attach cheek plumper to the denture.

Figure 6

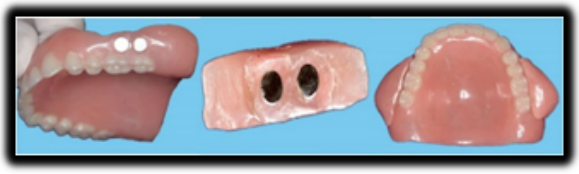

Figure 7

Modified Flange Denture:

Residual alveolar ridge form and shape may differ from severely resorbed to widely massive ridges in completely edentulous individual. Fabrication of complete denture proves to be challenging when the ideal biological consideration of both soft and hard tissues are not fulfilled. Most commonly conditions that affecting the esthetics and fabrication of complete denture is a labially proclined maxilla with presence of associated undercut. Due to differential resorption pattern of residual alveolar ridge extremely prominent ridge with labial undercut is more commonly seen in maxilla than in mandible.[16]

Indication:

- Labially inclined premaxilla

Anterior teeth arrangement of complete denture becomes troublesome because of the minimal space availability and thus it brings about an unaesthetic swollen lip appearance. Nonsurgical treatment option includes fabrication of a flangeless denture in order to restore the remaining ridges (Figure 8).[17]

Geeta P et al.,[18] suggested Flangeless denture for management of labial undercut in completely edentulous patient with economical, quick and easy method of fabrication of a flangeless denture for rehabilitation of proclined maxillary ridge with presence of labial undercut.

Figure 8

Labeled Denture:

Most international dental societies and forensic odontologists recommend labeling all dentures. In reality, legislation governs the marking of dentures in certain countries and states in the United States.[19]

Indication:

- Identification

As part of the obligation of the profession, a dental practitioner needs to maintain meticulous dental records of his patients. This would include documenting the identity of dentures. Many situations demand that the individual be identified, out of which forensic scenario remains the prime concern. When all other approaches fail, it is clear that only marked dentures will show a person's positive identity. (Figure 9). This alone is sufficient justification for the use of ID-marking on dentures. Scribing, engraving, and embossing are examples of surface markings.[19]

Several inclusion methods are as follows

- Denture bar coding
- Paper strip method
- Lenticular card method
- ID band method
- T bar method
- Laser etching
- Electronic microchips
- Photographic methods
- Radio-frequency identification tags
- Incorporation of lead foil
- Incorporation of SIM card.

Bathala et al.,[20] suggested that if dentists/prosthodontists and laboratories keep careful records and mark/label all of their patients' prostheses, prosthodontics can really be used as a tool in forensic dentistry.

Figure 9

Characterized Dentures:

Denture characterization is the process of changing the shape and color of the denture base and teeth to make them look more natural (Figure 10). The anatomic morphology of teeth or oral mucosa may not be replicated in the full denture. Many patients want complete dentures to look more normal, with spacing between incisors, a fractured incisal tip, stained teeth, and a proclined teeth. As a result, special considerations should be taken when modifying the denture base and teeth. Such modifications lead to characterization of dentures. Complete dentures can be characterized by two methods:

1. Characterization by selection, arrangement, and modification of artificial teeth.
2. Characterization by tinting the denture bases.[21]

Indications:

- For patients demanding for enhanced esthetics
- High smile line
- Socially active
- Stage performers.

Figure 10

Duplicate Dentures:

These dentures are either an exact copy of the previous denture or a minor alteration of a serviceable denture. For patients who are mentally or psychologically unable to adapt to new dentures. The majority of completely edentulous patients choose two sets of dentures because it is very embarrassing for them to be without a denture for a brief period of time in the event of a denture fracture or during technical procedures.[22]

Indications:

- Patients in need for a spare set of dentures
- Patients treated with immediate dentures that require replacement
- Patients with worn teeth who are happy with the fit of their old dentures.

CONCLUSION:

Patient satisfaction can only be achieved by accurate diagnosis and appropriate treatment plan. Better rehabilitation of the edentulous patient is possible with the appropriate use of these unconventional dentures. The various available treatment options and modifications in treatment procedures allow a clinician to provide a more natural and esthetically pleasant rehabilitation to the patient, thereby satisfying his/her esthetic, phonetic, and functional demands.

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