Review article:

Unconventional complete dentures: Innovative approach in prosthodontics

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Abstract:
Routine complications faced by the dentist include atrophic ridge, microstomia, flabby tissue, xerostomia, bony exostosis, labially inclined premaxilla, esthetic demand, bruxism, systemic disorders, patient’s demand for duplicating dentures, etc. Management of these difficulties can be done by proper incorporating of suitable materials and advanced techniques. This article describes the unconventional approaches to various modalities so as to provide ultimate satisfaction for the patient.

Keywords: complete dentures

Introduction
Transforming conventional into unconventional approach is a characteristic feature of evergrowing 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. Complete dentures made in conventional manner proves satisfactory in most of the patients, but in compromised patients conventional method brings with it certain disadvantages. So starring new techniques based on same old fundamentals of prosthodontia is known as the unconventional complete dentures, a manifestation of new vision in prosthesis construction.

Routine complications faced by the dentist include atrophic ridge, microstomia, flabby tissue, xerostomia, bony exostosis, labially inclined premaxilla, esthetic demand, bruxism, systemic disorders, patient’s demand for duplicating dentures, etc. Management of these difficulties can be done by proper incorporating of suitable materials and advanced techniques.

The conventional approach may not fulfill the five 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. Hence, it is never too late to introduce the unconventional route. This article has described a simple, effective and noninvasive treatment alternative to the classical conventional technique in a completely edentulous patient.
Following table describes routine complication and proposed technique

<table>
<thead>
<tr>
<th>Routine complication</th>
<th>Proposed technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flabby tissue</td>
<td>Pressure less technique(^1)</td>
</tr>
<tr>
<td></td>
<td>Liquid supported complete denture(^2)</td>
</tr>
<tr>
<td>Microstomia</td>
<td>Sectional impression(^7)</td>
</tr>
<tr>
<td>Xerostomia</td>
<td>Split denture technique(^7)</td>
</tr>
<tr>
<td>Bruxism, repeated denture fractures.</td>
<td>Metal reinforced denture base(^3)</td>
</tr>
<tr>
<td>Labially inclined premaxilla</td>
<td>Modified flange technique(^6)</td>
</tr>
<tr>
<td>Large maxillofacial defect or atrophic ridge</td>
<td>Hollow denture(^7)</td>
</tr>
<tr>
<td>Esthetic demand</td>
<td>Characterization(^8)</td>
</tr>
<tr>
<td>Social or professional consideration</td>
<td>Immediate denture(^9)</td>
</tr>
<tr>
<td>Slumped or hollow cheeks</td>
<td>Customized attachments retained cheek plumper prosthesis(^10)</td>
</tr>
<tr>
<td>Tuberosity undercut, Consistent denture fracture</td>
<td>Flexible denture(^11)</td>
</tr>
<tr>
<td>Patients demand for replicating denture</td>
<td>Dolly (duplicate) denture(^12)</td>
</tr>
<tr>
<td>Lack of retention</td>
<td>Denture with mechanical retentive components(^13)</td>
</tr>
</tbody>
</table>

Table 1: Routine complications and their proposed techniques

1. COMPLETE DENTURE FOR PATIENT WITH FLABBY TISSUE:

One of the common difficulties challenging the dentist is the mobile fibrous tissue in maxillary ridge. This is termed as “flabby” or “soft hyperplastic” tissue. This can be explained as a sequeale to tooth loss i.e. residual alveolar ridge resorbs and is replaced by mobile fibrous tissue. The problems associated with the flabby ridge are compromised retention/stability of the maxillary complete denture and lack of posterior interocclusal space.\(^1\) Fibrous tissues are easily displaced labially, buccally, or lingually & they do not supply stability or support for dentures. They must not be displaced when impressions are made since they will be painful when the dentures are worn & will tend to lift the denture when the teeth are not in contact.\(^13\)

Watson described the ‘window’ impression technique where a custom tray is made with a window or opening over the (usually anterior) flabby tissues. (figure 1 & 2) A muco-compressive impression is first made of the normal tissues using the custom tray with zinc-oxide and eugenol. A low viscosity mix of ‘plaster of Paris’ is then painted onto the flabby tissues through the window.\(^14\) Kelly in 1972 coined the term “combination syndrome” and described changes caused by mandibular removable partial denture opposing maxillary complete denture.\(^15\)
Management of flabby tissue:
Technique employed should be such that it displaces fibrous tissue as least as possible during impression. Primary impression should be recorded by a mucostatic impression technique. Secondary impression should be “selective pressure” providing relief to the flabby tissue.¹

2. SECTIONAL COMPLETE DENTURE FOR MICROSTOMIA
Oral submucous fibrosis, an insidious chronic disease and a precancerous condition, affecting any part of the oral cavity and sometimes the pharynx is caused by prolonged use of tobacco, arecanut, spices etc. The fibrosis involves the lamina propria and the submucosa and may often extend into the underlying musculature resulting in the deposition of dense fibrous bands giving rise to the limited mouth opening which is a hallmark of this disorder.³

Microstomia is defined as an abnormally small oral opening, caused by scleroderma, oral submucous fibrosis, sequale of burns, surgical resection of facial and oral neoplasms and temporomandibular joint disorders. Since they have a limited mouth opening, conventional method is difficult and challenging. Hence it is necessary to modify technique.³ For facilitating easy insertion and removal of the impression tray, sectional impression technique is advised i.e tray should be cut into two section.³ (figure 3) Final impressions were made with non-Eugenol impression material as Eugenol would cause burning sensation to the patient.

3. LIQUID SUPPORTED DENTURE

Conventional complete denture lacks retention and stability in patients with fibrous hyperplastic tissue. Several techniques have been employed for managing such cases. One of those techniques is to provide flexible tissue surface in complete denture. Liquid supported denture, with its flexible tissue surface is the available option.²

(figure 4) Liquid supported denture is based on the theory that when the force applied on the denture is absent, the base assumes its preshaped form that is the one during processing.² The principle of this design was that a liquid-supported denture is flexible and continuously adapts itself to the mucosa. However, it is also rigid enough to support the teeth during actual use. Thus, the denture base is covered with a close-fitting flexible foil to keep a thin film of liquid in its place.² (table 2)
Table 2) Layers in liquid supported denture

The foil remains in the resting position in the absence of forces acting as a soft liner and when the dentures are in use, masticatory loads are distributed in all directions by the liquid resulting in even stress distribution. This helps in long-term preservation of bone and soft tissues. Apart from the combined benefits of tissue conditioners and soft liners, load from biting forces and even bruxism, will be distributed over a larger surface (Chase, 1961).

Advantages of liquid supported denture include good base adaptation to the modified form of mucosa due to hydrodynamics of the liquid improving support, retention and stability, optimal stress distribution of masticatory forces over a larger area which reduces tissue overloading, prevention of soreness and increased comfort level and patient acceptance.

4. METAL BASE DENTURE

Routine Poly methyl methacrylate (PMMA) denture bases have good mechanical, biological and aesthetic properties. But, they may fail because of excessive para functional and/or functional forces (in cases of bruxism and/or complete dentures opposing natural mandibular teeth). Metal based denture can be used to strengthen the denture bases (figure 5.a, b).

These thin metallic bases have several advantages, besides rigidity and fracture resistance, like: excellent strength to volume ratio, good adaptation to the supporting tissues, enhanced control of denture plaque, high thermal conductivity, high biocompatibility, no dimensional changes in time through fluids absorption and no interferences with phonation. The fracture of acrylic resin denture is an unresolved problem in removable prosthodontics. Midline fracture of an acrylic denture base results from flexural fatigue failure, acrylic deformation of the base during function, sharp changes in contour, pin holes and residual processing stresses. Various approaches such as use of metal bases, wires, bars, & high impact acrylic resin reduces the incidence of midline fracture.

INDICATIONS include 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. Materials used for metal denture base are Cr-Co – (most retentive), Al, Ni – Cr, Titanium, Gold.
5. HOLLOW DENTURE

For the patients with poor resorbed residual ridge or large maxillofacial defect, the conventional denture fabricated proves to be both bulkier and heavier and so compromises retention and stability of the prosthesis. Reduction in the residual ridge height leads to increased inter arch space which ultimately increase the amount of denture base material in the denture making it less retentive. With the aim to reduce the weight, care should be taken to exclude the denture base from the planned hollow cavity of the prosthesis. (figure 6). Materials utilized for this purpose included a solid three dimensional spacer including dental stone (Ackerman, 1955), cellophane, wrapped asbestos (Worley & Kniejski, 1983), silicone putty (Holt, 1981) or modelling clay (DaBreo, 1990) during laboratory processing. A maxillary hollow denture can offer solution for this situation as hollow dentures will be of lesser weight compared to that of normal dentures.

6. IMMEDIATE DENTURE

Immediate denture is defined as a removable dental prosthesis fabricated for placement immediately following the removal of natural tooth or teeth. Advantages of Immediate denture includes avoiding the embarrassment of appearing in the public without teeth. Also, immediate dentures can minimize changes in the patient’s appearance that can occur when natural teeth are removed. Post extraction complications are reduced with these dentures as they have therapeutic and prophylactic effect. It prevents bleeding, protects the wound against trauma, prevents the entrance of food and liquid into the wound, protects blood clots and accelerates healing and enables a more correct formation of the residual ridge.

Disadvantages may be listed as increased visits for patient, traumatic procedure, complex clinical and laboratory procedures and variation in bone and soft tissue change lead to compromised retention, rebasing required and anterior try in not possible so esthetic compromised.

7. MODIFIED FLANGE COMPLETE DENTURE

Complete denture fabrication proves to be challenging when the ideal requirements of both hard and soft tissues are not fulfilled. Surgical procedures i.e preprosthetic treatment need to be implemented with a view to fulfill patient satisfaction after complete denture fabrication. One of the conditions affecting the denture insertion and esthetics is labially inclined premaxilla and associated undercut. Esthetic principle was compromised with the complete denture fabricated by conventional approach because of the excessive fullness by thick labial flange. Preprosthetic surgery might reduce the foundation for denture support. To cope up with this difficulties, modification is required in complete denture fabrication i.e it is a non surgical procedure to give modified labial flange so as to improve esthetics. (figure 8)
8. CHARACTERIZATION IN COMPLETE DENTURE

Complete denture may not resemble the previous anatomic morphology of teeth or oral mucosa. Many patients demand more natural like appearance of complete denture such as spacing between incisors, fractured incisal edge, stained teeth, proclined profile, etc. So special considerations should be employed in modification of denture base and teeth. This modifications are called “characterization”. Complete denture can be characterized by two basic methods.

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

9. CHEEK PLUMPER PROSTHESIS

Esthetic factor not only confined to teeth but also to be considered for facial appearance. Facial esthetic may be compromised due to lack of support from the internal structures, i.e. teeth, ridge, denture, etc. This results in slumped or hollow cheek proving detrimental to facial esthetics. Cheek plumper help to enhance facial appearance by supporting the slumped cheeks. It is attached to complete denture by customized attachments or magnets. A Conventional cheek plumper would be a part of the complete maxillary denture prosthesis forming single unit prosthesis with extensions on either side in the region of the polished buccal surfaces of the denture and are continuous with the rest of the denture. Indications of such prosthesis are to provide a youthful appearance in patients with hollow cheeks and to restore esthetics in patient with Maxillofacial defect.

Drawbacks associated with cheek plumper prosthesis include excessive weight added to the upper denture thus compromising retention, interference with masseter muscle and the coronoid process of the mandible and so difficulty in chewing, difficulty in insertion and removal.
10. FLEXIBLE DENTURE

Undercut is considered to be an aid for retention but that’s only in case of unilateral one. Severe unilateral or bilateral undercuts are frequently encountered and instead of enhancing retention interfere with the path of insertion and removal of complete denture. Conventional management techniques include modification in denture bearing area, denture base adaptation and relining.

Flexible denture base material is nylon-based thermoplastic resin. They have shown several advantages over the traditional rigid acrylic denture bases. The translucency of the material picks up underlying tissue tones, making it almost impossible to detect in the mouth. Some of the commercially available products are Valplast, Duraflex, Flexite, Proflex, Lucitone, Impak where as valplast and lucitone are monomer free. Flexible denture material is so strong that it can be made very thin, which makes it comfortable to wear and esthetically pleasing. (figure 11). As the flexible dentures are fabricated using advanced and improved technique, they exhibit better accuracy compared to conventional techniques. Being flexible, the denture adapts well in the undesired bony areas. The amount of adjustment required at time of denture insertion is greatly reduced. Also, this reduces post-insertion complaints of denture-induced trauma [ulceration].

Absolute bioadaptability is because the material is free of harmful chemicals [monomer] and metal, these being the principle causes of allergic reactions in conventional denture materials. Temporary dentures are recommended by dentists during therapeutic episodes. After surgical reconstruction of the upper jaw, there is a need to accommodate the patient during the period between surgery and the fabrication of a final dental appliance. For this purpose, a flexible denture offers a great solution that allows the patient to recommence daily activities. Midline fracture of complete dentures has been reported to be the second most common type of fracture in denture prosthesis. Flexible denture material has been reported to have therapeutic advantage in overcoming midline denture fractures. Flexible dentures form an excellent alternative to traditional hard fitting denture.

Material being soft and strong can be made thinner and are light in weight compared to conventional dentures that promotes better adaptation of the tongue and cheek to the denture base. These dentures absorb small amounts of water to make the denture more soft tissue compatible. Due to their ability of excellent mouldability, light weight to density ratio and high thermal strength, flexible dentures have been proven as an excellent treatment option for complete and partial edentulism. However, careful case selection and clinical judgment is required to use flexible dentures in appropriate situations in order to obtain a successful treatment outcome.

11. DOLLY (DUPLICATE) DENTURE

Many complete denture patients ask the dentist to provide them with two sets of dentures instead of one. They cannot face the embarrassment of being without a denture, even for a short period of time, in case of denture fracture or in case of
any technical procedure. Esthetics of previous denture can be duplicated by this technique restoring the previous appearance of the patient.  

12. DENTURE WITH MECHANICAL RETENTIVE COMPONENTS

The various mechanical factors which aid in retention are retentive springs, magnetic forces, suction chambers and suction discs, etc. In the past, suction chambers in the maxillary dentures were used to aid in retention. The suction chamber creates a negative pressure, which aids in retention. They are avoided now due to their potency of creating palatal hyperplasia. (Figure 12) Intramucosal magnets aid in increasing retention of highly resorbed ridges. (figure 13).

Conclusion

Correct treatment starts with correct diagnosis and correct treatment planning. Correct diagnosis and appropriate treatment plan must be implemented so as to achieve utmost patient satisfaction. This article gives us precise knowledge of appropriate use of both materials and techniques with a view to accomplish the various prosthetic needs of patient.

References:

17. Corina Marcafioreanu, Luciana Goguña, Anca Jivanescu, Bratu titanium complete denture base in a patient with heavy bruxism, year xv · nr.3/2008 · pag. 96-99

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