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Review Article

Virtualising Natural Effects in Complete Dentures

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Abstract: In rehabilitating complete denture patients, Esthetics have an exemplified part in natural smile. The physical environment of edentulous mouth is in constant and permanent change. Denture esthetics is the effect produced, which improves beauty and appeal for an individual. For this reason, an artistic effort in treating edentulous patient should follow the change and progression. Dentures must be preceded by the changing physical personality traits of a patient as well as physiological age changes in the tissues. This can be achieved by incorporating personnel characteristic features in teeth and denture bases in order to contribute to a Life-Like appearance. Skilful manuveours performed during denture fabrication will allay in improving the appearance, thus enhancing the esthetics. Conventional treatment planning now not only focuses on restoring the teeth but also engineering it to suite the smile and face. Making and managing dentures with precision is what prosthodontist is working on incessantly and for this several dentists has put forward the principles of design, but their application to reality is always a challenge. Hence the purpose of this report is to enlighten the fact and to integrate the minute changes which could be performed in every single denture to personalize them.
Keywords: Dentogenic concept, Dentures characterization, Esthetics, Teeth

INTRODUCTION

In the natural oral environment, emulating it is a herculean task, but an illusion when created, would be suggestive and of simulative type. The complaint that an upper & lower complete dentures do not match in color as well appearance of artificial teeth whichis most often been heard. This simply means that reproducing surface colorin the denture as well as artificiality in teeth arrangement will not provide denture satisfaction. The color effect of any denture base must be evaluated in its ultimate environment, the Wearer's mouth [1].

A complete denture is said to be complete when it is in proper form, function & esthetics. All the steps involved in complete denture fabrication should be performed to obtain proper form and function. But for estheticswhich adds an additional life like appearance to it bringing the teeth & the patient's attitude towards life, establishing it is an altogether an imperative task. For esthetics to appear in the denture, as stated by Hardy "to meet the Esthetic needs of the denture patient, we should make the (denture) teeth look like (the patient's) natural teeth" [2].

As in routine dentistry, fabricating a complete denture, estheticsare overlooked. By integrating these minuscule facts, will complete the denture as an individuals' own, hence the purpose of this article is to enlighten certain perceptions to virtualise natural effect in complete dentures.

MATERIALS AND METHODS

A review of literature was done which engaged most of the articles published in peer-reviewed journals pertaining to the subject published in English and limited to "Characterisation" from January 1,1900 to August 31,2013, in Medline (pubmed) and Google Scholar. Articles retrieved from electronic search were then hand searched for relative and cross references. The Desired articles were obtained and those that did not focus exclusively were excluded from further evaluation. The full texts of all included articles were identified through electronic and manual searches were then reviewed and assessed for suitability.

For acquiring natural effects in complete dentures, of severalways and means, categorically, two methods have been described here as

- Illustration by teeth and/or their arrangement
- Contouring of denture bases.

Illustration by teeth and/or their arrangement

Since Williams [3] introduced the square, ovoid, & tapering concept of choosing the form of teeth for

dentures, square face deserved square teeth, an ovoid face required ovoid teeth, & a tapered face will deserve a tapered tooth [4]. A concept introduced by Frush and Fisher [4-9], Dentogenics, the art, practice, & technique of creating the illusion of Natural teeth in artificial dentures, being based on the elementary factors suggested by sex, personality& age of the patient. It is designed to enhance the naturalness of appearance in an individual for whom it is made by its complementary contribution to the beauty, charm, character, or dignity observed in a fully expressive smile or in earnest conversation. The practical application of the dentogenic concept involves three separate educational phases. The first is the education of a dentist. Axiomatically, the dentist cannot achieve an accomplishment as he does not understand any more than the student artist whom can be expected to produce a portrait comparable to that executed by a master painter. The second is the education of Dental laboratory technician. For many dentists, they are very valuable assistant; together they form a working team. The third is the education of the patient. In the final analysis, the patient must be pleased; but without an understanding of the esthetic asset to the dentist himself, patient cannot be expected to desire or even to be willing to submit to the innovations of dentogenics [4]. So characterisation can be done by selection, modification and/or of the teeth.

- Light shades of teeth mold for young people & darker shades for older ones.
- A hair line crack can be given in the teeth.
- Varying the direction of the long axis of teeth
- Place one maxillary central incisor incisal edge slightly in an anterior direction to the other central incisor; we create a position which is evident but harsh.
- Incisal edges together but one of the central incisors ahead of the other at the cervical end we have created a harmonious, lively position.
- Move bodily one of the central incisor anterior to the other giving a more vigorous position
- Combined rotation of two central incisors with the distal surface forward, with one incisor depressed at cervical end & the other depressed incisally.
- Lateral incisors rotated to show its mesial surface, whether slightly overlapping the central incisor or not, gives softness or youthful coquettishness to the smile.
- By rotating the lateral incisors mesially (to have the vision of distal surface also), the effect of the smile is hardened.
- Place the teeth so that the tips of the maxillary lateral incisors show when the patient speaks seriously; the amount depends on the age & sex, less for old than for young people & more for woman than for men.
- Spacing &diastemas often exist in natural dentition. Thus slight diastema can be created between the lateral incisor & the cuspid on one side. The wearing away of the natural teeth at the contact points creates spaces between the teeth. The migration of teeth also creates spaces. To simulate the wear by positioning the artificial teeth to create spaces, can give a natural appearance. Diastema given should exceed 2-3mm & should be wider at the incisal edge than the base. In diastemas smaller than 2-3 mm, fibrous food tends to be trapped & can be a source of embarrassment [10].
- Grinding the incisal edges. Teeth abrade with age. Reshaping the incisal edges &mesiodistal diameter makes it possible to modify any tooth to the desired form [3, 11].
- Gingival tissues recede with age. Selecting a long tooth, contouring the wax to show gingival recession & then staining it a bit, can give natural appearance, can reproduce this recession.
- Use an eccentric midline. Create asymmetry in the divergences of the proximal surfaces of the teeth from the contact points. Martone stated that, “The key to esthetics lies in asymmetry” [12]. Most things in nature are asymmetric, & in the human face many minute & subtle differences are found from one side to the other.
- Place one maxillary central & lateral incisor parallel to the midline & rotate the other central & lateral incisors slightly in a posterior direction.
- Create asymmetry for the maxillary right & left cuspids. Rotate one in a posterior direction than the other.
- A teeth arrangement that is too perfect may not be ideal. In fact, slight modifications in the position of teeth such as overlapping, tilting, rotation &incisal variations may contribute to a natural-looking denture [11].
- Often, gold or alloy restorations can be placed in these teeth to create the illusion of naturalness [13]. The use of gold occlusal surfaces on the teeth of prosthesis can contribute to its clinical success [14].
- Silver filling can be given on posterior teeth.
- Cast crown can be given on posterior teeth. Some patients who seek new dentures ask that a metal crown be placed in the denture to resemble their natural dentition [15].

Contouring Of Denture Bases

One of the best descriptions of contours of the soft tissues is by s. Howard Payne referring them as a series of complex French curves as there is basically no

straight line or flat surfaces. Some are abrupt curves but most are subtle and free flowing [16]. The free gingivae or gingival margin, attached gingivae, interdental papillae, root eminences, and the attachment of mucobuccal folds on the facial surfaces. The incisive papilla, rugae, lingual margin proximal to posterior teeth, and the contour in approximation with the anterior teeth are included on the lingual or palatal surfaces. Excess grinding or polishing of the processed denture will remove the anatomic contours and staining. the wax-up does not require the skill of an artisan [17].

The sulcus is produced by inserting a no. 23 explorer tip, between the tooth andwax at the gingival margin moving it mesiodistally. Free gingival margin at the neck is carved flat and tight to the tooth neck and then blended directly into the base material. inthe oral cavity, it is drawn tightly around the tooth with a definite rolled edge which simulates the cuticle around a fingernail, having a slight undercut so that it shows no direct attachment. From an esthetic standpoint, carving done in this manner have a marked naturalness partially because saliva adheres in this area more naturally, enhancing the blend between the tooth and gingiva and dispersing the colors more harmoniously [18]. The gingival margin or free gingival limits are formed by removal of wax from the cervical portion of the teeth until sufficient areas of their labial and buccal surfaces are exposed. More of facial tooth structure is exposed in aged patients to represent the normal physiologic gingival recession. The interdental papillae are left long and pointed for young patients, increasingly short and blunt for older patients. Excess wax between the margin and borders, representing the attached gingivae and mucobuccal fold, are trimmed. During trimming, minor eminences are left over the root areas of incisors, and heavy eminences are formed over the cuspid roots. Gingival surfaces, proximal to the posterior teeth may show continuous alveolar bulk or minor root contours. It should be emphasized that the cuspid eminences are very prominent, all others being nonexistent or obvious only under careful examination. The gingival margin is accentuated by indenting it along the junction of the attached gingivae and the free gingival margin, blending it into these grooves.

The palatal surfaces should be contoured so that the patient can regain the maximum sensation of contours present before the loss of the dentition. The elements contributing are rugae and the anatomy of tissues adjacent to teeth. In order to reproduce rugae, various methods are available in literature; one of them as described here is using a tin-foil where pattern is made before the base plate is secured to the cast. This pattern is removed and two thicknesses are separated. The second layer, in apposition with the cast, is trimmed accurately and put aside until the lingual wax-up is carried out. The corresponding baseplate area is cut away at this time. The thickness of wax on hard palate is reduced until the color of the cast just commences to become apparent through it as this creates minimal impingement on the tongue space by the vault surfaces. The tin-foil rugae pattern and its edges are then sealed. After dewaxing procedure, this tin foil is removed and followed by conventional procedure. It can also be added to an existing prosthesis.[19]

Stippling, a surface phenomenon where the natural attached gingivae appears rough whenwiped dry. Stippling acts to blend the individual anatomic components and causes an uneven light refraction, which is an important factor contributing to naturalness [17].The desired stippling effect can be created by several ways on the dentures, namely with Offset bur technique[5], Toothbrush technique[18], Blow wax technique[20]and with the help of sponge[21].

As these features are inculcated in dentures, investment stands as an important procedure. Here, the reproduction of anatomic contours must be definite and there must be a minimal change in dimensions of the cured dentures. So, after base flasking, base and teeth are painted with Debubblizer or other wetting agent. To avoid trapping air bubbles in the interproximal spaces during flasking procedures and to copy in better detail, scrub a thick mix of stone investment over the wax denture with a small, soft bristled tooth brush until a thin, almost transparent layer of stone covers the wax and teeth. [17]Once the surface tension is relieved, the remainder of the investment can be placed quickly. This technique avoids the dangers of vibration and allows the use of a strong, quick setting investment for the primary covering over the teeth and wax [20], then carrying out with conventional procedure.

Anatomic contouring is incomplete without incorporating natural oral structure textures. To achieve this, various coloring agents such as ester soluble dyes, water soluble dyes, inorganic and organic pigments, internally colored polymers [1], Replident (kit of 8 dispensor-type bottles of differently colored metha methacrylate polymers) [18], Natur –Tint (supplied in 4 solutions) [22], standard kayon kit (supplied in 5 shades) [16]were used. One of the methods described here as before packing, application of tinting materials like replident in the upper compartment of the flask in reverse manner is done [18]. But difficulties encountered would be that it is difficult to predict the results or to correct errors of application since the effect of adding the stains cannot be observed as well as the repeated addition of monomer directly against the separating medium may result in the investment material adhering to the base acrylic resin. Pound developed a technique where flexible acrylic veneer is made and can easily be adapted on denture surfaces during the packing operation [18, 23]. Kemnitizer [17] prompted the usage of Plastic or cellophane trial pack sheets, placed between the teeth and acrylic resin during packing. The final trial-pack separation finds the acrylic resin adapted to the cast, with an anatomic reproduction

of the lingual and facial surface; later followed by staining procedure. The tints are applied with a small camel's hairbrush wetted with monomer or by dusting and wetting with dropper on the external contours of denture base and the imprints of the ridge-lap portions of the teeth. With either approach only small amount of the tinted resins are added which will not cause overfilling of the mold. This technique allows you to preview your efforts to some degree. But as the teeth are in other half of the flask, so the complementary effect of their shade cannot be appreciated. Also, the Possibility of scuffing the color veneer, when it is returned to the flask and Pigments are only on the surface, so subtle shading is more difficult. The esthetically critical areas of gingival cuff and papilla are the most difficult once to control. Another technique is Dusting and wetting. This technique has more widespread acceptance, involves applying the tints in reverse order from outside in, i.e. after dewaxing the different shades of resins are applied in different areas by dusting and wetting prior to filling the base with the mold resins. To simulate melanin pigmentation, use of brown and purple resins were suggested [16].

Powers suggested that dusting and wetting technique is all-imaginary in the absence of the patient and its time consuming. Therefore, he developed a technique named as Brush-on or paint-on technique, applying tinting material directly to the finished denture after processing, in the presence of the patient. As coloring of the denture varies from one patient to another; so, one cannot use the same color resins for each patient and the coloring of the denture base should be modified according the tissue color of each patient [22].

Pattanaik [24] described the usage of tissue paper for internal characterisation. They adapted a strip of tissue paper over the labial and buccal surface of the waxed-up denture and cut according to the scalloping pattern of gingiva around teeth. Then, painted with acrylic pigments over this tissue paper according to the pigmentation pattern of the patient's gingiva. Then retrieving and applying it gently before packing and the procedure is carried out in conventional pattern. Newer, autopolymerizing and light-cured shade modifiers are cadmium-free and are thus preferred. When the denture has been processed in the appropriate shades, it is contoured and smoothed with an acrylic bur but not polished. Custom tinting is done at this time by increments of powder (color chosen according to the area where application is desired) along with placing monomer and keeping stains moistened with monomer to prevent crystallization. Later, acrylic resin stains are cured in the pressure pot or light-curing unit according to the manufacturers' instructions.

Previous color characterization techniques rarely recommended surface staining of finished dentures with autopolymerizing acrylic resin stains because of the lack of colorstability and lack of abrasion resistance of the stains. However, applying stains to the gingival surfaces in the flask before packing has a major disadvantage. If any reshaping of these surfaces is required after processing, the stains are lost in finishing and in polishing. In this technique, surface staining of finished dentures is possible because of clear, light-cured resin coatings [25, 26].

The clear coating provides a hard, high gloss which makes the polishing of dentures unnecessary. The coating seals the surface which promotes the color stability of the base an0d stains. Abrasion resistance of the denture base and custom staining should be greatly improved. It is claimed that the coatings render the denture more wettable and retentive, and that urethane coatings may prevent allergic responses to poly-methyl methacrylate; but these claims cannot be confirmed. The technique initially involve slightly sandblasting the unpolished denture avoiding stained areas, then clean with detergent solution and dry with oil-free air. With the help of a soft clean brush, in thin even film coatings are then applied, painting in one direction only to avoid air bubbles and then polymerize it. Light cured gum shading are also available as they consists of micro filled composite resin which can be applied in multilayered technique and can delivers unlimited possibilities for gingival reproduction [27].

Conclusion

Though several techniques and methods are overviewed here, but what being practical to the dentist and the given condition to him or her; but the success of complete dentures largely depends on the patient's acceptability. The achievement of this result is based simply upon a determination to study nature with an open mind & then to give sufficiently of our personal time to apply this knowledge.

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