"An incumbent clinical approach to determine outline form for functionally generated amalgam stops in complete denture prosthesis"

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Abstract

Artificial resin teeth for complete denture prosthesis have been modified in different ways to prevent their wear. Inserting silver amalgam has been one of the common and most inexpensive methods used. Much attention has been laid on the properties of the material rather than the biologic aspects of determining the outline form for such preparations. This article in the form of a clinical case report has attempted to enumerate the factors that determine the outline form for such preparations. Detailed clinical and laboratory procedure have also been mentioned. In addition, an unusual fact about patient's previous information and knowledge has also been discussed.

Introduction

The topic of occlusion for complete denture prosthesis has been a subject of research ever since its conception. Much has been said and mentioned about the occlusal schemes for complete denture prosthesis. Long term satisfaction of complete denture prosthesis has also been associated with the type of occlusion one incorporates within the prosthesis. Complete denture occlusion is not only complex but in fact is dynamic throughout the period it serves in oral cavity. Ever changing denture bearing tissues compounded with changes in stomatognathic system as a result of aging gave rise to essentials of balancing the occlusion in complete denture prosthesis. Balanced occlusion is developed for stability of denture bases in relation to supporting structures during functional and parafunctional movements. Lack of balancing, eventually results in instability of dentures, mucosal soreness, bone resorption, dissatisfaction with the prosthesis.

Techniques to achieve balanced occlusion in complete dentures are either those that dynamically equilibrate the occlusion by the use of a functionally generated path or those that statistically equilibrate the occlusion using an articulator programmed to simulate the patient's jaw movement. The functionally generated chew in techniques seems to provide the most accurate method of recording occlusal patterns. Irrespective of the techniques used the problem with balanced occlusion is maintenance of these contacts over a long period of denture service. Acrylic teeth are the preferred replacement for natural teeth due to their dynamic ability to be customized in complete denture prosthesis. The drawbacks of acrylic teeth are rapid wear of occlusal surfaces along with concomitant decrease of vertical dimensions of occlusion which in turn results in ridge resorption initiating instability and a chain reaction. However this problem has been meted out by inserting amalgam stops into the resin occlusal surfaces that not only slows down wear but also improves the long term masticatory efficiency of resin teeth. This case report describes an unusual case of a complete denture patient who had been wearing a repaired broken complete denture that was in service for the last twenty years. Factors that affect the preparation of resin teeth in such cases are also discussed.

Clinical case report

A male geriatric patient, aged 72 years reported to the department of prosthodontics with history of wearing a complete denture since 20 years (Fig 1). Patient dwelled from a village where health care facility was mainly delivered by self-styled medical and dental practitioners. Medical history revealed was non-contributory. Patient's habits included tobacco chewing and smoking since 40 years. Complete denture history revealed seventeen denture repairs that included midline fracture correction three times and replacement of artificial anterior teeth three times (Fig.2). Anterior teeth except the right canine were missing in the mandibular denture. Maxillary posterior teeth were severely worn to the level of the denture base whereas the occlusal surfaces of mandibular posteriors were intact. The patient was made to believe by his only one complete denture could be made for a person in his lifetime by his self-styled dentist. Routine clinical and radiographic investigations were done to ensure that patient did not have any underlying conditions. Oral examination
revealed moderately resorbed mandibular residual alveolar ridge with flabby mucosa in the anterior region. Treatment plan included patient education through counselling, oral physiotherapy followed by a new complete denture fabrication. As the patient dwelled from a place where health care facility was not routinely available it was decided that the complete denture occlusion would be maintained efficiently by using silver amalgam on the occlusal surfaces of the artificial teeth. Complete dentures were fabricated using a semi adjustable articulator and an arbitrary face bow.19 Planning of the amalgam stops was carried out in a two stage procedure.

First stage: Determining the outline form of occlusal preparation on artificial teeth based on the envelopes of mandibular motion.

Second stage: Refining of articulator generated amalgam stops in the patient's mouth through a modified clinical remounting procedure.

Stage 1: Complete denture prosthesis was fabricated in conventional manner till the stage of denture processing. Outline form of occlusal surfaces was planned during the stage of laboratory remounting. During this stage the processed denture along with the working cast was remounted back on the programmed articulator. After the necessary occlusal corrections as a result of processing changes, the occlusion was evaluated first for all the existing centric and balancing contacts. During excursive movements of each maxillary cusp over the inclines of mandibular cusps, outline form for amalgam stop was determined by moving the cuspal inclines of maxillary teeth posteriorly over the proximal slopes of mandibular functional cusps till they reach near the marginal ridges of mandibular teeth situated posterior to it. The position where the cusps of maxillary teeth discontinued contact became the posterior outline of the amalgam stop. This is true for mandibular premolars. When the maxillary second premolar was pushed into retrusion on articulator to simulate protrusion in patient, the buccal cusp of maxillary second premolar would run over the mesial marginal ridge of mandibular first molar. The level at which the mesial marginal ridge crosses but still continues running posteriorly determined the outline form of the amalgam stop on mandibular first molar mesially (Fig.3). For lateral excursions when the maxillary member of the articulator was moved laterally the outline form was determined by marking a point slightly lateral to the area where balancing contacts exist on each tooth. Once the outline form within each tooth was analysed, points were marked on the occlusal surfaces of maxillary and mandibular teeth which were joined together to form the outline of the amalgam insert.

Stage 2: Once the outline form of the amalgam stops was marked, the next step included a modified clinical remounting procedure which was done in presence of the patient during denture delivery. The plaster index left on the semi adjustable articulator needs to be preserved and would be used to attach the denture while doing clinical remounting. A centric relation record was made with final finished and polished denture carrying the outline form for the amalgam inserts. The dentures were then remounted on the previously programmed articulator for achieving the balanced occlusion utilizing the left over plaster indices that were attached to the mounting rings. Vertical pin was removed and any changes in occlusion as a result of water sorption and heat (during polishing) were corrected. The denture was then verified for balanced occlusion in the oral cavity. The dentures were then placed back on the articulator and resin teeth were then prepared within the scribed outline form with an inverted cone bur, thus forming a truncated inverted cone shape cavity (Fig.4). Silver amalgam was then filled into the cavity to an excess of 1 mm above the occlusal surfaces and movements on the articulator were carried both in excursive and laterals (Fig.5). Excess amalgam was removed and the dentures were immediately placed in the patient’s mouth and the patient was instructed to move the mandible to generate a functional path while the amalgam was setting. After finishing and polishing of the amalgam on the occlusal surfaces of the denture, patient was instructed regarding their maintenance (Fig.6). The patient was put on follow up for a period of two years, during which time the patient did not face any problems (Fig.7).

Discussion

Information and knowledge regarding artificial denture use is low in places where self-styled dentist run dental practices as is evident by the fact that the patient thought that one can make a complete denture prosthesis only once as per the information imparted upon him by the person who had made his dentures first time who unfortunately was not a dental practitioner by profession. Ethical violations for the sake of selfish motives seem to be prime reasons for giving such information to the patient. Explanation like once the dentures are made the underlying bone is lost and new dentures can never be made verify the intentions of the self-styled health care worker. All of
the repairs that the denture had undergone had done by the same person. Patient also revealed the fact that he had paid more for denture repair than what the actual denture had cost him.

Determination of the outline form for placing silver amalgam on occlusal surfaces is an important procedure which should not be overlooked. Preparing occlusal surfaces randomly without actually understanding the paths that each cusp tip follows can lead to errors in occlusion which in turn effects efficiency of balanced contacts and / or errors in occlusion. After preparation of 1.5 to 2 mm the cavity should be deeper in the areas of centric contacts and should follow the cuspal inclines from center to periphery. Silver amalgam should be overfilled in the cavity while generating amalgam stops so that the margins between the material and the resin merge without any discrepancy.

Combination of articulator and functionally generated amalgam stops allows one to position the centric and eccentric contacts in amalgam along with the path between the two contacts. This ensures that the entire function of occlusion in complete denture prosthesis is being borne by silver amalgam which has high wear resistance as compared to resin.

Conclusion

Much needs to be done in the third world countries to educate people about health care services to avoid their exploitation. Reaching vast majority of ignorant population has always been a challenge and is still a challenge. Patients who cannot replace their complete denture prosthesis even after their service time is over need to be treated differently. One such method is inserting amalgam stops on the occlusal surfaces of resin teeth, determined biologically by the above mentioned method.

References

Illustrations

Illustration 1

Patients Existing Maxillary and Mandibular Complete Denture

Illustration 2

Extra Oral View of the Patient
Illustration 3

Determining the Outline form for Amalgam Stops on Mandibular First Molar on the Semi Adjustable Articulator

Illustration 4

The External Outline Form Determined Through Application of Envelope of Motion on Maxillary Artificial Teeth
Illustration 5

Mandibular Teeth Filled With Silver Amalgam and Refined by Opposing Teeth on the Articulator

Illustration 6

Final Denture With Amalgam Stops
Illustration 7

Extra Oral View of the Patient With Complete Denture having Amalgam Stops