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Case Report

Determining the need of a coping and/or its number/type in a tooth supported overdenture

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***ABSTRACT*:**
The use of copings for overdentures is less practiced in prosthetic dentistry perhaps because of clinicians inability to determine at the time of diagnosis whether a coping should be used or not and if used, then whether a long or short coping will be indicated. This dilemma can be solved if one understands and is able to examine the vertical dimensions of occlusion and rest appropriately at the time of diagnosis. Fabrication of overdentures with copings requires such clinical skills which cannot be gained overnight. With the assistance of presenting two different cases of overdenture and immediate overdenture, we present a clinical diagnostic method that will assist a prosthodontist to determine whether copings will be indicated or not while also being able to decide among different types of copings.
Keywords: endodontic, supraeruption, copings, base metal alloy, denture support.

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Introduction

Complete edentulism is an indirect representation of the process of ageing throughout various cultures. Increased average life span in the last few centuries has increased the time period that a person has to live in an edentulous state. This significantly has laid emphasis on the prosthodontist to find methods to preserve natural teeth, thus delaying the state of complete edentulousness. The importance of tooth retention in association with complete denture prosthesis dates back to 1856, when mouth preparation for receiving complete denture was published. [1] Nearly a century later, information about the concept of overdentures as a viable gerodontic treatment option was launched and it was in 1969, when simplified overdenture treatments were published.[2,3] While we may credit the treatment of overdenture having its known advantages (directional sensitivity, proprioception, tactile sensitivity, ligament support, improved occlusal force and chewing efficiency), [4] it is actually the presence of natural teeth that makes the difference. The natural tooth that serves as an abutment for overdenture incorporates all the advantages of a natural tooth into a denture although to a lesser extent. Among different types of overdentures, [5] the decision to whether to use a metal coping or not, always puzzles the students as well as the clinician. This article presents two cases of overdenture with short copings and discusses the factors to be considered in making such a clinical decision.

Case 1: Maxillary overdenture using short copings and a mandibular immediate overdenture

A female patient aged 47 years reported to the department of prosthodontics with a chief complaint of inability to masticate due to loss of natural teeth.

Figure 1: (A) Existing maxillary teeth (B) Existing mandibular teeth (C) Resin copings (D) metal copings (E) mandibular prepared teeth (F) surgical template (G) completed treatment

Medical, social and drug history were not significant while dental history revealed loss of teeth due to caries and mobility. Extra oral examination revealed normal findings. Intra oral examination revealed a kennedy class 1 modification 1 partial edentulous situation **(Fig 1 A)** in the maxillary arch and a kennedy class 2 modification 1 situation **(Fig 1 B)** in the mandibular arch. Maxillary teeth were showing some form of tooth preparation done earlier, including occlusal attrition while mandibular teeth had problems of severe attrition, grade 2 mobility in anteriors and wide spacing. Treatment options presented to the patient, including implant supported prosthesis with both fixed and removable options, cast partial denture, overdenture/ immediate overdenture or extraction of remaining teeth followed by a complete denture. Treatment planned consented by the patient was a maxillary overdenture with coping and a mandibular immediate overdenture without coping (amalgam plug). Endodontic treatment was done for all the required abutments irrespective of using a coping or not. Direct technique for fabrication of coping pattern using duralay resin **(Fig 1 C)** was employed, followed by their casting, finishing and final cementation using zinc phosphate cement **(Fig 1 D)**. Mandibular immediate overdenture fabrication employed preparation of respective abutments (followed by sealing with amalgam plugs) and later extraction of planned teeth **(Fig 1 E)**. A surgical template made of clear acrylic was designed for accomplishing a near accurate preplanned osteoplasty **(Fig 1 F)**. The clinical and laboratory procedures for fabrication of overdenture were done in the conventional way. Dentures were inserted and the patient **(Fig 1 G)** was given instructions regarding its maintenance

Case no 2

An elderly female patient aged 53 years, reported to the department of prosthodontics for replacement of her missing teeth with chief complaint being an inability to chew and poor aesthetics. Medical history revealed she was diagnosed with hypertension about 2 years back and was under a drug regimen. Social history revealed she was a housewife by occupation and her social interaction was occasional with friends and relatives. Drug history included present medication for hypertension and multivitamin tablets. Dental history disclosed she had lost her teeth mainly due to tooth decay and few were lost as a result of mobility. Extra oral examination revealed presence of a long maxillary lip in relation to the lower third of the face and also showed hypomobility **(Fig 1A)**. Intra oral examination revealed a kennedy class 1 modification 1 partial edentulous situation in the maxillary arch **(Fig 1B)** while the mandibular arch was intact. The central incisors were supraerupted while the maxillary left premolar was maintaining the vertical dimensions. The treatment plan presented to her was the fabrication of a maxillary overdenture or a cast partial denture although other options of implant supported fixed prosthesis were also discussed. Drawbacks and concerns over the longevity of cast partial denture were explained in her first, following which she consented to a maxillary overdenture as a treatment option. Pre prosthetic treatment included oral prophylaxis and endodontic treatment of remaining maxillary teeth. Routine clinical and laboratory steps for overdenture (short, coping) fabrication were done. The short coping was designed to be retained by a post within the roots **(Fig 1C)**. After the casting of the copings was done, they were cemented in place with zinc phosphate cement **(Fig 1D)**. The patient was given instructions regarding use and maintenance of the prosthesis. During her regular follow up appointment **(Fig 1E)**, she had adapted well and was satisfied with the outcome of the prosthesis.

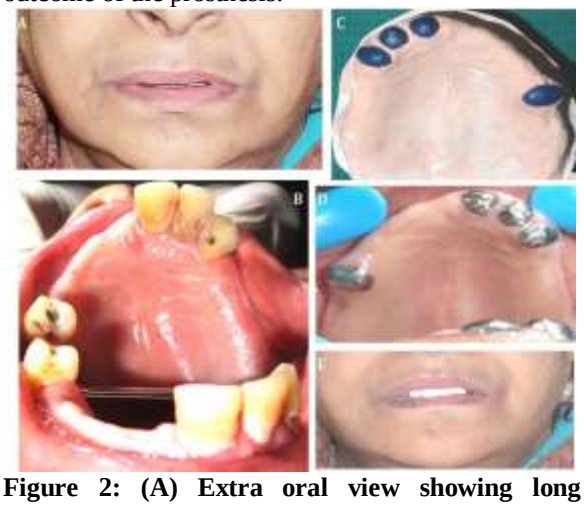

Figure 2: (A) Extra oral view showing long maxillary lip (B) Intra oral view (C) Master cast with wax copings (D) Copings cemented in place (E) Post insertion view

Discussion

Two cases of tooth supported overdenture and immediate overdenture have been presented in this article. By definition, an overdenture in its simplest form is a complete or removable partial denture that covers and rests on one or more remaining natural teeth or roots or an implant abutment. [6] Principally it is one of the most implementable and effective treatment option to practice preventive prosthodontics. Since the natural teeth are present, they provide the denture with advantages like directional sensitivity, tactile sensitivity to load, Dimensional discrimination, proprioception and more importantly, ridge preservation. [4] The types of overdentures have expanded in recent decades and have become a significant tool in the armory of a prosthodontist. Prosthetic options within an overdenture range from non coping overdenture, coping overdenture, attachment retained overdenture, magnetically retained overdenture and even submerged vital roots. Within the option of coping, we have a non coping overdenture (with or without endodontic treatment), a short, coping overdenture (2-3mm, endodontic treatment may or may not be required) and long coping overdenture (5-8 mm long to eliminate the need of endodontic treatment). [7-9] The success of tooth supported overdentures has paved way for even having the same treatment designs in implant supported overdentures also. According to various estimates it has been reported that 1 out of various implant treatment options is the use of an implant supported overdentures.[10] Although implants have been successfully used to manage various partial edentulous situations, [11] their affordability and underlying medical conditions of the patients render them a distant treatment of the future for many patients. [12,13]

Clinical decision making regarding which type of the above mentioned overdenture options within coping overdenture is difficult that can develop with a deep and bettter understanding of the dynamic functional relation between the incisal/occlusal plane and the inter arch distance between residual alveolar ridge and the relative position of the abutment tooth to be used within this space **(Fig 3)**. While most of the prosthodontist observe freeway space mostly in a completely edentulous situation rather than dentulous situation, one must understand that in a case of an overdenture both teeth and residual alveolar ridges are present. This situation puzzles the mind and it is imperative to focus on either the tooth or the edentulous ridge at one time during a clinical examination.

Since few teeth may be supraerupted in such cases, the focus is mainly on the natural tooth positions. The position of the tooth to be used as abutment has been shown at three different points, namely a, b, c. When the incisal edge of a natural tooth is at point a, the distance between the alveolar ridge and the incisal edge of that natural tooth is decreased, but at the same time it increases the possibility of accommodating a coping within the interarch distance. It is preferable to place two copings in overdenture (one on the abutment tooth and one within the denture), in such cases the amount of the available interarch distance is critical because it is important to understand that placement of two copings should not be at the expense of pushing the incisal plane towards the mandibular arch. This will impair esthetics. Hence, determination of the amount of freeway space relative to the natural tooth observed, is imperative to determine whether one should use a single coping or one can accommodate two copings for a denture. Position b is just above or near the anticipated incisal plane and is ideal since it creates equal distance within the interarch distance and the anticipated incisal plane. However, this position also increases the chances of increasing the possibility of vertical dimension alteration if one uses two copings for an overdenture. Therefore, in such cases, whenever the existing incisal position of the natural tooth is close to the anticipated incisal plane, a single coping overdenture is the safest choice. Two physiological methods of determining vertical dimensions are necessary during clinical examination. The swallowing threshold and the phonetic method. When both tests are conducted on the patient, and if the patient presents with short timed contact during swallowing and/or some or little space during speech one can accommodate two copings overdenture. At position c, the incisal plane is below the anticipated incisal plane of the overdenture and placement of a coping necessitates the need of endodontic treatment. However, depending upon the available abutment one can decide whether long coping is feasible, in

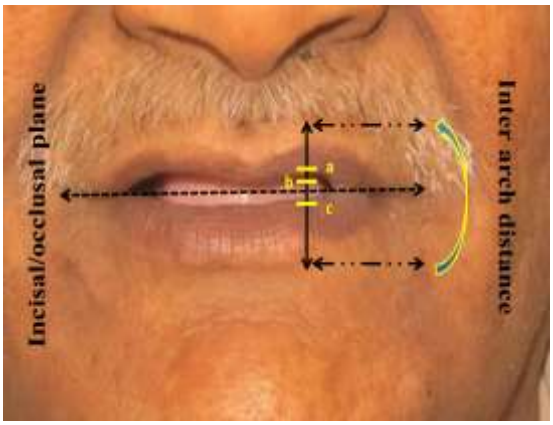

Figure 3: Relation between the anticipated incisal plane, interarch distance and three different positions of the natural tooth

that case endodontic treatment is not needed. This situation is extremely difficult to determine since one must also consider the age of the patient (secondary dentin deposition). However, it requires minimal tooth preparation within the enamel since the exposure of the dentinal tubules would create the

issue of sensitivity and patient will reject such treatment. The position of pulp in relation to the anticipated incisal plane should be considered in such cases. The more the distance between the two, the less is the need of the endodontic treatment. At the same time point c also represents supra eruption of the tooth, which necessitates the need of endodontic treatment followed by placement of two copings.

Similar clinical decision making interestingly, is also involved if one plans to make an immediate overdenture as in the first case of this report. The only unpredictable factor in such cases is the level of bone after extraction of remaining teeth. [14] Different authors have presented different approaches for making an immediate denture with a balance in the principles of both immediate dentures and tooth supported overdenture. [15] Although such dentures are an ideal option for esthetic conscious patients who are socially active, in our case there was no such factor.[16]

Conclusion

Clinical skill of decision making comes with close observation and deep understanding of the various relations between various variables. In the case of a tooth supported overdenture the anticipated incisal plane, the current tooth position and the interocclusal distance are three important variables that need to be explored in the case of tooth supported overdentures.

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