Maxillomandibular relationship record for implant complete mouth rehabilitation with elastomeric material and facial surface index of existing denture

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INTRODUCTION

Conventional complete denture principles are frequently used to restore edentulous patients receiving implants for complete mouth rehabilitation. Following the reliable osseointegration is achieved; the sequential clinical steps including elastomeric impressions, maxillomandibular relationship (MMR) records, mounting of the MMR records onto the articulators, fabrication and try-in of the implant fixed restoration framework, verification of MMR records by taking another records, veneering of the metal framework with the ceramics or indirect composites are well-described in various clinical reports in the literature. All these routine procedures have been carried out with few modifications and alternate techniques. Using patients existing denture for recording the MMR is one of the commonly used modification during recording the MMR. However, the implant definitive

Abstract

Introduction: The maxillomandibular relationship (MMR) record is a critical step to establish the new occlusion in implant supported complete mouth rehabilitation. Using patients existing denture for recording the MMR requires implant definitive cast to be modified extensively to completely seat the denture (with unaltered flanges) on it. This may influence the correct seating of the denture on the implant definitive cast causing faulty recording of the MMR.

Materials and Method: Elastomeric record bases, reinforced with the resin framework, are fabricated and relined with the light body elastomeric material when all the healing abutments are in place. The MMR is recorded with these elastomeric record bases using vacuum formed facial surface index of the occluded existing dentures as a guideline.

Results: The elastomeric record bases with facial surface index of the existing dentures can allow clinicians to record MMR records without removing the healing abutments from the mouth with acceptable accuracy. This can save chair-side time of the procedure. The record of facial surfaces of existing complete denture in the form of vacuum formed sheet helps to set the occlusal vertical dimension.

Conclusion: Use of facial surface index together with the elastomeric record bases can be the useful alternative technique to record the MMR in patients with implant supported full mouth rehabilitation. Further study is required to prove its routine clinical utility.

Key Words: Implant restorations, maxillomandibular relation, occlusion rim, record base

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cast needed to be modified extensively to completely seat the denture on it (without altering the flanges). This may influence the correct seating of the denture on the implant definitive cast. The MMR record is a critical step to establish the new occlusion in such situations. Conventional screw retained record bases on implants have been tried by the clinicians. However, these procedures are time consuming due to repeated removal and replacement of healing/prosthetic abutments, impression copings or similar components during the clinical appointments. Using patients existing denture for recording the MMR requires implant definitive cast to be modified extensively to completely seat the denture (with unaltered flanges) on it. This may influence the correct seating of the denture on the implant definitive cast causing faulty recording of the MMR. To overcome this problem, the elastomeric record bases, reinforced with the resin framework, are fabricated on both the arches and MMR is recorded with the vacuum formed index adapted on the facial surfaces of the occluded dentures.

**PROCEDURE**

- At the time of stage II surgery (uncovering), place titanium healing abutments (Adin implants, Israel) of appropriate heights in the patient’s mouth to prevent the soft tissue from closing over the implant
- When the surgical site is completely healed, modify the intaglio surface of an existing denture at healing abutment level by selective grinding and addition of the soft (Sofreliner Tough; Tokuyama Dental, Tokyo, Japan) or hard denture reline material (Tokuyama Rebase II; Tokuyama Dental, Tokyo, Japan). Re-examine and correct the vertical and centric relation after relining. Note that, alternately the denture can be remade at this stage
- Confirm the correct MMR records by keeping the dentures in mouth and fix them with the help of sticky wax (National Keystone Products, Cherry Hill, NJ, USA). Once the fixed denture removed outside the mouth, the secure the dentures together with the help of the instant sticking glue (Fevi Quick, Pedilite, Australia) in minimum three different contacting areas of the dentures
- Place the joined dentures on the vacuum former machine and adapt 2 mm thick vacuum formed polyethylene sheet (Tray-Vac Complete, Buffalo Dental Manufacturing, NY, USA) to cover the entire facial polished surfaces of both the dentures (secured together with the instant sticking glue) to make a facial surface index (FSI) [Figure 1]
- Remove the FSI from the dentures and cut it along the flanges of the dentures to make it look like a mouth guard [Figure 2]
- Remove the healing abutments (Adin implants, Israel) and replace them with the impression copings. Make an impression with open tray technique
- Connect the implant lab analogs (Adin implants, Israel) to the impression copings. Pour a soft tissue simulating material (Gi-Mask, Coltene/Whaledent Inc., Mahwah, NJ, USA) and type IV gypsum (Ultra-rock, Kalabhai Karson, Mumbai, Maharashtra, and India) to make a definitive cast
- Seat all the healing abutments on the implant definitive casts on the respective implants [Figure 3]. Prepare a horse-shoe shaped resin framework on the definitive cast just enough to cover the areas of all the healing abutments [Figure 4]. Apply tray adhesive and the silicone putty (Zetaplus Soft, Zhermack, Badia Polesine, Italy) to the framework and make an impression of abutments by keeping minimum flange extensions on facial and lingual side [Figure 5]. Note that, alternately light-body impression material can be applied on the healing abutments while making the putty impression (single step putty-wash impression technique)
- Repeat step 8 to make similar putty record base of the opposite arch. Note that a polyvinyl-siloxane or polyether material can be used instead of condensation silicone to prepare the record bases
- Seat the maxillary and mandibular silicone putty record

**Figure 1:** Vacuum formed facial surface index of denture

**Figure 2:** Facial surface index
bases in mouth. Add or remove putty impression material on the elastomeric record bases to adjust the vertical relation. Every time during addition of a new material to either of the record base, apply separating media like Vaseline Petroleum Jelly to the opposite record base to prevent sticking them with each other. Thus repeated addition and removal the putty material and the use the FSI (seated along the labial and buccal vestibules) help recording the desirable vertical relation (closely matching with the denture vertical dimensions) [Figure 6]

- Record and verify the centric relation in conventional manner
- Apply the tray adhesive and silicone putty on the inner aspect of the FSI. Apply impression putty to the inner aspect of the FSI and carry it inside the mouth to seal the already established MMR records as shown in Figure 7
- After setting of the silicone putty, remove the entire block of elastomeric MMR record [Figure 8]
- Cut the flange extensions of the elastomeric MMR record block with a cutter and examine for the proper seating of the implant definitive casts on respective record bases [Figure 9]
- Mount the maxillary casts on the semi-adjustable articulator and proceed with fabrication of the metal/ceramic/metal-ceramic restorations.

DISCUSSION

Securing the record base to the implants is a useful way to obtain an accurate MMR registration. There are various methods to reseat the record bases intraorally and on the cast alternatively depending on the prosthetic need, implant systems, ease of procedure, supporting healing/prosthetic abutments.[11-21] Several clinicians have used resin record bases on healing abutments, screwed record bases, relined denture, or duplicating denture in various forms to record the MMR.[17-21] Most of the techniques use methods to secure the record bases to the implants to record the accurate MMR records. These procedures can be time consuming due to removal of the healing abutments and placement of other components for MMR recording and vice versa.
However, Rungcharassaeng and Kan\textsuperscript{[17]} uses light polymerized resin record bases and Papaspyridakos and Lal\textsuperscript{[18]} used existing dentures at abutment level in which fixation of the record bases to the implant components is not required. Savabi et al.\textsuperscript{[14]} described the technique of application of plastic sprues that fit on the top of implants to hold the record bases and allows for easy recording of MMR with an implant-supported record base. Usually, the procedures are more time consuming due to screwing/unscrewing of the abutments and complexity of fabrication of the record bases that are fixable to the implants. Nimmo and Nimmo\textsuperscript{[22]} used two widely spaced implants as the optimal number of implants to stabilize record bases. Parnia et al.\textsuperscript{[11]} described a technique to transfer an ideal vertical dimension and centric relation of the patient's previous denture to the definitive cast with the help of individual silicone cones. Cranin et al.\textsuperscript{[12]} and Misch\textsuperscript{[13]} that described the use of plastic template to capture the final denture contour.

The elastomeric record bases described in this article are used to record the MMR. In addition, the vacuum formed index was adapted on the facial surfaces of the occluded dentures to prepare the FSI. The FSI copies (1) exact vestibular shape, (2) shape and contour of the facial polished surfaces and (3) the level and cant of the occlusal plane of the existing dentures in occlusion. Hence, the FSI can be a direct and/or indirect guide for recording the MMR for complex fixed implant restorations. The FSI is useful in initial evaluation and verification of the vertical relation as it copies the relation from the patient's existing denture. Later the same FSI can be used to transport the elastomeric material to seal the already recorded MMR. The direct use of the previous dentures thus can be avoided to record the MMR in such situation.

Recording the MMR with the help of FSI alone is not recommended. The FSI engages into the vestibules and cannot be repeatable at the same position as there are possibilities to close the mandible in slightly different positions each time. The FSI being transparent, the clinician can easily look through it to confirm that the record bases are in correct position before they can be sealed. The elastomeric material can be transported with the help of FSI to seal the record bases in the already recorded and verified (by FSI) position. While sealing the MMR, anterior area of the FSI can be left empty to look through the FSI for better visibility. It is recommended that the record bases should rest on maximum or all the healing/prosthetic abutments to achieve stability to the bases. In atrophic alveolar bone limits the placement of implants as well as contribute to unstable record bases. The resin base frameworks are used to reinforce the elastomeric bases as elastomeric bases alone cannot have sufficient strength. This technique recommends to prepare the resin framework to avoid unnecessary flexion/distortion/bending of the elastomeric bases. Though this technique provides accurate MMR records for a single case, further study is required to prove its routine clinical utility.
CONCLUSION

The long term success of implant fixed restorations lies in accurately reproduced centric and eccentric occlusal contacts and the accurate occlusion is produced with accurate MMR records. Use of FSI together with the elastomeric record bases can be the useful alternative technique to record the MMR in patients with implant supported full mouth rehabilitation. The record of facial surfaces of existing complete denture in the form of vacuum formed sheet can be considered as an initial guideline to set the occlusal vertical dimension.

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