INTER OCCLUSAL RECORD MATERIALS USED FOR PATIENTS UNDER GOING PROSTHODONTIC REHABILITATION

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ABSTRACT
The precise mounting of casts in the articulator is important for success of any prosthetic rehabilitation and treatment, it is very much essential to achieve harmony between the maxillomandibular relationship and anatomy of patient. This relationship is not simple opening or closing, but a complex relationship which exists in 3 dimensions. Variations may occur in any direction vertical, anteroposterior, or mediolateral. Thus, it is necessary to record this relationship with the least possible error to obtain a successful prosthesis. However when relating the maxillary and mandibular dental casts, the ultimate accuracy depends on accuracy and dimensional stability of the material and the technique used to record the maxillomandibular relationship.

KEYWORDS: Interocclusal Recording Material, Occlusion, Fixed Partial Denture

INTRODUCTION - Most of the patients undergoing prosthodontic rehabilitation present with poor intercuspation of the remaining dentition. In such cases, the casts cannot be positively articulated in a reproducible position and the use of interocclusal record medium becomes a must. The success of treatment, in general, depends on many aspects that are related to the fidelity of cast mounting on the articulator. The interocclusal registration material records the occlusal relationship between the natural and/or artificial teeth for planning occlusal rehabilitation and for construction of removable and fixed partial dentures. The goal in the success of removable and fixed partial denture is achieved when maxillomandibular centric relation is recorded accurately.

Centric relation (CR) is the horizontal relation usually utilized for occlusion analysis, diagnosis and rehabilitation treatment. Due to the fact that the CR is a determined position by the temporomandibular joint, it is fundamental that no muscular activity interferes in the mandibular position and, therefore, all neuro-protector reflexes must be avoided during registration. The utilization of interocclusal records is necessary for the mounting of casts in CR because this gives support and stability to these casts and allows relation without contact of occlusal surfaces.

Ideal Requirements of Interocclusal Bite Registration Materials:
1. Limited resistance before setting to avoid displacing the teeth of mandible during closure.
2. Rigid or resilient after setting.
3. Minimal dimension changes after setting.
4. Accurate record of the incisal and occlusal surface of teeth.
5. Easy to manipulate.
6. No adverse effects on the tissues involved in recording procedure.
7. The interocclusal record is verifiable.

**Types of Interocclusal Recording medium**

1. Plaster of Paris
2. Zinc oxide eugenol pastes.
3. Acrylic resin
4. Polyether elastomers.
5. Silicone elastomers

**THERMOPLASTIC WAXES**

The thermoplastic waxes are most commonly used for interocclusal registration or as a carrier for registration. Although wax is probably the most maligned, it is yet the most versatile and widely accepted material. This is due to its cost and clinical flexibility of waxes that it can be corrected, modified, changed and verified with comparative ease.

Wax is softened and placed against the upper arch to indent it. The mandible is guided to CR and patient closes into wax. However studies have demonstrated that wax as an interocclusal records material when compared to other materials are inaccurate, unstable, inconsistent, and susceptible to distortion on removal from mouth. As a result they can interfere with passive and active mandibular movement. Distortion more frequently seen in a vertical direction followed by anteroposterior direction.

Bite registrations are often made from 28-gauge casting wax sheets or from hard baseplate wax, but waxes identified as bite waxes seem to be formulated from beeswax or hydrocarbon.

Waxes such as paraffin or ceresin. Certain bite waxes contain aluminium or copper particles.

There are no ADA or federal specifications for bite waxes.

**TECHNIQUE**

A wax interocclusal centric relation record is made before the abutments are prepared. Then the abutments are prepared and another interocclusal record is made with a half of sheet of softened wax. The wax is molded into the shape of the dental arch and is positioned on the teeth and the patient is asked to close the jaws or, the mandible is guided into centric relation. Then patient is asked to open and close the mouth several times. The wax is cooled with water, while the teeth are held together, the patient is asked to open the mouth and the wax is cooled further. The total cooling must be at least two minutes. The wax record is removed from the mouth and is allowed to cool for on a minute under running water. The wax record is trimmed for possible interferences and is returned to the mouth. The trimming for possible interferences is done by shaving the wax with a sharp blade to prevent its distortion. The seating of record on the teeth and closure must be precise. The registration is compared with the record made prior to abutment preparation.

**PLASTER OF PARIS**

Impression plaster is based on calcined calcium sulphate hemihydrate, which reacts with water to form a hard mass of calcium sulphate dihydrate. This setting reaction is associated with an expansion of 0.3-0.6%. When this is within the confines of an impression tray it will lead to a significant
reduction in accuracy. Mixing the plaster with anti-expansion solution (containing 4% potassium sulphate and 0.4% borax) will reduce this. The potassium sulphate reduces expansion to 0.05%, but this also accelerates the setting reaction, and borax is added as a retarder, which gives more time to take the impression.

Records of impression plaster are accurate, rigid after setting, and do not distort with extended storage. Studies show that the plaster records, along with a few others showed the least 3 dimensional changes after 30 min of storage and remained dimensionally stable for more than 24 hours. However, the use of plaster is more complicated than wax or zinc oxide eugenol paste. It is difficult to handle because the material is fluid and unmanageable prior to setting. The final inter occlusal record is brittle.

TECHNIQUE

Impression plaster is applied over the top of the recording plate and the patient is asked to close in centric relation. The impression plaster on the adjacent teeth is cut away so that a rectangular contact area in plaster remains. Undercuts due to adverse tooth contours are reduced to assure removal of the plaster without chipping or cracking the record. Right angle cuts are made on buccal and lingual /palatal indices of the teeth adjacent to the copings. The interocclusal record and the buccal and lingual /palatal indices are removed and are reassembled. The dies are positioned in the record and a master cast is poured.

ZINC OXIDE EUGENOL PASTE

Zinc oxide Eugenol paste is an effective and reliable interocclusal registration material. It is simple to use, sufficiently rigid and easy to store. It offers many advantages such as:

1) Fluidity before setting – Fluidity is a critical quality of interocclusal registration material because it ensures minimal interference with mandibular closure during record making procedures.
2) Adhesion to its carrier.
3) Rigidity and inelasticity after final set.
4) Accuracy in recording occlusal and incisal surfaces of the teeth.
5) High degree of repeatability

However, it dehydrates and becomes significantly brittle so it can sticks to the teeth and important portions of the record may be lost due to breakage. Certain studies do not recommend the use of zinc oxide eugenol paste as it is extremely variable with lengthy setting time and can result in open cast relationship.

TECHNIQUE

A frame is used to carry the paste into position between the teeth. Sufficient paste is mixed to cover both sides of the gauze and to register half of the length of the abutments and at least one adjacent tooth. The frame is placed distal to the last tooth to prevent impingement upon the metal of the frame. The patient is asked to close in centric relation. The record is removed from the frame and is used for mounting the cast.

ACRYLIC RESIN

The most frequent application of acrylic resin for interocclusal records is the fabrication of single stop centric occlusion records. It is supplied in powder and liquid form.

COMPOSITION

Powder - Polymer – Polymethyl methacrylate, benzyl peroxide.
Liquid - Monomer – Methyl methacrylate
- Tertiary amine – Dimethyl Para toluidine

It is accurate and rigid after setting. It has Initial hardening time is 30 minutes.

The dimensional instability is due to continued polymerization shrinkage, rigidity of the material which can damage plaster cast and dies during mounting on the articulator.

TECHNIQUE
Apply petroleum jelly over occlusal surfaces of teeth. Measure monomer and polymer according to manufacturer’s recommendations wait until dough stage is reached. Form dough patty into a flattened shape approximately 2mm thick. Keep it over occlusal surfaces of teeth. Guide mandible to centric position and ask patient to occlude. Wait for final set according to manufacturer’s instructions. Trim the excess and recheck the record16.

POLYETHER ELASTOMERS
Polyether interocclusal registration materials are supplied as two paste systems containing plasticizer such as glycol ether or phthalate and filler such as colloidal silica.

The advantages of this material as an interocclusal record material such as accuracy, stability after polymerization and during storage, fluidity and minimal resistance to closure, can be used without carrier17.

Disadvantages are that resiliency and accuracy may exceed the accuracy of plaster casts.

Both of these factors can interfere with the placement of the plaster cast into the recording medium during mounting procedures18.

TECHNIQUE
Place the material over the occlusal surface of teeth. Guide mandible to centric and ask patient to occlude, wait for final set according to manufacturer’s instructions. Trim the excess and recheck the record19.

SILICONE ELASTOMERS
Two types of elastomers are available as interocclusal registration materials.
1. Addition silicone
2. Condensation silicone.

They are highly accurate, and were found to be dimensionally stable over a period of 48hrs. The other advantages are minimal resistance to closure and does not require a carrier.

However the disadvantages are minimum working time, resistance to compression of a set material which contributes to difficulty in the seating of plaster casts20.

TECHNIQUE
Take equal amount of base paste and catalyst paste and mix according to manufacturer’s instructions obtaining a streak free mixture. Load the syringe by maintaining a slight angle while scraping the pad. Place the material over the occlusal surface of teeth. Guide mandible to centric and ask patient to occlude, wait for final set according to manufacturer’s instructions. Trim the excess and recheck the record21.

CONCLUSION
Interocclusal records were utilized in the following situations:
1.) In the registration of centric relation, an interarch relation, (A) for diagnosis and treatment of natural teeth by means of articulated casts, and (B) in the diagnosis and treatment of edentulous or partially edentulous patients by means of occlusal
rims mounted on an articulator (Wirth, 1971).

2.) In the registration of centric occlusion. This is an important objective in the fabrication of single crowns or fixed partial dentures.

An interocclusal record is a precise recording of maxillomandibular position it should be capable of maintaining extreme accuracy even under such varying condition as storage and handling even though a record may appear to be fixed and accurate it may still undergo dimensional changes which can only be evaluated microscopically the clinical change in interocclusal record can be only evaluated by dentist or by the patient in reference to high points.

The cause of occlusal discrepancies attributable to the interocclusal record can be divided into three categories one cause is related to biologic characteristics of stomatognathic system, a second cause is attributed to iatrogenic errors and third cause is associated with the properties of interocclusal recording material.

The ideal material technique combination for making interocclusal records would allow the placement of indirectly fabricated prosthesis in patients mouth with no occlusal adjustments.

REFERENCES

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