INTEROCCLUSAL RECORDS FOR FIXED PROSTHODONTICS:
A REVIEW OF VARIOUS TECHNIQUES.

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ABSTRACT
The precise relation of maxillary and mandibular casts is an essential step in developing accurate occlusion in fixed prosthodontics. When an adequate number of opposing teeth and stable intercusption exist, direct occlusion of the casts is the most accurate method of articulation. In the absence of definitive occlusal contacts for direct relation of the casts, an interocclusal record is required. This becomes even more important when the distal tooth in the arch is also an abutment in the fixed partial denture. This article reviews various techniques for recording interocclusal relationship in fixed prosthodontic procedures.

Key words: Intercuscular records, occlusion, fixed partial denture.

INTRODUCTION
An accurate interocclusal record and correct mounting of the casts on an articulator allow the laboratory technician to create proper contours and alignment of the metal substructure of the restoration as well as the proper contour and intercuspation of the teeth in porcelain. Failure to capture an accurate interocclusal record will result in time-consuming chairside adjustments, the need for remounting casts and possible refabrication of the prosthesis.

It is most accurate to articulate casts without a record when they can be accurately related by hand into a stable centric occlusion or maximum intercuspation. However, when several teeth are prepared or missing, precluding a stable relationship between casts, a separate interocclusal record may be required.

When no signs and symptoms of trauma to the dentition are present, and a segmental restorative treatment is planned, the patient’s pretreatment maximum intercusal position (MIP) is usually maintained. When a unilateral fixed partial denture (FPD) involving terminal teeth is prepared, a stable and accurate interocclusal record is necessary. A number of techniques using several materials have been described to record the maxillomandibular relationship.

DIFFERENT RECORDING MATERIALS AND TECHNIQUES
1) Dawson’s technique
He used bilateral manipulation to guide the mandible to centric relation and used following recording techniques:

a) Wax bite record: a brittle hard wax is used for this technique. Wax is softened and placed against the upper arch to indent it. The mandible is manipulated to CR and patient closes into wax. Keep upward loading compression on the condyles as the patient closes, otherwise the patient may protrude the jaw. There should be no impingement into soft tissues.

b) Anterior stop technique: when the mandible is closed, the lower incisors strikes against a stop that is precisely fitted against the upper incisors. The stop should be thin enough so that the first point of tooth contact barely misses but under no circumstances should any posterior tooth be allowed to contact when the anterior stop is in place. A firm setting bite registration paste is injected between the posterior teeth and allowed to set.

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c) **Record for edentulous ridges:** when large edentulous areas are present a premade wax base can be adapted on a cast of the opposing arch and retention can be added for future attachment of silicone putty. Ask the patient to lightly bite into the wax to form shallow indentations. Chill the wax record to harden it and add putty silicone to it. Manipulate a verified centric relation and ask the patient to close into the indentations. The soft putty silicone will adapt to the opposing ridge.

2) **Triple tray technique**: A plastic registration frame (triple bite impression tray) is used in this method to carry the interocclusal registration material. The frame is tried in the mouth on the side with the prepared teeth. Trim away the film that covered the unprepared teeth. Apply the bite registration material evenly on to both top and bottom of the frame and insert the tray in the mouth, centering the loaded portion over the prepared tooth or teeth. Cut of any material that extends over the unprepared teeth adjacent to preparation. Remove the excess thickness of the record so that only the imprint of cusp tip should remain. The part of the record facial to the mandibular buccal cusp tips is cut off all the way through the posterior member of the frame and the facial segment of the record is discarded.

3) **The enamel island (cone) method**:
This method preserves a centric stop on an abutment as an aid when making interocclusal record.

a) **Cone preparation on a natural abutment:**
Prepare the abutment leaving a slightly tapered or a wide island (cone).

The cone is removed from the cast during fabrication of prosthesis and from the abutment during cementation.

b) **Metal reinforced cone on an endodontically treated abutment:** Fabricate a metal core with a projection opposing the fossa and cement it into the abutment. Pack composite around the projection and prepare the composite into a cone shape.
4) **Interocclusal registration technique with a vacuum-formed matrix**: On the teeth opposing the planned abutments, a 0.20-inch vacuum-formed matrix is made. Prepare the opposing teeth abutments and make the definitive impression in the material of choice. Place the matrix on the opposing dentition and ensure that it clears the opposing occlusion completely. Add autopolymerizing acrylic resin to the surface of the matrix to record a cusp of the preparation in maximum intercuspation or centric occlusion.

5) **Direct intraoral fabrication of transfer copings and interocclusal record using flowable, light-activated composite resin**:

   Lightly lubricate the prepared abutment teeth and the occlusal surface of the opposing teeth with petroleum jelly. Dispense flowable composite on the abutment tooth and light cure for 10 seconds. The thickness of the composite should not be more than 1 mm. The extension of coping to one half of the occluso-gingival length of the axial walls is sufficient to provide positive seating of the copings on the dies.

   Using the dispensing syringe, introduce flowable resin between the occlusal surface of the coping and the buccal cusps of the opposing tooth. Light cure the composite in this position for 10 seconds. Send the copings to the lab along with the final impression and the opposing cast. After pindexing, the lab technician will place the copings on the dies and mount the casts [Figure 6].

6) **Intraoral Acrylic Resin Coping Fabrication for Making Interocclusal Records**:

   Select a preformed polyethylene core former of appropriate size, to fit loosely onto an abutment tooth. Fill the polyethylene matrix (about one-third) with the resin mixture, and place it over the prepared tooth and verify that there is adequate occlusal clearance. Remove the coping and light cure it. Separate the resin coping from the polyethylene matrix.

   Lubricate occlusal surfaces of antagonistic teeth with petroleum jelly. Add small quantities of low-shrinkage autopolymerizing acrylic resin to the occlusal surface of the coping and ask the patient to close into maximum intercuspation. Keep teeth in contact until complete polymerization. After polymerization, the record is trimmed to remove flash, leaving the impression of the opposing cusp tips intact.
Tylman has termed the acrylic resin coping as “acrylic bonnet”.

7) Interocclusal records for implant patients with posterior edentulism:

Make the definitive impression of the implants. Connect castable plastic burnout abutments to the implants. The abutments should permit rotation to connect multiple implants. Adjust the height of the abutments to the available interocclusal distance. Connect the abutments together intraorally with a low-shrinkage autopolymerizing acrylic resin and create a platform to act as a carrier for the interocclusal registration material. Make index grooves on the top of the platform to orient the interocclusal registration material. Proceed with the interocclusal registration with a suitable material such as vinyl polysiloxanes [Figure 8].

DISCUSSION

Stable and accurate interocclusal records can be made in clinical situations using several techniques and materials. The most widely used technique is wax bite record as suggested by Dawson. Anterior stop method deprograms the muscles and helps to achieve correct centric relation. The triple tray technique maintains the interocclusal distance accurately, but requires a special tray for the procedure. The enamel island (cone) method, a conical vertical stop is used as a third point of reference to make a stable occlusal relationship. But if the cone is slender it may result in instability of the vertical stop when it contacts the oblique plane. The wide enamel cone can provide better stability, but may result in inaccuracy of the prepared occlusal surface, because a large volume of enamel has to be removed later.

In case of vacuum formed matrix, care must be taken to ensure that it is well adapted to the teeth and cast. The flowable composite technique is simple and accurate, but is not economical. Acrylic resin coping technique is especially helpful when widely separated abutment teeth exist, but the entire procedure is usually completed in two separate stages. During the first stage, coping formation is accomplished, and at a later stage, the recording procedure is finished. The technique described for implant patients, utilizes plastic burnout abutments for recording maxillomandibular relationship at the same appointment that the definitive impression is made.

CONCLUSION

Both direct and indirect techniques of interocclusal record formation for fixed prosthodontics have been discussed. The technique chosen by the dentist should depend on the availability of materials, experience of the operator and the clinical situation present. The enamel island (cone) method is the simplest, where no extra materials are required, but may create small percentage of error. The other methods discussed, record the intermaxillary relationship using different materials through which the final prepared cast can be articulated precisely.
REFERENCES


