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Intraoral Acrylic Resin Coping Fabrication for Making Interocclusal Records

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Abstract

A safe and accurate method for the fabrication of acrylic resin copings to be used for interocclusal registration is described. Copings are fabricated on vital prepared teeth using visible light-cured acrylic resin, and the records are then obtained with autopolymerizing acrylic resin. This allows for an interocclusal recording to be obtained at the final impression appointment.

When no signs and symptoms of trauma to the dentition are present, and a segmental restorative treatment is planned, the patient's pretreatment maximum intercuspal 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.[1]

Acrylic resin copings can provide a stable, accurate, versatile, and easily verified method of recording interarch relationships.[2,3] Autopolymerizing acrylic resins are usually used, although visible light-cured (VLC) resins have also been proposed.[4,5] The resin copings are usually constructed extraorally on master dies to have better control of polymerization shrinkage and exothermic reaction. In such cases, a second appointment is necessary for the interocclusal registration.

A technique that uses acrylic resin copings for recording the maxillomandibular relationship at the final impression appointment is described. This technique is especially applicable for patients who present with widely separated abutment teeth. The copings are safely and precisely fabricated directly on the prepared teeth. A combination of acrylic resins is used. Light-cured resin is used for the coping formation, and autopolymerizing acrylic resin is added to the occlusal surface of the coping to complete the registration.

Technique

Once the maxillary and mandibular full-arch impressions are made, proceed with coping fabrication and registration as follows:

1. From a set of core formers (Fig 1) (Kuraray, Europe GmbH, Frankfurt am Main, Germany), select a preformed polyethylene cup of appropriate size, to fit loosely onto an abutment tooth. Shorten it using scissors (Fig 2), leaving about 1 mm above the finish line. Place the matrix onto the abutment. Ask the patient to close into MIP (Fig 3) and using a waterproof pencil mark the buccal edge to verify its orientation.
2. Use a light-cured acrylic resin (Unifast LC, GC Europe NV, Leuven, Belgium) (Fig 4) to form the coping. Add powder to liquid in the mixing cup (the standard powder/liquid ratio is 1.0 g/0.5 ml) and mix quickly for 10 to 15 seconds. Fill the polyethylene matrix (about one-third) with the resin mixture, and place it over the prepared tooth. Ask the patient to close into MIP. Pulling a double piece of 200 μm articulating paper (Dr. Jean Bausch KG, D-50769, Köln, Germany) between the coping and opposing dentition, verify that there is adequate occlusal clearance. After 2 to 3 minutes, when the resin has reached a rubber-like consistency, gently remove the coping from the mouth, using a mosquito forceps. Remove flash and undercuts, and light cure the transparent resin coping form extraorally using an appropriate VLC device (470 nm wavelength) for 40 seconds from the buccal and 40 seconds from the lingual side. Place the coping back onto the abutment tooth to verify positive seating and occlusal clearance.
3. Separate the resin coping from the polyethylene matrix using an explorer (Fig 5). Trim the coping to have a wall thickness of about 1 mm. Using a waterproof pencil, mark the buccal edge of the coping to verify that it seats properly.

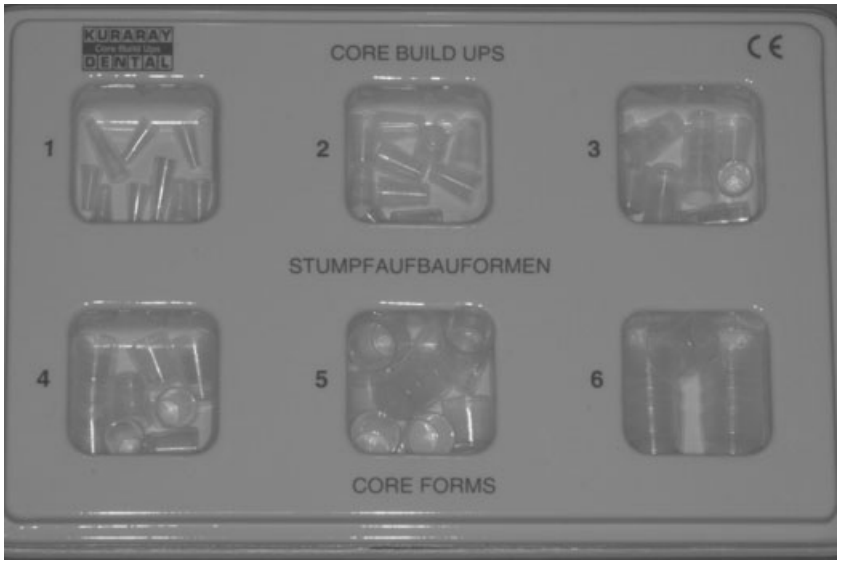

Figure 1 A polyethylene matrix is selected from the set of core buildups to be used for acrylic resin coping formation.

Place the resin coping back in the mouth. Lubricate occlusal surfaces of antagonistic teeth with petroleum jelly. Using the bead brush technique, add small quantities of low-shrinkage autopolymerizing acrylic resin (GC Pattern Resin, GC Europe NV) to the occlusal surface of the coping and ask the patient to close into maximum intercuspation (Fig 6). 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.

4. If necessary, repeat the same procedure for each abutment tooth separately. Once all acrylic resin buildups are formed (Fig 7), place all the copings onto their abutments and use 8 μm shimstock occlusion foil (Almore International, Portland, OR) to verify antagonistic contacts of unprepared teeth in maximum intercuspation. Transfer the record to the laboratory for the FPD construction.

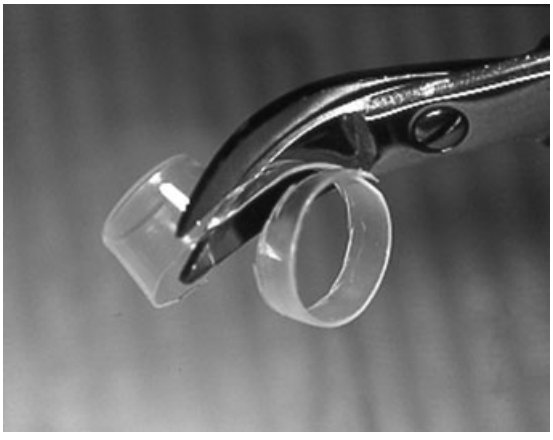

Figure 2 The matrix of appropriate size is trimmed to suit the prepared tooth.

Discussion

Accurate and stable interocclusal records can be produced using transfer acrylic resin copings. This technique is especially helpful when widely separated abutment teeth exist and individual records are obtained.[2,3] 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.

Coping fabrication

The most popular method for resin coping construction is on the master cast. The usual technique for fabrication of these copings is the addition of resin directly onto the stone die. When

Figure 3 The matrix is placed onto the abutment tooth in the maximum intercuspal position.

Figure 4 The light-cured acrylic resin used to form the coping.

copings are constructed extraorally, an extra appointment is necessary for the recording procedure. The intraoral construction of acrylic resin copings is contraindicated, especially when abutments are vital teeth. The exothermic polymerization reaction of resin-based materials, especially poly(methyl methacrylates) (PMMAs), could damage pulp vitality of freshly prepared teeth.[6,7] In the proposed technique, the direct intraoral coping construction is achieved using a light-cured polyethylmethacrylate (PEMA) resin polymerized outside the mouth to avoid any possible thermal effect on vital abutments. A soft polyethylene matrix is used to form a stable and dense coping, avoiding porosities. This matrix is available in six sizes, which cover the complete range from incisor to molar teeth. It is shaped in a 12.5° angle so the produced coping has an axial wall conver-

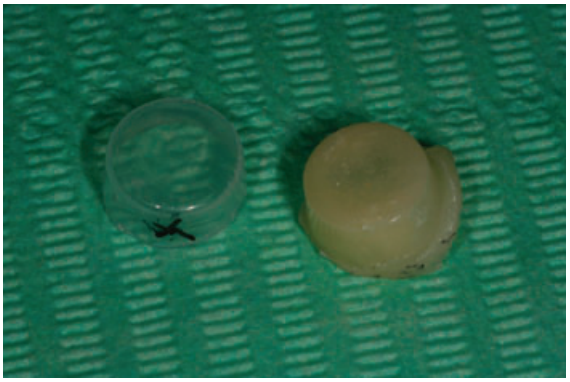

Figure 5 The coping (right) that has been formed from the polyethylene matrix (left).

Figure 6 The interocclusal record is completed using an autopolymerizing acrylic resin to contact the occlusal surface of the opposing dentition.

gence comparable to that of the prepared teeth. The resin coping is easily separated from polyethylene, because no chemical reaction exists between the two materials. The copings must be thick enough to resist fracture, so usually a thickness of 0.5 to 1.0 mm is sufficient. The standard extraoral method for coping formation is typically described.[8-10] A technique has been described for interocclusal records using intraorally prepared copings from flowable composite resin.[11] In daily practice, this is a very technique-sensitive procedure, because of the handling difficulties presented and the instability of this material.

Occlusal record making

Records made with copings are usually very short in length, so an extremely rigid and accurate recording material is needed. Among available acrylic resins, PMMA resin is the first preference. The paint-on technique was used in the proposed method to fill the space between the coping and opposing dentition. There is a chemical connection between PMMA and PEMA resins, so a strong and accurate compound is produced. The positive seating of the coping onto the abutment tooth is secured simultaneously with the exact and rigid recording of the

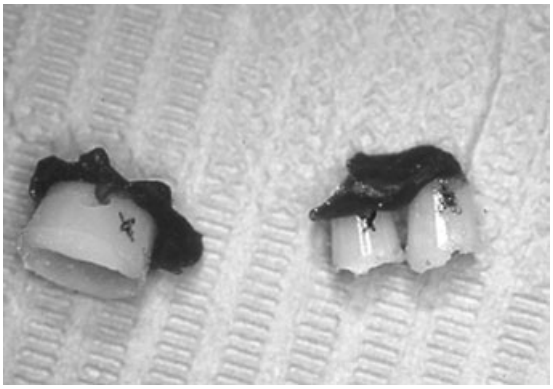

Figure 7 Completed interocclusal records of the three prepared teeth obtained as a combination of light-cured and autopolymerizing acrylic resins.

intermaxillary relationship. The copings can be repositioned either intraorally on the abutments or on the cast. Since this procedure can be done at the impression appointment, a second appointment for record making is avoided.

In the illustrated example, three teeth are prepared. Since the goal of interocclusal recording is to obtain maximum stability of both casts during articulator mounting, only two contacts with opposing dentition are theoretically necessary. These should be as far apart as possible; however, additional contacts improve the stability of the cast and allow further confirmation of the record. This has been achieved by joining individual copings together while they are seated on the prepared teeth.

Conclusion

A useful and safe method for direct fabrication of resin occlusal registration records has been described.

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