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A Simple Technique for Accurate Transfer of Secondary Copings in a Tooth-Supported Telescopic Prosthesis

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Abstract

Residual ridge resorption is a rapid, progressive, irreversible, and inevitable process of bone resorption. Long-standing teeth and implants have been shown to have maintained the bone around them without resorption. Thus, overdenture therapy has been proven to be beneficial in situations where few remaining teeth are present. In addition to the various advantages seen with tooth-supported telescopic overdentures, a few shortcomings can also be expected, including unseating of the overdenture, increased bulk of the prosthesis, secondary caries, etc. The precise transfer of the secondary telescopic copings to maintain the spatial relationship, without any micromovement, remains the most critical step in ensuring the success of the tooth-supported telescopic prosthesis. Thus, a simple and innovative technique of splinting the secondary copings was devised to prevent distortion and micromovement and maintain its spatial relationship.

Telescopic crowns or double crowns or crown and sleeve copings were used as retainers in the early 20th century. They consist of an inner primary telescopic coping cemented to the abutment and a harmonious secondary coping embedded into a removable prosthesis. The secondary coping forms a telescopic unit over the primary copings and aids in the anchorage of the remaining dentition.[1-3] Telescopic crowns are considered to be a more effective option for missing teeth in comparison to conventional fixed dental prosthesis as they are well tolerated by the patient psychologically. Various benefits have been seen with the crown and sleeve retained prosthesis over the years:[4-7]

1. Preservation of the residual alveolar ridges for a longer duration due to counteracting action of the remaining natural teeth, in comparison to conventional complete dentures.
2. Direction of vertical forces along the long axes of the teeth, favorable for the abutment teeth.
3. Maintenance of oral hygiene and periodontal health around the abutment teeth, due to the easily accessible and cleansable areas after removal of prosthesis from the mouth.
4. The splinting effect of a telescopic overdenture has a favorable stabilizing effect on the remaining dentition.
5. Can be removed and repaired in case of failure of the abutment teeth, without reconstructing the entire prosthesis.
6. Greater psychological benefit to the patient on assurance of retaining the natural teeth.

That said, one of the most common problems associated with the tooth-supported telescopic prosthesis during clinical and laboratory procedures is the unseating of the denture. This mainly occurs during the transfer of the secondary copings to the prosthesis using the direct or indirect technique. Thus, a simple technique has been devised to maintain the spatial relationship of the secondary copings to each other and in relation to the primary copings intraorally, in a tooth-supported telescopic denture.

Technique

1. Prepare the selected abutments and make impressions using heavy- and light-body elastomeric impression material (Aquasil; Dentsply, Konstanz, Germany) to receive primary copings (Fig 1).
2. Cement the primary copings to the prepared teeth (Fig 2) using a permanent cement (GC Fuji I; GC Corp., Tokyo, Japan) and make an impression using heavy- and

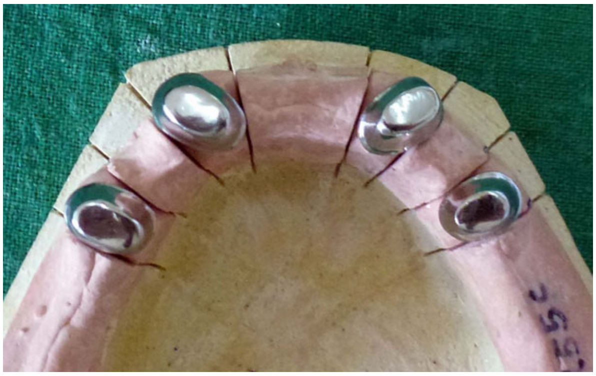

Figure 1 Primary metal copings.

Figure 2 Primary metal copings cemented over the abutments intraorally.

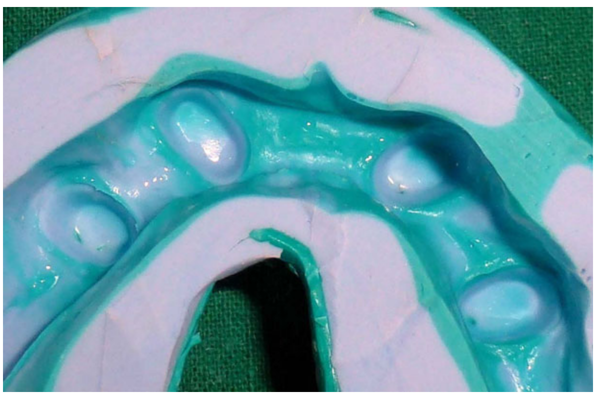

Figure 3 Impression of primary metal copings made to fabricate secondary telescopic copings.

light-body elastomeric impression material (Aquasil) for fabrication of the secondary telescopic copings (Fig 3).

3. Fabricate the secondary copings using the conventional technique and seat them over the primary copings intraorally to make a pickup impression using irreversible hydrocolloid impression material (Algitex; DPI, Mumbai, India), so that a primary cast can be recovered for making an special tray, for the final impression (Fig 4).

Figure 4 Pickup impression made of the secondary telescopic copings seated over the primary metal copings intraorally.

Figure 5 Final impression made using light-body elastomeric impression material.

4. Pour the pickup impression using Type III dental stone (Kalstone; Kalabhai Karson Pvt Ltd, Mumbai, India) and recover the cast.
5. Secure the secondary copings on the cast, fabricate a special tray, and make the final impression using light-body elastomeric impression material (Aquasil), with the secondary copings secured on the primary copings intraorally (Fig 5).
6. Pour the secondary impression using Type III dental stone (Kalstone) and recover the cast.
7. Section appropriate lengths of plastic toothpicks and secure them between the secondary copings using cyanoacrylate, maintaining a 1 mm distance from the residual ridge and box the area surrounding the secondary

Figure 6 Appropriate lengths of plastic toothpicks secured between secondary telescopic copings with modeling wax boxed around it.

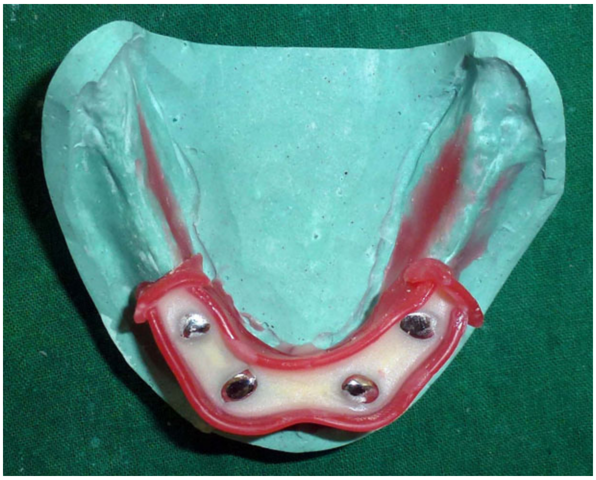

Figure 7 Self-cure acrylic resin poured into the boxed area.

copings using modeling wax (Modelling Wax No.2; Hindustan Dental Products, Hyderabad, India) (Fig 6).

8. Make a thin mix of self-cure acrylic resin (Self Cure Tooth Moulding Powder/Liquid; DPI) and pour it into the boxed area and leave it to set (Fig 7).
9. Once set, recover the splinted secondary copings from the secondary cast and check for fit intraorally (Fig 8).
10. On confirmation of passive fit intraorally, trim the inner coping resin to facilitate the accommodation of artificial teeth on the temporary record base.
11. Place the splinted copings onto the cast and adapt autopolymerizing acrylic resin (RR Cold Cure; DPI) to fabricate a temporary record base (Fig 9).
12. Fabricate occlusal rims and record maxillomandibular relation, arrange artificial teeth, and try in the trial denture accordingly.
13. Invest the trial denture and dewax it using conventional technique.

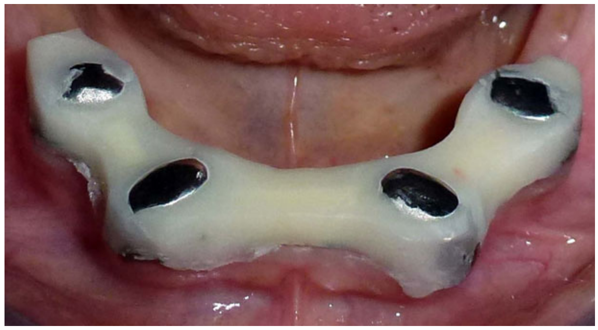

Figure 8 Splinted secondary telescopic copings tried introrally over the primary metal copings.

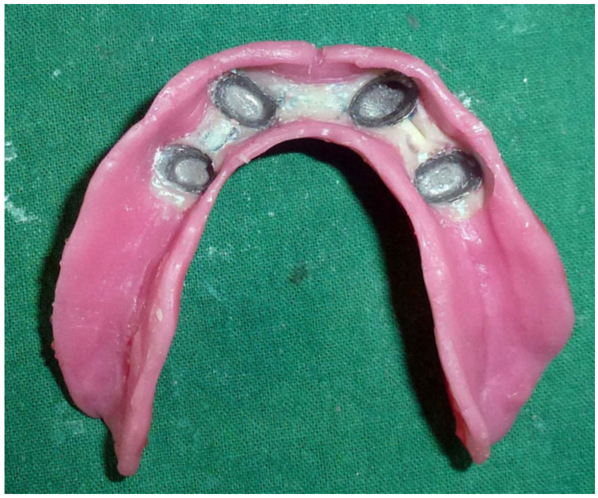

Figure 9 Temporary record base fabricated over splinted secondary telescopic copings.

14. On removal of the flask, recover the secondary copings from the record base and secure it to the cast using temporary luting cement (Zinc oxide eugenol Type I, DPI) on the inner borders of the copings to prevent micromovement during the acrylization process.
15. Pack the appropriate permanent denture base material, curing, finishing, and polishing the permanent denture accordingly.

Discussion

The accuracy of the fit of the tooth-supported telescopic prosthesis is greatly affected by the transfer of the spatial relationship of the secondary copings intraorally to the master cast. Unseating of the tooth-supported telescopic overdenture is mainly attributed to the misfit of the secondary copings. It occurs as a result of dimensional changes of the impression material and denture base material and micromovement of the secondary copings within the denture base material used for fabrication of record bases. To prevent the aforementioned problem, a reliable and accurate method will be achieved by a rigid connection between secondary copings to preserve the spatial relationship independent of denture base material used. Thus, a simple procedure involving the splinting of the secondary coping using self-cure acrylic resin was developed.

Advantages

1. Ease of fabrication and transfer intraorally.
2. Maintenance of spatial relationship of the secondary copings during the denture fabrication procedures.
3. Maintenance of passive fit of the secondary copings.
4. Reduced distortion and movement of the secondary copings during clinical and laboratory procedures of denture fabrication.
5. Good psychological benefit to patients, as they experience similar fit as would be seen in the definitive prosthesis.

Limitations

1. The technique used to fabricate the copings provided clinically acceptable results; however, electroplating and milling remain the gold standard for fabrication of copings with enhanced precision and accuracy.
2. Distortion can occur during the splinting procedure due to the polymerization shrinkage of the self-cure acrylic resin. Thus, alternative substitutes with less polymerization shrinkage can be considered.
3. Distortion may also result from dimensional changes of the impression material, as well as movement of secondary copings within the impression during the pickup. So splinting/stabilizing the secondary copings rigidly to the primary copings, by some means, before the pickup impression can be considered.
4. Increased cost compared to conventional complete dentures.
5. Laboratory procedures are complex and time consuming.

Conclusion

Splinting of the secondary copings with self-cure acrylic resin can be used as a fitting alternative for maintenance of the spatial relationship and prevention of micromovement in tooth-supported telescopic overdenture fabrication; however, alternative strategies using different materials and techniques of splinting can be explored and discovered accordingly.

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