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DENTAL TECHNIQUE

A digital technique for splinting periodontally compromised mobile teeth in the mandibular anterior region

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ABSTRACT

A digital technique for fabricating a periodontal splint is presented. The lingual surface of periodontally compromised mandibular anterior teeth is captured and registered to form the emergence profile of the periodontal splint. An accurate periodontal splint is fabricated for mandibular anterior teeth with increased mobility after scaling and root planing. (J Prosthet Dent 2020;■:■-■)

Periodontitis results in the destruction of alveolar bone, which is associated with increased tooth mobility.[1] In patients with severe horizontal bone loss and persistent tooth mobility, speech and mastication can be still affected after eliminating the inflammation by scaling and root planing,[2] especially in the mandibular anterior region.[3]

Splinting of affected teeth to relatively healthy adjacent teeth has been used to overcome these problems and can improve comfort and provide better control of occlusion.[4] Splinting teeth allows the distribution of forces from mobile teeth to their immobile neighbors, thereby gaining support from stronger teeth, prolonging the life expectancy of the mobile teeth, providing stability for the periodontium to reattach, and improving comfort, function, and esthetics.[3] Moreover, splinting may avoid tooth extraction and complex and costly prosthodontic treatment.[4]

As bone loss from severe periodontitis can rarely be restored, the splint should be long lasting, stable, effective, biologically safe, and easily designed, fabricated, and applied. In addition, it should not adversely affect esthetics, plaque control, and periodontal health. This article describes a digitally guided technique for fabricating a periodontal splint based on computer-aided design and computer-aided manufacturing from titanium alloy materials.

TECHNIQUE

The technique is described for a patient with advanced periodontitis and a chief complaint of mobile mandibular anterior teeth (Fig. 1). His mandibular incisors had severe bone loss with 2- to 3-degree mobility.[5] Re-evaluation 8 weeks after initial periodontal therapy reported absence of infection, but no change in mobility (Fig. 2). A digital technique for splinting his mobile mandibular anterior teeth was used.

1. Scan the mandibular dentition (TRIOS; 3Shape) and save the digital scans as a standard tessellation language file named File A (Fig. 3A).
2. Import File A into a digital dental software program (exoCAD; exocad GmbH). Use the partial framework module, which has the function of autorelief for optimal fit, to block the undercuts between the adjacent teeth and to design the virtual periodontal

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Figure 1. Mandibular anterior teeth before periodontal initial therapy. A, Intraoral photograph. B, Periapical radiographs.

Figure 2. Mandibular anterior teeth after periodontal initial therapy. A, Labial view. B, Lingual view.

splint as File B. Extend the splint to the canine teeth bilaterally. Do not extend the margins beyond the incisal edge and cingulum. The thickness of the splint ranges from 1.2 to 1.5 mm. Design an X-shaped groove on the tooth side to increase the surface area (Fig. 3B).

3. Import File B into a selective laser sintering 3D printer (Titanium Ti 200; Profeta). Fabricate the periodontal splint from titanium alloy (Ti6Al4V Gd23; Falcontech).
4. Finish and polish the lingual surface with rubber wheels (EVEFLEX; EVE Ernst Vetter GmbH) (Fig. 3C) and airborne-particle abrade the intaglio surface of the splint (Fig. 3D). Cement the splint to the lingual surface of the mandibular anterior teeth with an adhesive luting agent (Superbond C&B; Sun Medical) (Fig. 4).
5. Recall the patient monthly for 3 months and then every 3 months to examine the splint, reinforce oral hygiene instruction, and provide prophylaxis.

DISCUSSION

The digitally guided technique provides a clinical strategy for splinting periodontally compromised mobile teeth in the mandibular anterior region, which effectively maintains tooth stability and promotes bone repair.[6] After 6 months, this patient had good oral hygiene with no further gingival recession (Fig. 5A, 5B). The periapical radiograph showed defined lamina dura at the crest of the bone around the incisors (Fig. 5C).

Conventional splints have limitations, including fracture of composite resin restorative materials, accumulation of plaque around fiber-reinforced composite resin and ligature wires, or the need for complex prosthodontic treatment with telescopic crowns and fixed partial dentures.[7] The described splint with a polished titanium alloy surface facilitated plaque control and had good adaptation to the curve of the dental arch and lingual profile of the teeth.

The clinical workflow is straightforward, convenient, and accurate. However, the long-term stability and the

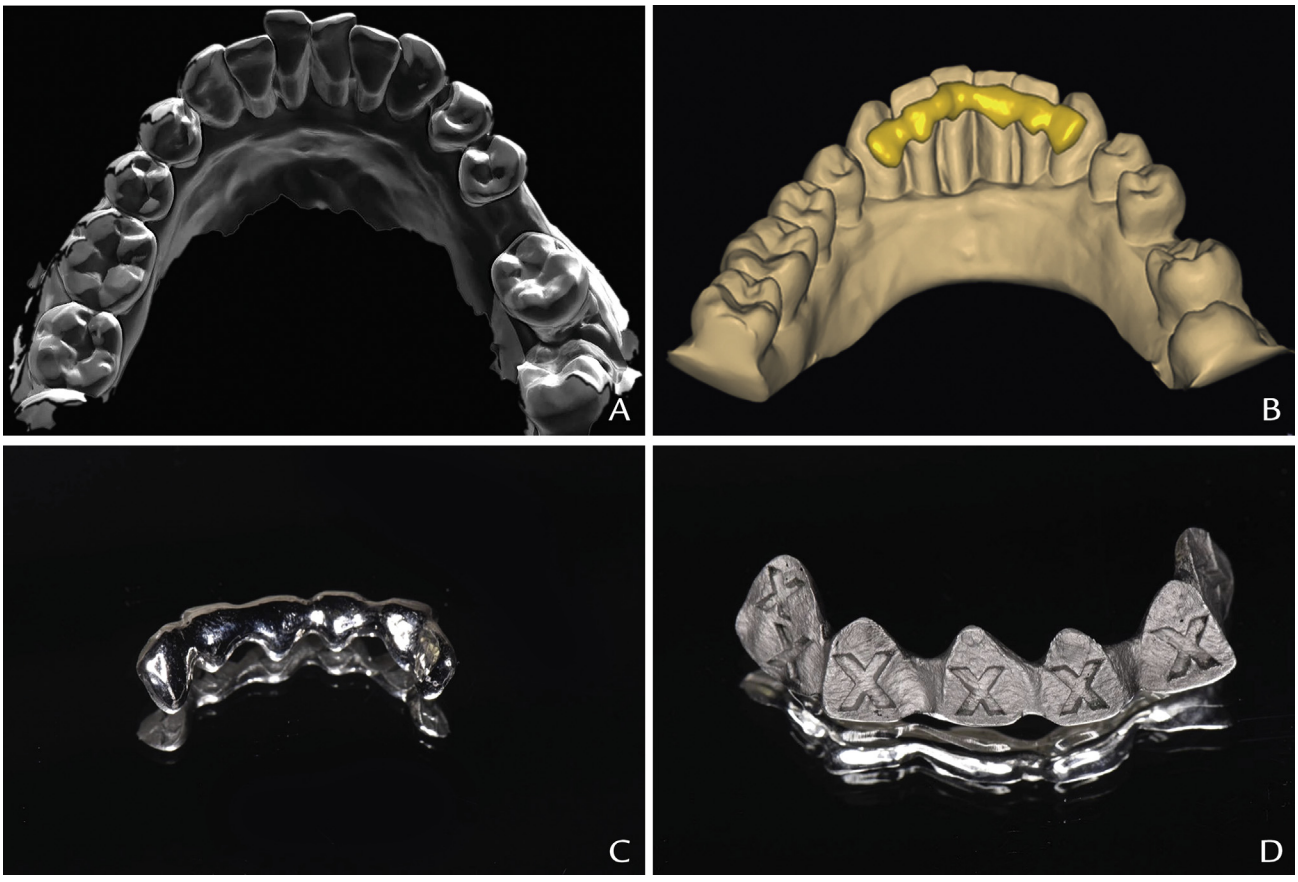

Figure 3. CAD-CAM splint. A, Digital cast. B, Designed virtual splint on digital cast. C, Fabricated splint (lingual view). D, Fabricated splint (intaglio view). CAD-CAM, computer-aided design and computer-aided manufacturing.

Figure 4. Clinical cementing process under dental dam isolation. A, Etch lingual surface. B, Wash and dry. C, Cement splint.

Figure 5. Cemented splint after 6 months. A, Labial view. B, Lingual view. C, Periapical radiographs.

effectiveness of this technique should be evaluated with controlled studies.

SUMMARY

This article describes a digitally guided technique that allows clinicians to design and make a stable splint for periodontally compromised mobile teeth in the mandibular anterior region.

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