

CAD-CAM Fabrication Technique of 4 Locator® Abutments to Correct Severely Misaligned Implants in the Case of 4-Implant Maxillary Overdenture.



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Figure 1a,b. a) Before, b) After.

Background and Purpose

Implant overdenture treatment has become a popular treatment modality with considerable patient's acceptance and has good impact on patient's quality of life.¹ It has been proposed that maxillary overdentures without palatal coverage be supported by at least 4 implants, evenly distributed around the arch, and connected by either stud attachments or a bar.^{2,3}

When individual implants and retentive mechanisms will be used, placing the implants so they are parallel to each other or have their long axes nearly aligned with each other facilitates the prosthodontic phase of treatment by allowing the use of standardized components. This is not easily achievable when 4 implants are placed as far apart as possible in the maxillary arch: 2 implants in the premaxilla and 1 implant in each posterior area. This will create parallelism problem and becomes one of the most difficult problems to overcome in the fabrication of maxillary implant-overdenture.⁴ The implant misalignment is the result of unfavorable anatomy, lack of a well designed and stable surgical guide, and poor communication within the dental treatment team.⁵

Malalignment of individual implants with abutments can make prosthesis placement more difficult and the plastic retentive element are pinched more often during placement and removal, producing excessive wear and earlier loss of retention. A common complication (30% of the prostheses) is the need for activation or replacement of the mechanical retention.⁶

CAD-CAM LOCATOR® ABUTMENTS CLINICAL TECHNIQUE REPORT

4 implants were placed on the maxillary arch in a severely tilted position rendering the Locator abutments position in an inappropriate labial inclination interfering with labial flange of the overdenture. To solve this problem, we have fabricated 4 custom-made CAD-CAM 2-pieces Locator® abutments by TruAbutment® Inc. (www.truabutment.com).

- Once the implants are integrated, the overdenture is lab relined over the healing abutments. Then the complete denture is well adapted over the soft tissue using the pressure indicating paste procedure. It is important to apply all basic principles of removable complete denture fabrication, such as adequate fit and esthetics and balanced occlusal scheme. This will minimize the wear of the Locator plastic retention snaps. (Fig. 2)

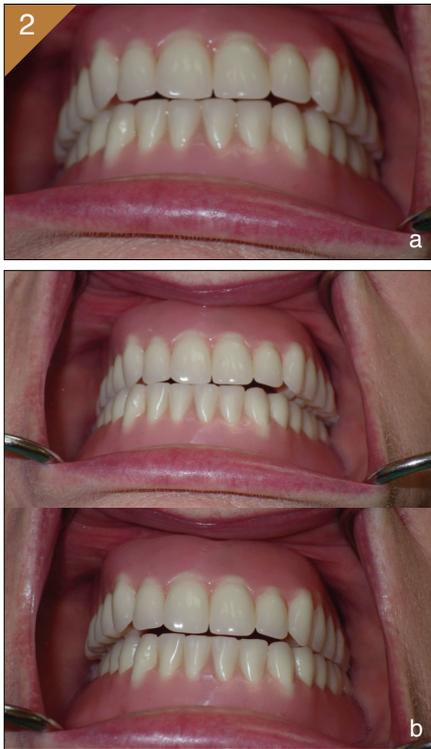


Figure 2. a) Removable complete dentures showing tight centric contacts. b) Balanced occlusion scheme.

- Then healing abutments are removed and closed-tray impression copings are selected and placed over implants. A polyvinyl siloxane (PVS) impression and final cast (Fig. 3) are made and sent with a lab prescription to a CAD-CAM TruAbutment® center (www.truabutment.com) (Fig. 4). In some cases, it is beneficial to send the final cast to the center with a duplicate maxillary complete denture. This duplicate denture, made with clear auto-polymerizing acrylic resin in a Lang® duplicator⁷, will help the CAD-CAM center to design the final abutments.



Figure 3. The master cast with the closed-tray impression copings is showing severely 4 mis-aligned and misplaced osseointegrated implants.

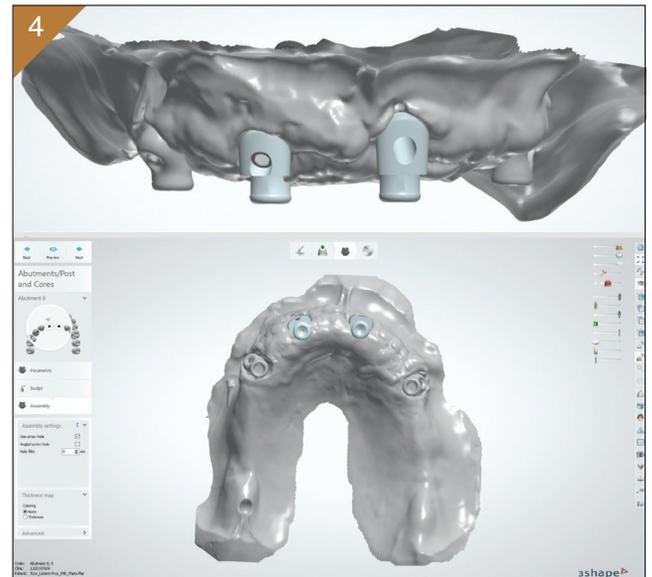


Figure 4. CAD-CAM custom made Locator angled abutments design verification before their milling process. (Courtesy of TruAbutment Corp)

- The abutment design is sent by email to be approved before the milling process. (Fig. 4) Then finished.



- The custom-made CAD-CAM Locator® abutments (Fig. 5) are placed over the implants.



Figure 5. An Example of CAD-CAM Custom-made 2-piece Locator® abutments.

- Block out each gingival surface of each Locator® abutment with low viscosity composite resin (Opal-Dam, Ultradent™ products Inc.) after placing the white nylon ring. (Fig. 6)

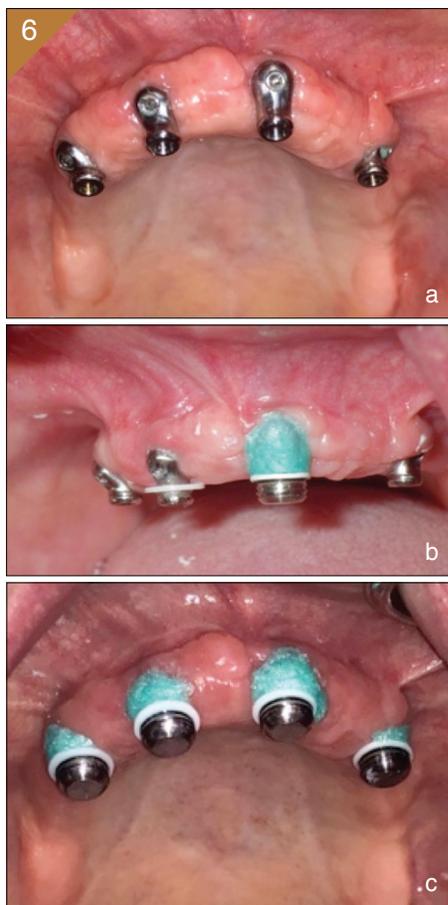


Figure 6a-c. a) The custom Locator® abutments over the implants. Please note the parallelism of the abutment retentive top portions. b) Light cured resin barriers OpalDam (Ultradent™ products Inc.) used as block-out material, is placed all over the gingival surface of the 2-piece abutments, one at a time. Then the intaglio surface of the denture is relieved at that location. c) Relieve the denture one at a time before the pick-up procedure with pink or tooth-colored auto-polymerizing acrylic resin.

- Place one Locator® metal housing over the implant and relieve the overdenture at this location until no contact is present between the denture intaglio surface and the metal housing. (Fig. 7)

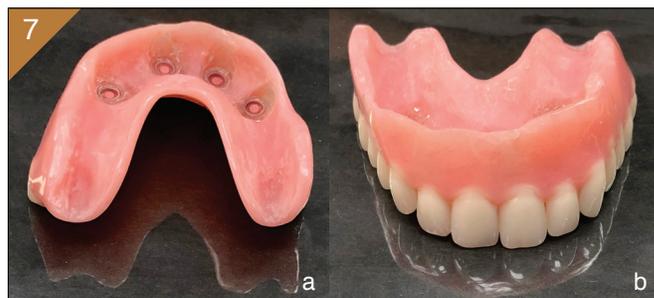


Figure 7a,b. a) Intaglio surface of the overdenture showing the Locator® metal housings with the pink retentive clips. b) Facial view of the maxillary overdenture.

- Verify this by using a light bodied PVS into the recess. Relieve any acrylic show-thru that are present before placing the next metal housing. It is advisable to place one housing at a time for ease of fabrication. Then pick-up each metal housing one at a time with your favorite auto-polymerizing acrylic resin. This will prevent the overdenture locking over the implant abutments.
- Remove the excess acrylic resin each time you pick up the Locator® metal housing. Keep the black plastic in the housing after each pick up. Sometimes it is helpful to remove the black plastic inserts with no replacements to pick up the next housings.
- Remove the black plastic inserts after all the Locator® housings are picked up by the overdenture and replace them with your favorite retentive clip. (Fig. 7) Use the least retentive clips such as the blue-colored inserts at first and check the overall retention of the overdenture and check if patient can remove the prosthesis. (Fig. 8)



Figure 8. Final smile.

The experience of the author is to select the pink Locator® snap for male patients and the blue one for the female patient. The retention of the Locator® snap is as shown below - blue 1.5lbs, pink 3lbs, clear 5lbs. In some cases when the dual retention of the snaps is used and the patient has hard time in removing the overdenture, extended range snaps are used instead. (Fig 9)



Figure 9. The dual retention Locator snaps v/s the extended range single retention Locator snaps. (courtesy of www.zestanchors.com/products/products-locator)

Summary

The objective of this case report was to present a simple, cost-effective technique to achieve enhanced retention and stability of the maxillary overdenture prosthesis on 4 severely non-parallel implants utilizing CAD-CAM fabricated angled Locator® Abutments (www.truabutment.com). This case report illustrates the custom-made angled Locator® abutments to accommodate non-parallel implants in the case of 4-implant maxillary complete overdentures.

This procedure minimizes laboratory expense and is a viable alternative to more costly CAD-CAM fabricated bars.

Conflict of interest:

The author declares no conflict of interests relating to this article.

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