

How to achieve precision in the manufacturing of a customized zirconium implant abutment when using a digital workflow

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IN MY PREVIOUS COLUMN, I HAVE DESCRIBED

the adhesive cementation protocol that should be used to bond customized Ti-based zirconia implant abutments in implant-supported restorations. In response, I received several messages from colleagues asking me about the positioning of the abutment finish line in relation to the gingival

contour, as well as the seating of the subgingival or transmucosal portion, which produced some compression on soft peri-implant tissues. In addition to these questions, there were uncertainties about the manufacturing of such customized abutments when using a digital workflow. Well, in this issue, we will discuss a technique that I have developed to avoid the need to adjust any type of abutment to peri-implant tissues at the time of placement, considering both the transmucosal area and the position of the finish line. This technique, which I named Prep-Scan (Fig. 1), consists of the preparation of a provisional crown, fabricated on the day of implant placement, as if it were a natural tooth, and the fabrication of an abutment based on it, which will receive the total crown and, later, be used for the scanning of this temporary component. Scanning should be conducted out of the patient's mouth with the provisional crown screwed to an

implant analog¹. Let us divide the provisional crown into two zones: 1 - clinical crown and 2 - transmucosal area (Fig. 2). If we reduce the dimensions of the clinical crown using a metal-free preparation, we will obtain the design of an abutment, as if it were a natural tooth. Moreover, we may limit the positioning of the abutment margin in relation to the gingival contour, so that its entire perimeter lies slightly under the gingiva. The transmucosal area should already have the ideal dimensions, and its design should not be changed, as it is what defined the format of the prosthetic emergence profile in the peri-implant tissue (Fig. 3-5). This will ensure that, when we remove the provisional crown from the patient's mouth, we have an ideal design for the fabrication of the future final abutment, which will be perfectly adjusted to the transmucosal area. In addition, the finish line will be positioned in an ideal relation to the gingival contour (Fig. 6-7).

Figure 1: Concept of Prep-Scan technique. Preparation of a provisional crown after scanning.

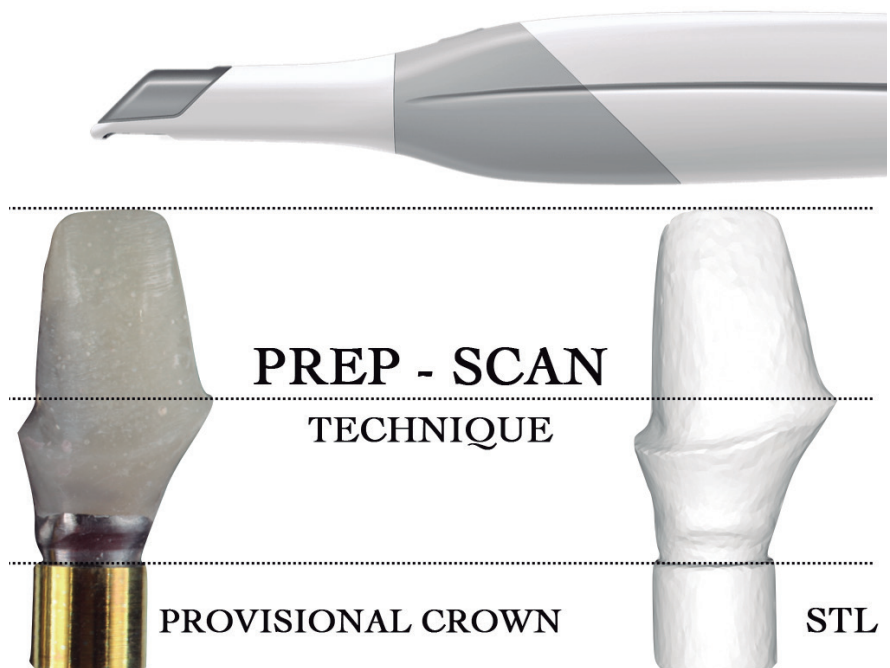
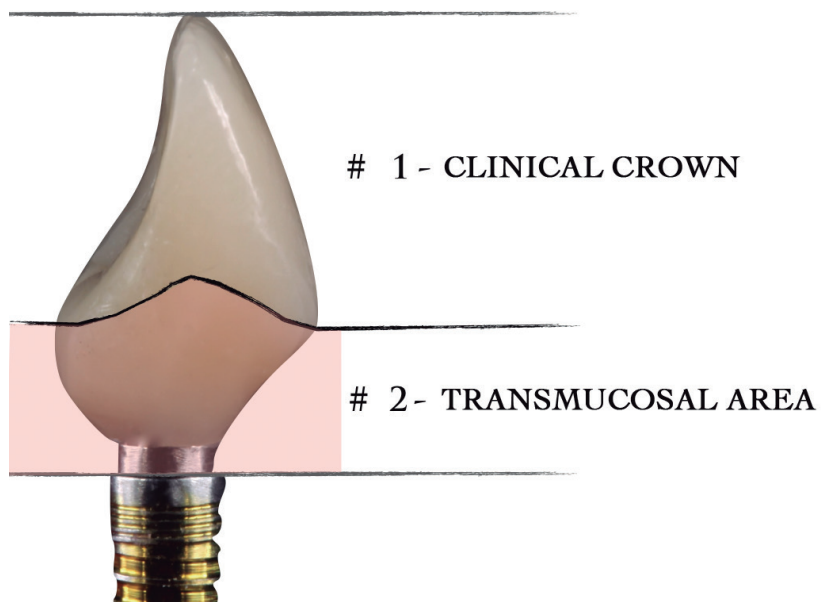


Figure 2: Two areas of provisional crown.



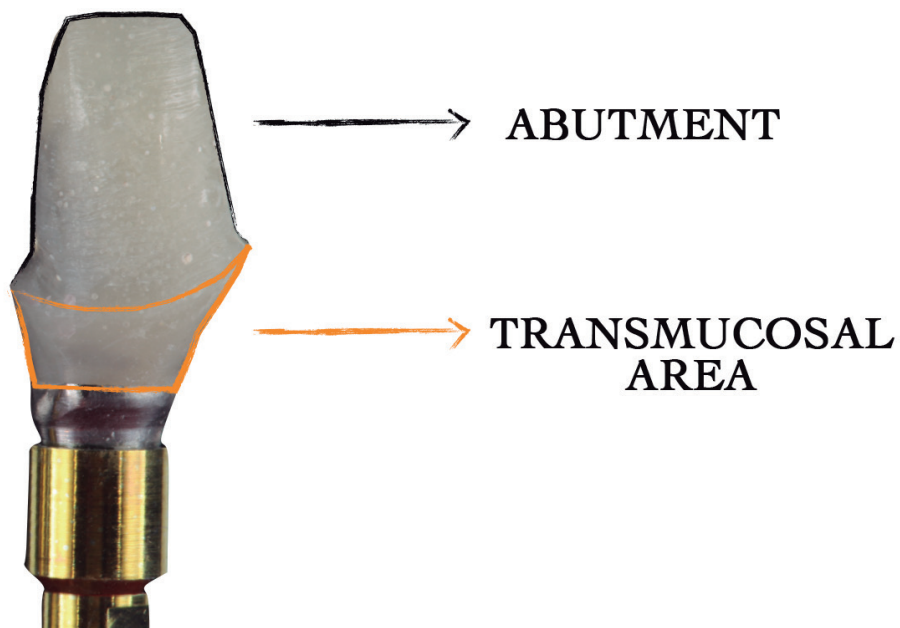
**PROVISIONAL
CROWN****PREPARE****ABUTMENT**

Figure 3: Preparation of clinical crown to fabricate abutment to receive metal-free crown.

TRANSMUCOSAL AREA

Figure 4: Transmucosal area; these dimensions should be equal to those of definitive abutment.

Figure 5: Image of previous provisional crown turned into provisional abutment.



Figures 6 and 7: Removal of provisional abutment. Transmucosal area follows design of prosthetic emergence profile as well as gingival contour perimeter.

The scans of the provisional crown, which has already been prepared and has the shape of an ideal abutment, are used to generate a stereolithographic (STL) file (Fig. 8), which is then imported into a computer aided design (CAD) system and, later, sent to a computer aided manufacturing (CAM) unit, where it is machined and then sintered to finish the manufacturing of the customized zirconia abutment (Fig. 9-10).

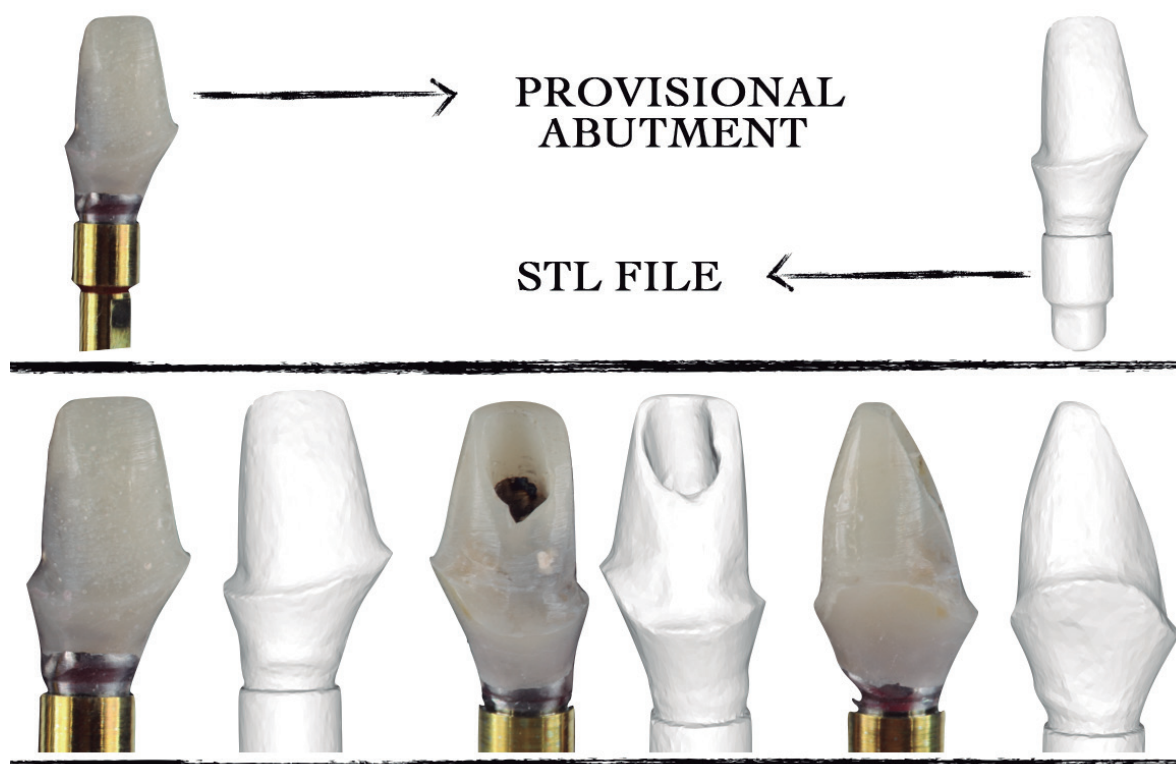
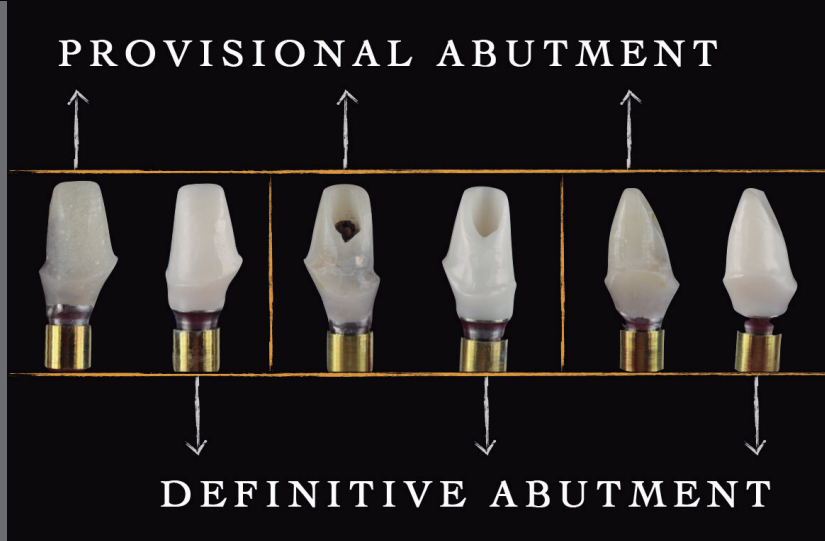


Figure 8: Comparison of provisional abutment and digital STL file.



Figures 9 and 10: Zirconia abutment fixed to Ti base, and comparison of provisional and definitive abutments. Dimensions are accurately reproduced.

Two specific points are important in this workflow. The first is the fact that we should fabricate a small silicone guide before the preparation of the provisional crown, so that the crown can be pressed over the prepared abutment. This crown may be a reproduction of the restoration before preparation, or of an analogue or digital diagnostic waxing. The other point is that the diameter of the Ti-base seating collar should not be greater than the diameter of the base of the provisional component used for the manufacture of the provisional crown on the day of the surgery. Failing to ensure that would result in compression of the soft tissue in the peri-implant perimeter (Fig. 11). For the largest possible amount of digital data, we should scan the prepared abutment after positioning (Fig. 12), the emergence profile immediately after the removal of the prepared abutment and, finally, the scan body after positioning (Fig. 13-14). Using this workflow, we are able to obtain extremely precise customized abutments (Fig. 15-16) and thus avoid any unexpected event at the time of placement. See you next time!

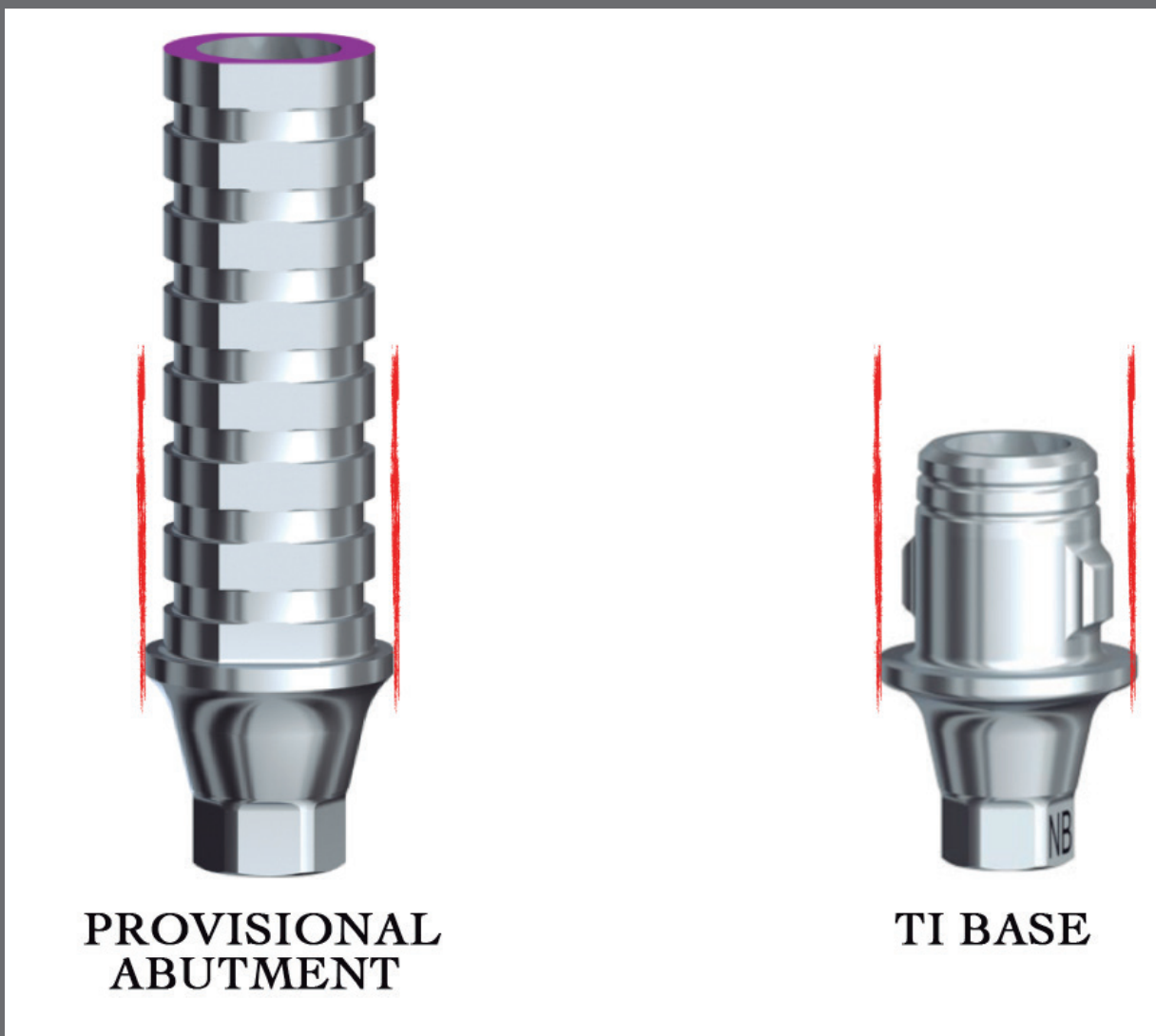


Figure 11: Diameter and height of provisional abutment collar should be equal to those of Ti base.

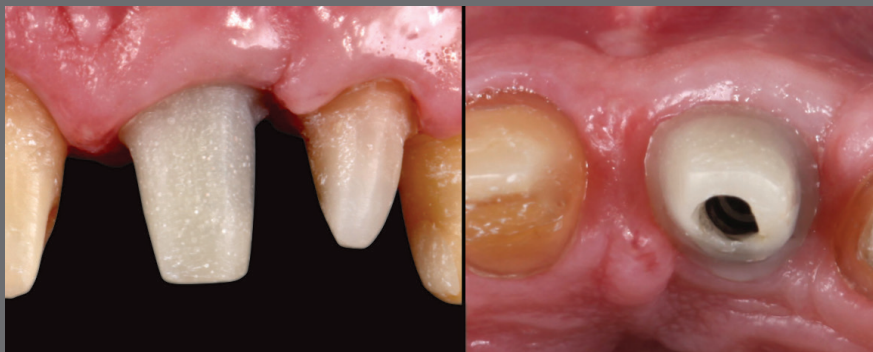


Figure 12: Scanning abutment after positioning.



Figures 13 and 14: Scanning emergence profile and then scan body.

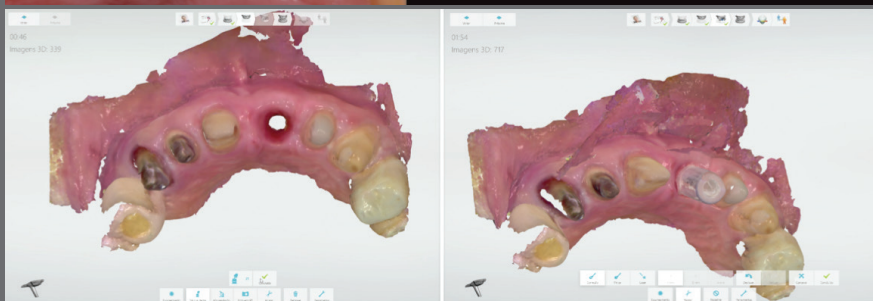


Figure 15: Accurate reproduction of provisional abutment.





Figure 16: Successful seating of definitive abutment, in both impression and patient's mouth.

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