Use of Implant Custom Abutments in Navigating Screw-Retained Restoration Complications : A Case Series

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Introduction

Pre-fabricated titanium abutments serve to retain and support implant restorations, and occasionally, mechanical complications of these abutments can occur (e.g. abutment fracture, and restoration decementation). Such complications can be mitigated through the use of custom implant abutments.

Purpose

The aim of this report is to showcase several occurrences of abutment-related mechanical complications, and the processes to manage them through designing and fabricating custom abutments.

Case 1

A patient presents with a fractured implant crown #19, showing a cross-section fracture through the pre-fabricated abutment directly above the screw head.

A physical wax-up pattern was designed for definitive crown and submucosal contours, and a cut-back of the wax-up was used to fabricate the custom abutment through copy-milling, ensuring control over the abutment design and adequate restorative space for zirconia.

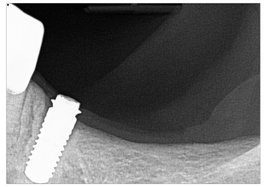

Fig. 1A

(A) (B) (C)

Fig. 1B

Fig. 1A - Radiograph of fractured pre-fabricated abutment at presentation.

Fig. 1B - (A): cut-back of the wax-up pattern. (B): copy-milled custom abutment. (C) definitive zirconia implant crown cemented to custom abutment

Case 2

A patient presents with a splinted #12i-13i implant supported restoration and a newly placed #14 implant. A cross-section fracture of #12i abutment occurred. A three-unit splinted implant restoration #12i-13i-14i was planned to minimize non-axial mechanical forces.

Fig. 2A

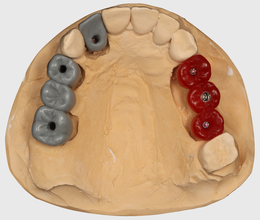

Fig. 2B

Fig. 2A - Original restoration with fractured abutment #12i.

Fig. 2B - Pattern resin replica of the splinted provisional restoration.

A splinted custom titanium abutment was designed to support a zirconia superstructure for maximum restorative strength.

A pattern resin replica of the provisional was fabricated, then prepared for abutment design and digitally superimposed on a scan of the provisional restoration. The superimposition enabled cross-sectional evaluation of available zirconia space before copy-mill fabrication.

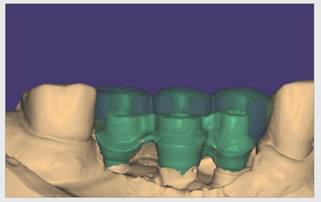

Fig. 2C

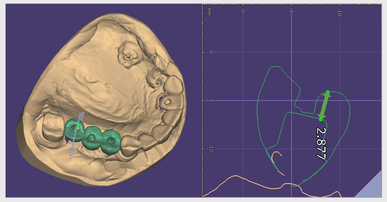

Fig. 2D

Fig. 2C - Superimposed provisional on prepared GC splinted abutment replica.

Fig. 2D - Cross-section measurement of superimposition for adequate zirconia thickness.

Case 3

An implant-supported fixed partial denture #18i-19p-20i was completely de-cemented from supporting titanium abutments.

Restorative space is limited, and height of the abutments was 3 & 3.75 mm respectively. Custom abutments were utilized to maximize parallelism, height, and surface area improving retention. The prosthesis is re-approximated, scanned, and custom abutments were designed subtractively through CAD from original restorative contours.

Fig. 3A

Fig. 3B

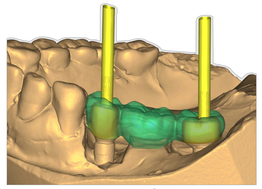

Fig. 3C

Fig. 3A - Decemented restoration with intact abutments.

Fig. 3B - Restoration re-approximated on a verified cast.

Fig. 3C - Digital design of custom abutments with original restorative contours superimposed.

Discussion & Conclusion

- In all cases reported, the custom abutments were fabricated through original equipment manufacturer (OEM) milling. With the main advantage being screw compatibility.
- Pre-fabricated titanium abutments with pre-determined dimensions can pose mechanical limitations in certain cases.
- Custom implant abutments can be designed to optimize height, thickness, and surface area. Which in turn increases the strength and retention.