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All-ceramic one-piece telescopic abutments for implant-supported overdentures

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Introduction

Removable implant-supported prosthesis should combine easy handling and hygiene, suitable fixation and aesthetic rehabilitation. Especially for elder and manually handicapped patients removable dentures are state of the art. There are different options of anchorage to attach removable overdentures to implants. Telescopic systems are established in conventional prosthetics for a long time. Alternatively to bars or balls telescopic retainers have advantages in implant dentistry concerning retention, maintenance, hygienic aspects, and in divergent implant angulations. [1] Furthermore telescopic retainers enable an uncomplicated integration of implants and natural abutment teeth to support a removable prosthesis. [2] The use of all ceramic abutments offers various advantages like good biocompatibility to peri-implant tissues and low plaque accumulation. Furthermore aesthetic outcome of ceramic abutments is often more attractive to many patients. [3] Conventional telescopic abutments consist of two pieces from metal and ceramic often luted with a resulting gap. Contemporary computer-aided design/computer-assisted manufacturing-technologies allow milling of one-piece abutments from ZrO2 which can be torqued directly to the implant.

Objectives

The aim of this report was to present the application of all-ceramic CAD/CAM milled zirconia one-piece implant telescopic abutments in complex clinical situations. Furthermore options for the integration of natural abutment teeth were demonstrated.

Clinical Report 1

The patient was edentulous in the maxillary. In the mandible was an unilateral shorten arch on the right side, tooth 35 needed a crown (Fig. 1-3). By the use of a diagnostic wax-up ("backward planning") a DVT was ordered to plan the indicated implants (Fig. 4-5). Six implants were inserted computer navigated on bone level in the upper jaw, in the lower jaw three implants completed the unilateral shorten arch (SLActive, Ø 4,1 mm, Straumann, Basel, CH; Fig. 6-8).

Fig. 1

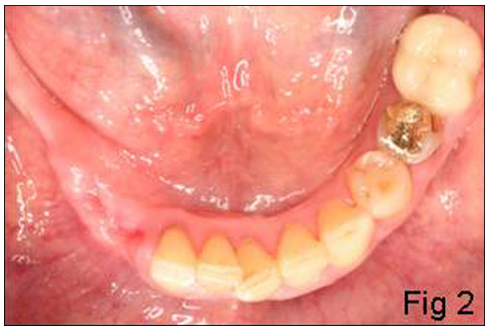


Fig. 2

Fig. 3

Fig. 4

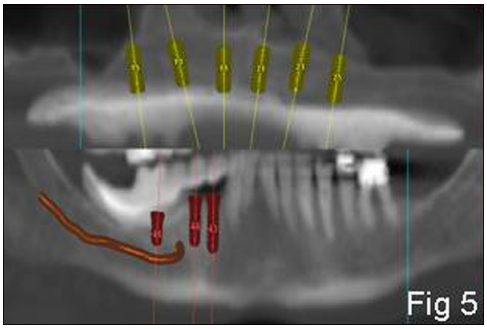


Fig. 5

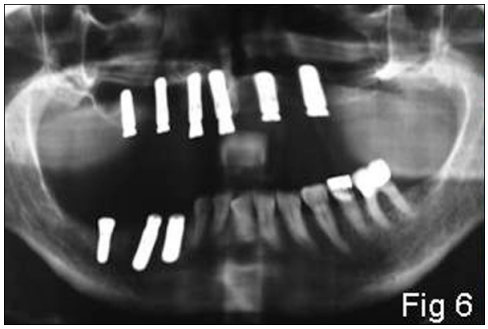


Fig. 6

Fig. 7

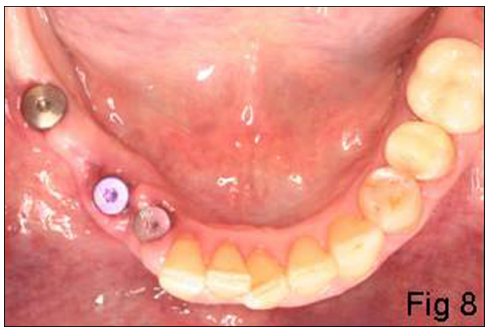


Fig. 8

After preparation of 35 and open tray impression with a polyether (Impregum Penta soft, 3M Espe, Seefeld, D) horizontal and vertical maxillomandibular records were made and controlled by the wax-up. The one-piece abutments and frameworks were waxed-up, scanned and milled in zirconia by a special CAD/CAM system (Straumann CAD/CAM, Basel, CH, Fig. 9-12). Highly precise electroplated gold mesostructures were luted intraoral (Degufill KE Gold, DeguDent, Hanau, D) with the cobalt-chromium-molybdenum framework to achieve passive fit (Fig. 13-16). The abutments were tightened to 35 Ncm, srew access openings were closed with a light curing composite (Tetric Evo Ceram; Ivoclar Vivadent, Schaan, LI). The fixed partial denture and the crown were cemented with a glass ionomer cement (Ketac cem, 3M Espe, Seefeld, D; Fig. 17-18). One year follow-up show acceptable results (Fig. 19-23).

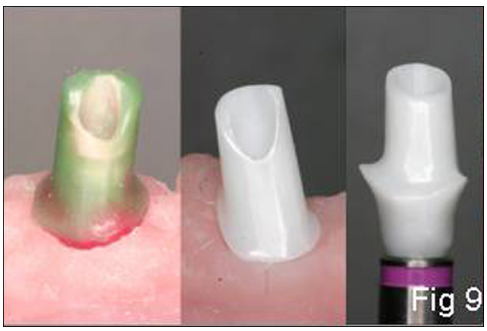


Fig. 9

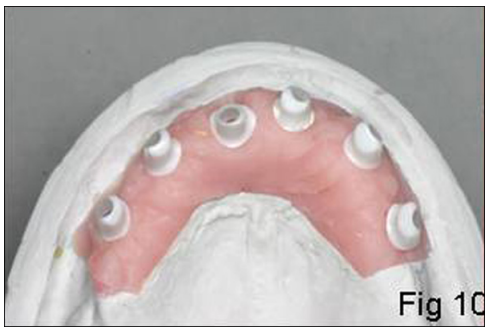


Fig. 10

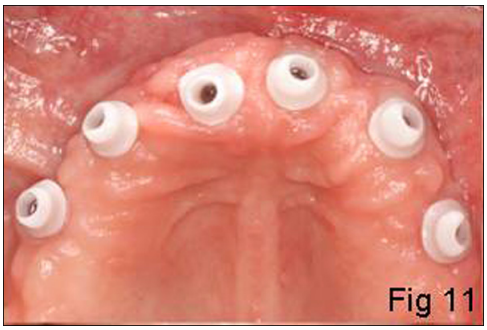


Fig. 11

Fig. 12

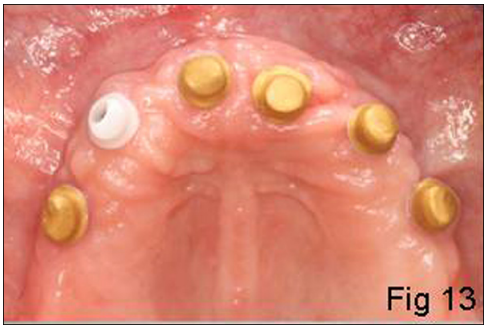


Fig. 13

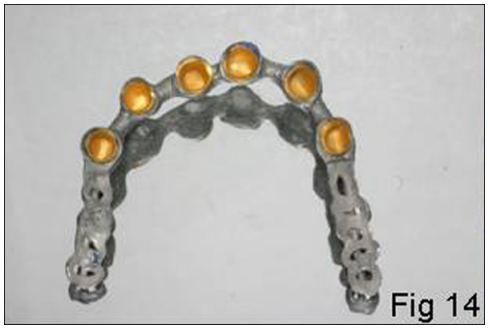


Fig. 14

Fig. 15

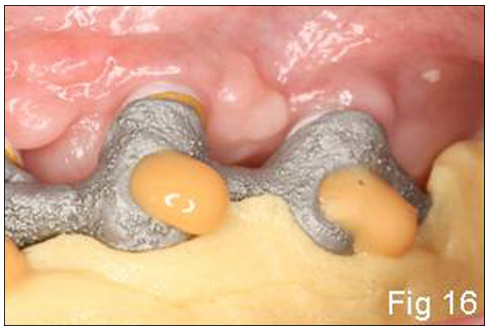


Fig. 16

Fig. 17

Fig. 18

Fig. 19

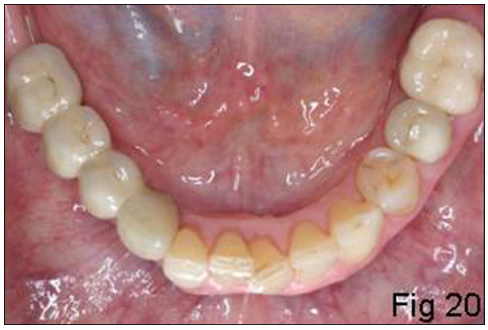


Fig. 20

Fig. 21

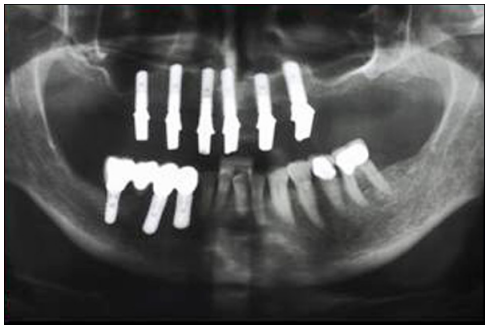


Fig. 22

Fig. 23

Clinical Report 2

The patient was edentulous in the maxillary. In the mandible 3 teeth remained (Fig. 24-26). By the use of a diagnostic wax-up ("backward planning", Fig. 27-28) four implants were inserted on bone level in the maxillary, additionally one implant in the mandible should function as strategic anchor (SLActive, Ø 3,3 mm, Straumann, Basel, CH; Fig. 29-30).

Fig. 24

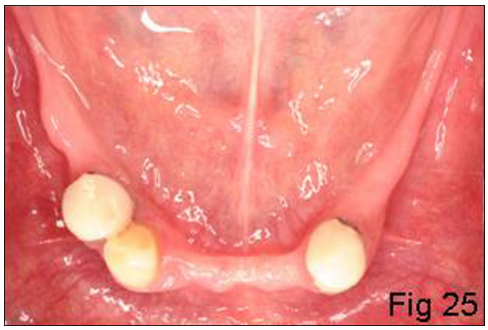


Fig. 25

Fig. 26

Fig. 27

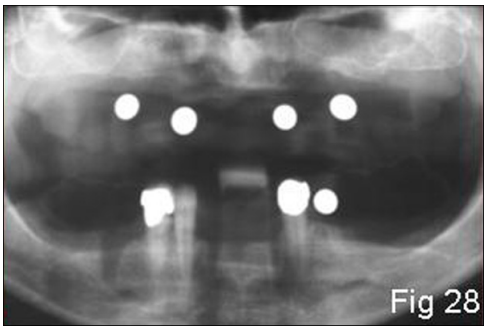


Fig. 28

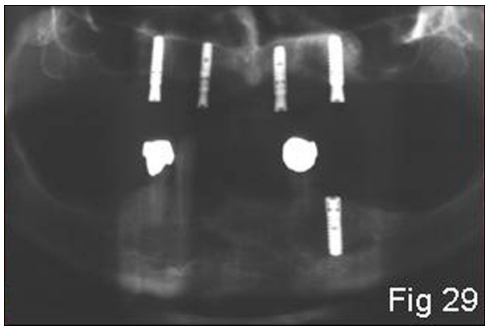


Fig. 29

Fig. 30a

Fig. 30b

After preparation of 33, 43, 44 and open tray impression with a polyether (Impregum Penta soft, 3M Espe, Seefeld, D) horizontal and vertical maxillomandibular records were made and controlled by the wax-up. The one-piece abutments and primary copings were waxed-up, scanned and milled in zirconia by a special CAD/CAM system (Straumann CAD/CAM, Basel, CH, Fig. 31-34). The following steps correspond to the procedure in report 1 (Fig. 35-38). The primary copings were cemented with a glass ionomer cement (Ketac cem, 3M Espe, Seefeld, D). One year follow-up show acceptable results (Fig. 31-37).

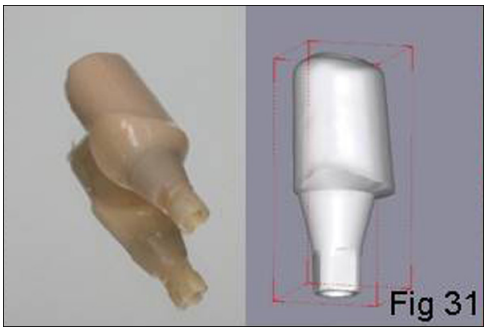


Fig. 31

Fig. 32

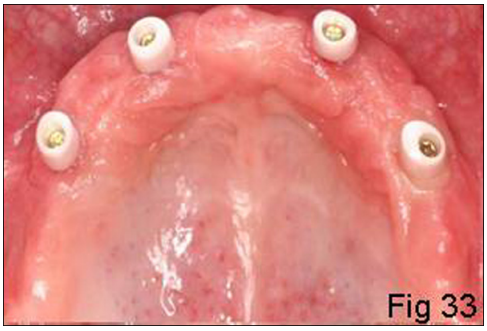
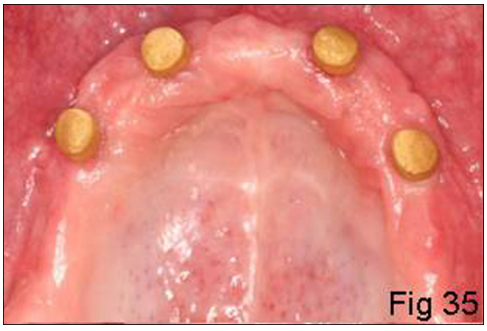


Fig. 33

Fig. 34



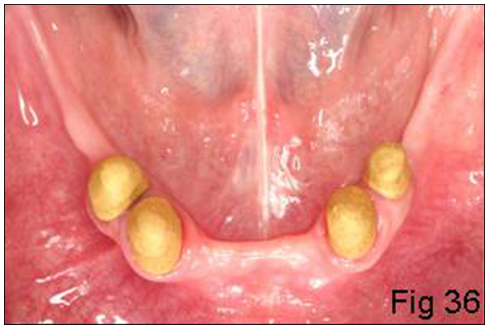


Fig. 35

Fig. 36

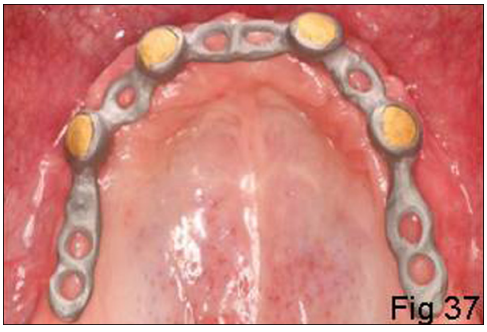


Fig. 37

Fig. 38

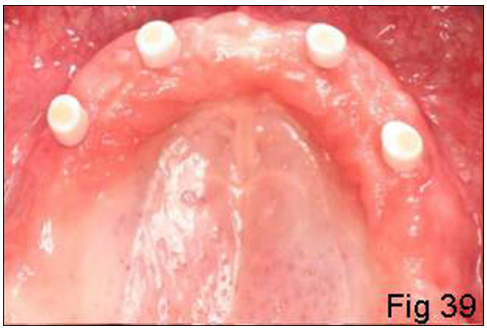


Fig. 39

Fig. 40

Fig. 41

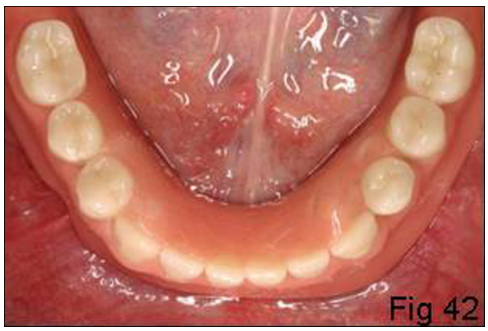


Fig. 42

Fig. 43

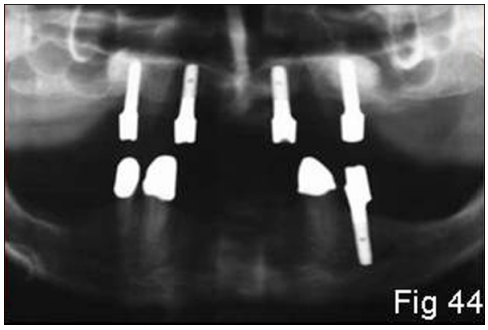


Fig. 44

Fig. 45

Conclusions

These exemplar cases show various application form of zirkonia. While rigid connection between the copings for implant-retained overdentures is discussed controversially one-piece abutments eliminate the debatable connection between abutment and internal coping. Longitudinal studies have to prove the success of this method.

Literature

1. Eitner S, Schlegel A, Emeka N et al.: Comparing bar and double-crown attachments in implant-retained prosthetic reconstruction: a follow-up investigation. Clin Oral Implants Res. 2008;19:530-537
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Poster Faksimile:

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All-ceramic one-piece telescopic abutments for implant-supported overdentures

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Topic: Implant therapy outcomes, prosthetic aspects

Abstract

Removable implant-supported prosthesis should combine easy handling and hygiene, suitable fixation and aesthetic rehabilitation. Especially for elder and manually handicapped patients removable dentures are state of the art. There are different options of anchorage to attach removable overdentures to implants. Telescopic systems are established in conventional prosthetics for a long time. Alternatively to bars or balls telescopic retainers have advantages in implant dentistry concerning retention, maintenance, hygienic aspects, and in divergent implant angulations. Furthermore telescopic retainers enable an uncomplicated integration of implants and natural abutment teeth to support a removable prosthesis. The use of all ceramic abutments offers various advantages like good biocompatibility to peri-implant tissues and low plaque accumulation. Furthermore aesthetic outcome of ceramic abutments is often more attractive to many patients. Conventional telescopic abutments consist of two pieces from metal and ceramic often luted with a resulting gap. Contemporary computer-aided design/computer-assisted manufacturing-technologies allow milling of one-piece abutments from ZrO_2 which can be torqued directly to the implant. The aim of this report was to present the application of all-ceramic CAD/CAM milled zirconia one-piece implant telescopic abutments in complex clinical situations. Furthermore options for the integration of natural abutment teeth were demonstrated. In one edentulous maxilla six implants were inserted on bone level. Another patient received four implants in the edentulous maxilla and one implant in the mandible. In addition to three natural abutment teeth. Both patients were treated with telescopic anchored prosthesis. All telescopic one-piece implant abutments and the telescopic copings were milled in zirconia by a special CAD/CAM system. To achieve passive fit highly precise electroplated gold mesostructures were luted intraoral with a cobalt-chromium-molybdenum framework. One year follow-ups showed good clinical results. The presented clinical cases demonstrated the application of an alternative type of telescopic abutment from zirconia. The introduced one-piece and gap free telescopic abutment offers advantages compared to conventional two-piece implant abutments. Controlled clinical studies have to prove the success of this restorative option.

Background and Aim

Comparing telescopic retainers to established bar anchorage systems there might be no difference in clinical success. [1] Furthermore telescopic retainers enable an uncomplicated integration of implants and natural abutment teeth to support a removable prosthesis. [2] Ceramic telescopic copings in combination with electroplated mesostructures have been used for telescopic retainers successfully for a long time. [3] First studies about ceramic abutments demonstrate similar results to conventional metal abutments. [4,5]
The aim of this report was to present the application of all-ceramic CAD/CAM milled zirconia one-piece implant telescopic abutments in complex clinical situations. Furthermore options for the integration of natural abutment teeth were demonstrated.

Clinical Report 1

The patient was edentulous in the maxillary. In the mandible was an unilateral shorten arch on the right side, the lower left second premolar needed a crown (Fig. 1-3). By the use of a diagnostic wax-up („backward planning") a DVT was ordered to plan the indicated implants (Fig. 4-5). Six implants were inserted computer navigated on bone level in the upper jaw, in the lower jaw three implants completed the unilateral shorten arch (SLActive, RC Ø 4,1 mm, Straumann, Basel, CH; Fig. 6-8).

After preparation and open tray impression with a polyether (Impregum Penta soft, 3M Espe, Seefeld, D) horizontal and vertical maxillomandibular records were made and controlled by the wax-up. The one-piece abutments and frameworks were waxed-up, scanned and milled in zirconia by a special CAD/CAM system (Straumann CAD/CAM; Fig. 9-12).

Highly precise electroplated gold mesostructures were luted intraoral (Degufil KE Gold, DeguDent, Hanau, D) with the cobalt-chromium-molybdenum framework to achieve passive fit (Fig. 13-16). The abutments were tightened to 35 Ncm, screw access openings were closed with a light curing composite (Tetric Evo Ceram; Ivoclar Vivadent, Schaan, LI). The fixed partial denture and the crown were cemented with a glass ionomer cement (Ketac cem, 3M Espe; Fig. 17-18). One year follow-up show acceptable results (Fig. 19-23).

Clinical Report 2

The patient was edentulous in the maxillary. In the mandible three teeth remained (Fig. 24-26). By the use of a diagnostic wax-up („backward planning", Fig. 27-28) four implants were inserted on bone level in the maxillary, additionally one implant in the mandible should function as strategic anchor (SLActive, NC, Ø 3,3 mm, Straumann; Fig. 29-31). After preparation of the canine teeth, the lower right first premolar and open tray impression with a polyether (Impregum Penta soft) horizontal and vertical maxillomandibular records were made and controlled by the wax-up.

The one-piece abutments and primary copings were waxed-up, scanned and milled in zirconia by a special CAD/CAM system (Straumann CAD/CAM; Fig. 31-34). Highly precise electroplated gold mesostructures were luted intraoral (Degufil KE Gold) with the cobalt-chromium-molybdenum framework to achieve passive fit (Fig. 13-16). The abutments were tightened to 35 Ncm, screw access openings were closed with a light curing composite (Tetric Evo Ceram). (Fig. 35-38). **The primary copings were cemented with a glass ionomer cement (Ketac cem). One year follow-up show acceptable results (Fig. 31-37).**

Conclusions

These clinical cases demonstrated various application of zirconia in implant dentistry. While cementing of telescopic crowns to implant abutments is discussed controversially one-piece milled telescoping abutments are an alternative and economically treatment option. Longitudinal studies have to prove the success of this method.

References

1. Eitner S, Schlegel A, Emeka N et al.: Comparing bar and double-crown attachments in implant-retained prosthetic reconstruction: a follow-up investigation. Clin Oral Implants Res. 2008;19:530-537
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