

Case Report

Two-piece Mesostructure and Vertically oriented Locking Screws Design for Implant-assisted Prosthesis in the Esthetic Zone

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ABSTRACT

Restoration of the malaligned dental implants in the esthetic zone is a challenge for dental practitioner because of the difficulty in obtaining balance and harmony between position and color of the final prosthesis and the adjacent teeth. Mesostructure is a part of the prosthesis that located on top of the dental implant and bearing the final prosthesis. It has a form of milled bar to bear an overdenture or as abutment used for the correction of malaligned dental implants. Such approach maintains screw-retained prosthesis option while allowing complete retrievability, improved accessibility, usage of thicker abutment screws, and acceptable esthetic outcomes. In this case report, a two-piece mesostructure was designed to correct the malposition of dental implants in the esthetic zone with 1-year follow-up system.

KEYWORDS: Dental implant, esthetic zone, fixed partial denture, mesostructure

INTRODUCTION

Implant dentistry has presented reliable prosthodontic options for rehabilitation of partial and complete edentulism with well-documented, long-term success, and survival rates.^[1,2] Although implant treatment is predictable, failure in diagnosis, proper case selection, treatment planning, surgical or restorative interventions may occur, which result in esthetic and functional compromised treatment outcomes.^[3,4] Placement of multiple implants in the anterior zone may present esthetic complications due to the local alveolar ridge anatomy and patients' esthetic demands.^[5] Several options have been reported for esthetic management of labially inclined implants including the use of either angle stock abutment, custom UCLA-based abutment, custom CAD/CAM-based abutment for cement-retained prosthesis or lingual locking

screws tapped into UCLA or CAD/CAM-based abutments for screw-retained prosthesis.^[6-8] The aim of this report is to introduce an innovative reconstructive technique to restore malaligned implants in the esthetic zone using two-piece mesostructure and vertically oriented locking screws design and to add an additional option to the contemporary dental implant techniques and practices.

CASE REPORT

A 65-year-old Caucasian male patient presented to clinic with a chief complaint: "My periodontist has placed five

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implants for me and I would like to get teeth on them.” Review of the preoperative dental records revealed severe chronic periodontitis relative to teeth #3, 5, 7, 9, 10, and 14, in which the periodontist opted to extract and graft their sites [Figures 1 and 2]. Five internal-connection prevail implants were placed after 4 months following the bone regeneration procedures. The patient was wearing removable interim partial denture during healing period. As this report is concerning the approach that was used to restore the mal-aligned implants in sites #7 and 10, the procedures relative to the posterior implants restoration will be excluded. An informed consent form was obtained from the patient before starting the treatment. After that, an open-tray fixture-level impression [Figure 3] was made for implants #7 and 10 using a stock tray painted with adhesive and filled with medium body polyvinyl siloxane impression (PVS) material with light body applied around the impression posts. The casts were then mounted on a semi-adjustable articulator to fabricate the implant-assisted temporary prosthesis. Upon the digital design process of the temporary prosthesis, it was revealed that the screw channel for implant #7 was projecting through the incisal edge at the mesial-incisal line angle [Figure 4a]. The temporary prosthesis was delivered and the mesial-incisal line angle was built-up using flowable composite of matching shade with the



Figure 1: Frontal view at MIP

temporary prosthesis [Figure 4b]. Two engaging UCLA abutments were utilized to restore the implants in sites #7 and 10 and were waxed with proximal extension to help in correcting the screw access direction. The wax pattern was completed with the help of a dental surveyor to achieve a common path of insertion between the two custom abutments. The abutments were casted with a noble metal alloy. The screw holes were tapped into the mesial-occlusal aspects of the abutments, in a vertical direction, to a diameter that is compatible with Biomet 3i Gold Screws. The abutments were considered as a mesostructure, in which the superstructure was waxed over and casted utilizing the same materials used for the custom abutments. The screw holes made in the superstructure were corresponding the screw holes that were tapped into the custom abutments. The abutments and superstructure were tried in the patient's mouth and checked for fit clinically and radiographically [Figure 5a and b]. Porcelain of matching shade to the adjacent teeth along with compatible gingival porcelain from the same manufacturer was applied according to the manufacturer's recommendations. The abutments and superstructure were then delivered and torqued to 20 Ncm. The screw holes were filled with Teflon tape and flowable composite [Figures 6a and b]. The patient was satisfied with the clinical results [Figure 7a and b]. One-year follow-up revealed stable prosthesis and the patient showed adequate oral hygiene practice [Figure 8].

DISCUSSION

Despite of clinical effort to regenerate deficient hard and soft tissues, the results may be unpredictable and deemed unsatisfactory. Malalignment of dental implants is one of the challenging scenarios in implant dentistry. In this clinical report, two-piece mesostructure was used to solve the axial malalignment of the dental implants. These structures were retained to the implants using abutment screws. Instead of using transverse screws to retain the final prosthesis to the mesostructures,

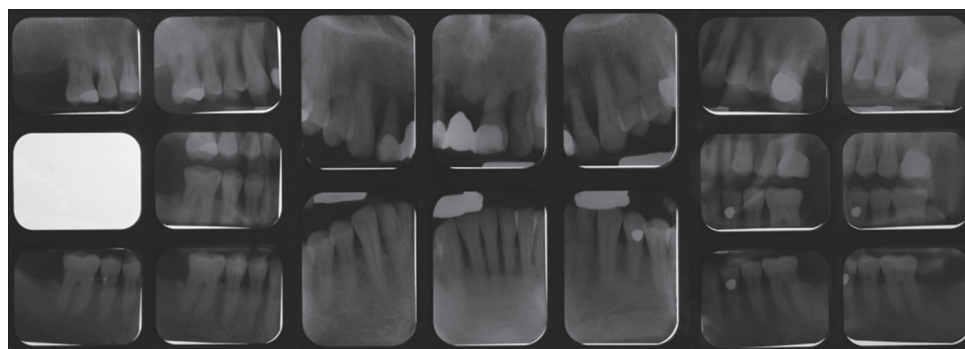


Figure 2: Full mouth series



Figure 3: Open tray impression posts indicating implants angulation prior to impression making

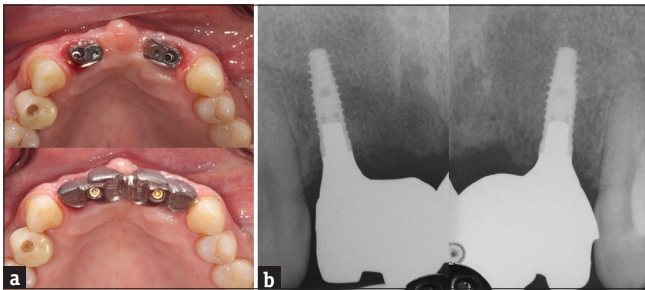


Figure 5: (a) Intra-oral view of abutments and superstructure. (b) Radiographic view confirming abutments fit



Figure 7: Smile views (a) before and (b) after treatment

full-length abutment screws were used in a vertical direction/axis. In this clinical report two separated pieces were used; a procedure has its advantages in saving cost and time as one piece will cost more for the extra metal and will need more time to properly join the two parts. In addition, it will reduce the overall bulk of prosthesis at the central incisors zone and allow adequate space for porcelain multi-layering application and therefore achieve higher esthetic results. To vertically secure the final prosthesis to the mesostructures, two wings were made mesially which efficiently allowed the use of full-length abutment screws. With such design the retrievability of the prosthesis was maintained and the

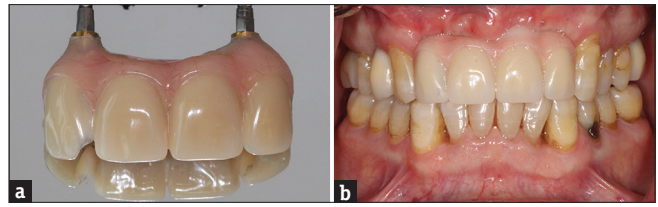


Figure 4: (a) Extra-oral view of implant-assisted temporary prosthesis. (b) Intra-oral view of implant-assisted temporary prosthesis



Figure 6: (a) Intra-oral frontal view of final prosthesis at MIP and (b) Intra-oral occlusal view of the prosthesis



Figure 8: Follow-up 1 year post-operative

accessibility of the screw went better with the vertical direction.

Although a wide variety of abutments are available, the final decision for the selection of the appropriate type of abutment for a specific case with malaligned implants depends mainly on severity of angulation, esthetic requirements, and axial load distribution. The preable abutments can be customized or modified to achieve a favorable position and function of the final prosthesis.^[6] The UCLA abutment, used in this case, is an example of a castable abutment, which can be used to correct angles up to 30 degrees. By using such abutments, any

additional procedures such as removal of implants or grafting of the bone can be avoided.^[9]

When using angled abutment in the esthetic zone it is important to be combined with deeper placement of the implant to avoid the exposure of the metal abutment which subsequently will negatively affect the esthetic appearance.^[10] Challenge in restoration of the missing teeth in the esthetic zone comes from the difficulty in achieving harmony between proper position and color of the final prosthesis relative to the adjacent teeth.

CONCLUSION

The use of two-piece mesostructure design in the esthetic zone offers correction of implants' angulation and path of insertion, direct accessibility to the retentive screws during insertion and removal, and easier retrievability. This approach may provide promising solutions for challenging maligned implant cases in the esthetic zone.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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