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Case Report

Mandibule rehabilitation after embolization of hemangioma with implant overdenture using existing endosseous implants: A clinical report

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ABSTRACT

Patient: A fifty-year-old man received embolization for mandibular hemangioma two years ago, and the surgeon had placed four implants in his mandible and made a removable denture upon the implants. His denture however fractured repeatedly in the past years. After examination and communication with the patient, an implant-assisted overdenture incorporating bar attachment combined ERA attachment and Locator abutment was re-fabricated. A sixteen months follow-up showed acceptable outcome.

Discussion: There are some guidelines on design of implant over-denture, the site of implant will affect the final result. The unfavorable bone structure of mandibular hemangioma restricts the number and the site of implant, modification of design is essential to improve the final result.

Conclusion: Multi-disciplinary cooperation should be established for extensive edentulous case. Overlay type prosthesis incorporating several types of attachments can be suitable for complex case because of acceptable results and easy maintenance.

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1. Introduction

The acceptance and success of implant overdenture have been studied. There are different types of attachments used to retain implant overdenture such as studs, bars or combination form. The specific design, by exchanging position of male and female portions, acts to affect the load distribution to the supporting implants [1–4]. Moreover, it requires less

supporting implants needed, which is cost effective and affordable to many patients. Mandibular intraosseous hemangioma makes up less than 1% of all intraosseous tumors [5,6]. Due to the intraosseous vessel malformation, implant placement is at high risk of bleeding and failure, limiting fixed denture reconstruction. Therefore, an implant overdenture may be more suitable. In this case, an implant-assisted overdenture incorporating different attachments was fabricated after embolization of mandibular hemangioma.

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2. Outline of the case

2.1. History and examination

A fifty-year-old male patient complained that his denture fractured repeatedly in the last two years. Medical history showed he had embolization for mandibular hemangioma two years ago, and the surgeon only saved left mandibular 3rd molar, placed three implants in his right mandible and made him a unilateral denture without extending the middle line, letting him unilateral chewing. According to his memory, the denture repeatedly fractured at the connection between the distal implant and the bar and also the overlay base. In their last treatment, the surgeon planned to place another implant in the left mandible and to made him a denture again, however, a uncontrollable bleeding happened in the surgery, so they terminated the treatment for the sake of safety, then referred the patient to prosthodontist. The patient refused any more surgeries.

Extra-oral examination showed lower lip swelling and pulsatory feeling but with no tenderness. Intra-oral examination showed three implants in right mandible connected with bars, the connector between the distal bar and distal abutment fractured at the soldering interface, the two right mesial abutments were connected with a bar by soldering, and two bars with a length of approximately 1 cm cantilevered respectively with the distal and the mesial implants, angulating with each other (Fig. 1a). The implants (Straumann, Switzerland) was stable. Residual ridge had inadequate height and width, and vestibule and mouth floor was shallow (Fig. 1b). The implant (Noble Biocare Replace, Sweden) neck in left mandible was located subgingivally about 8 mm and the less keratinized surrounding mucosa was hyperplasia with probe bleeding (Fig. 1c). The left lower 3rd molar had a moderate degree of mobility. Articulated cast showed an approximately 5 mm inter-arch space between the bar and opposed teeth (Fig. 1d). Panoramic image revealed good osseous-integration and implant angulation (Fig. 2a).

2.2. Treatment

2.2.1. Treatment planning

The embolization therapy resulted in tissue fibrosis of mouth floor, vestibule and lingual flange area, affecting extension of denture base and marginal seal, which is crucial for retention. The use of implants can assist denture retention in this situation. Choosing appropriate implant site and reasonable design matching biomechanical principle can optimize the stress distribution. Biomechanically, the implants should be placed in anterior region of mandible, joined by bar, and paralleled to each other. However, the patient in the case had a history of mandibular intra-osseous hemangioma, therefore, placement of more implants in mandible may be at high risk of life-threatening intra-osseous hemorrhage, additionally, the patient refused to experience more surgeries. Based on patient's will and his oral condition, an implant-assisted overdenture was preferred and modification of design should be taken.

The option of attachment and the denture design is very important for prognosis. However, the surgeons did not make full consideration of mandible anatomy and biomechanical stress when designing the denture. The old design of attachment gave no permission to denture displacement in vertical orientation, the two angulated cantilever bars had a length that lead to stress concentration at bar and implants, and the soldering connection may compromise the anti-fracture strength (Fig. 2b). Therefore, new design should take account of denture displacement during function and avoid stress concentration, and reinforce strength of the attachment.

Treatment procedures would include:

- (1) Remove the original bar attachment.
- (2) Place one Locator abutment would be placed on the right distal implant. A new bar would connect the two right mesial implants through casting connection with the abutments, incorporating an ERA attachment on the mesial extension of the bar. Retention would be gained by ERA attachment and Locator abutment, with no clip on the bar.
- (3) A two-piece CAD/CAM Zirconia abutment would be fabricated for the left implant. The angulation would be designed as axial as possible to provide some support. The intaglio of over-denture would be relief at the Zr abutment area.
- (4) The left 3rd molar would be saved with no clasps designed on.

Before impression, the Zr abutment was in placement (Fig. 2c and d). Zirconia abutment was bonded with Ti base using Super-Bond C&B (Sun Medical, Japan). Preliminary maxillary and mandibular impressions were made with irreversible hydrocolloid and a stock tray to fabricate a mandibular custom tray with light cured acrylic resin. After the Zirconia abutment was placed, the granulation tissues around the implant began to recede and in two weeks the epithelial tissues around the abutments healed well. The mandibular final implant-level impression was then made with a polyvinyl siloxane medium viscosity using a custom tray after a conventional border molding procedure with GC impression compound. The impressions were poured with type IV dental stone. A maxillary impression was used to create an opposite cast. With face-bow and wax rim, the inter-arch relation was transferred to a semi-adjustable articulator.

Metal copings were waxed and cast with a cobalt chromium alloy (Bego, Germany) using bar and Micro ERA cast-to-patterns to create custom over-denture abutments. Parallelism using a dental surveyor and milling were achieved on the master cast. Metal copings were intraorally evaluated and fitted. Ivoclar semi-anatomic denture scheme was used and set up. Bilateral balance was checked on the articulator. The final over-denture was processed incorporating the female parts of attachments. In the delivery appointment, the abutments were connected to the implants at 35 N cm (Fig. 2e). Then the overdenture was seated in patient's mouth (Fig. 2f). Marginal fitness, retention and stability were checked. Tissue surface upon the Zirconia abutment was relieved.

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