

Patient - Specific Implants With Screw Retained Wrap Around Hybrid Prosthesis For Hemimandibulectomy Patient - A Case Report

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Abstract

Hybrid denture prosthesis have been used popularly in prosthodontics as a tooth replacement option. with some controversy. Hybrid dentures consist of one of the most novel options in the restoration of the edentulous arches. The implants are only placed only in the anterior region and the prosthesis is provided in the posterior region with the assistance of a cantilevered bar or framework. Conventionally the framework for such a prosthesis is fabricated using titanium or cobalt-chromium metal. Traditionally the frameworks were fabricated using metal casting. However, with the advent of digital dentistry CAD CAM frameworks have become very popular which have allowed the use of an array of materials such as zirconia, PEEK amongst other traditionally used metals. Here we present a case of a 34-year-old male with multiple missing teeth and mandibular jaw defect. We suggest that implant-supported hybrid prostheses can be a reliable alternative treatment procedure when a porcelain-fused metal fixed restoration does not satisfy a patient's requirements for esthetics, phonetics, oral hygiene, and oral comfort.

Keywords Hybrid denture, Framework, Titanium, Zirconium, PEEK, Cobalt Chromium.

INTRODUCTION

Dental implants have become increasingly important in oral reconstruction. The high rate of success of rehabilitation with implant-supported prostheses has increased esthetic demands of patients and clinicians.¹ To obtain satisfactory functional and esthetic results, it is essential to achieve osseointegration and the ideal location of implants to support the intended restoration.² The main objective in implant therapy is either to avoid complete removable dentures by placement of implant-supported fixed prostheses or to improve the retention and stability of removable complete dentures. Basically, two approaches for an implant-supported fixed prosthesis exist. The first one is a metal-ceramic implant-supported fixed prosthesis consists of a ceramic layer bonded to a cast metal framework that can be cemented to transmucosal abutments or secured with prosthetic retention screws.³ An alternative to this type of fixed prosthesis is an implant-supported hybrid prosthesis. Implant supported metal-acrylic resin complete fixed dental prosthesis, originally referred to as a hybrid prosthesis was introduced to address the problems caused by unstable and uncomfortable mandibular dentures. The primary factor that determines the restoration type is the amount of intra-arch space. In addition, other patient-relevant clinical parameters such as lip support, high maxillary lip line during smiling, a low mandibular lip line during a speech or the patient's greater esthetic demands should be evaluated. Hybrid prostheses have a great number of advantages including reducing the impact force of dynamic occlusal loads, being less expensive to fabricate and highly esthetic restorations.² Furthermore, they may be successfully used by a combination of tilted and axially placed

implants in partial edentulism in the posterior part of resorbed maxillae.³ However, food impaction, speech problems or difficulties in dealing with hygiene were reported by authors.² Despite the favorable long-term outcomes achieved with prosthetic rehabilitations with implants, biological and technical complications such as surgical complications, implant loss, bone loss, peri-implant soft-tissue complications, mechanical complications, and aesthetic/phonetic complications are frequent.⁴ The authors implied that such complications are affected by many factors, including the operator's skills and judgments in treatment planning, prosthesis design, materials, patient-specific factors, and local and systemic conditions and habits such as bruxism, smoking, presence of periodontal disease, and maintenance.^[3] Furthermore, the communication between the prosthodontist and surgeon is emphasized as critical to ensure adequate restorative space for the various prosthetic designs, appropriate implant angulation, and minimizing cantilevers.³

CASE REPORT

A 34-year-old male patient presented to the department of Prosthodontics with multiple missing teeth in maxilla and mandible (missing teeth- 41 42 43 31 32 33 34 35 36 37) with midline shift. Patient had no previous experience of any removable denture. Patient was screened according to a protocol that took into account his general health and treatment possibilities. Intra oral examination showed left mandibular defect. After obtaining consent from the patient, it was decided to go for customized implant prosthesis (wrap-around hybrid prosthesis). 3D CT scan analysis was done before the surgery for patient specific implant placement (PSI). 2 months after the milled reconstructed PSI was placed, healing caps and suturing was done. At the next appointment, a closed stock tray was selected, three impression copings were inserted into the implant site, and an impression was made using putty wash. Later, after the cast had been poured, a conventional casting process using cobalt chromium alloy was carried out. Unilateral bite registration was made using an inter occlusal bite registration material, and the mounted model had been scanned using a model scanner. The metal framework was tried in the mouth, and the bite registration was carried out using base plate wax after teeth anatomic artificial teeth were arranged and try-in was done. During processing of the denture involved making indentations using a straight fissure carbide bur, which helps to keep the acrylic adhered to the metal frame in the finished denture. After acrylization final screw retained hybrid prosthesis was inserted in the patient and occlusal adjustments were made. (Figure 1)

DISCUSSION

Accurate and precise planning in dental implantology includes detecting any existing clinical difficulties prior to the treatment and foreseeing the final results before the treatment. Planning for esthetic cases requires different diagnostic perspective; it should include additional factors such as smile patterns and lip size, etc.¹ In addition, the restorative space for the prostheses, which is measured from the platform of the implant to the opposing occlusion, is often overlooked when implant positions are planned.⁵ The intra-arch distance which implant components, metal substructure, the acrylic resin, and the denture teeth are placed plays a major role on selecting appropriate restoration. With mandibular implant-supported fixed prostheses, a minimum of 12–15 mm of space has been suggested.² When more intra-arch space is present, a hybrid restoration is recommended.⁴ Hybrid denture frameworks have been produced using a variety of methods and materials over the years. Drago et al described guidelines for hybrid prosthesis stating that “framework must be fabricated from materials and protocols that allow passive and accurate fit between frameworks and implants and/or abutments.”⁶ Zarb and Jansson described two methods of fabrication of the framework.⁷ They were as follows: where metallic frameworks made up the bulk of the prostheses, while artificial teeth and minimal denture bases consisted of the only non-metallic components. Implant fixed prostheses consisting mostly of acrylic resin denture bases (wraparound design) and artificial teeth, with minimally sized metal frameworks.⁸ It's worth noting that the appropriate length of the framework wasn't mentioned in early implant literature. Since the implants for a hybrid prosthesis are placed anteriorly, the posterior portion of the framework will be cantilevered from the anterior. As a result, the cantilever's length, height, and width were critical in limiting the prosthesis deformation.⁹ According to Glantz⁸, the amount of deformation of the cantilever is directly proportional to the cube of the length and inversely proportional to the width and the cube of the height of the cantilever.¹⁰ As a result, the framework's length should be kept to a minimum while its width and height should be maximised.⁸ With the advent of digital dentistry the variety of materials used in the fabrication of implant frameworks has significantly eg. titanium, zirconia, Polyetheretherketone (PEEK) etc.

CONCLUSION

It was concluded that this type of prosthesis can provide satisfactory results in patients of whom dental implants were placed regardless careful treatment planning. The authors also believe that it is essential to evaluate the patient not only with a surgical perspective, but also from a prosthodontic point of view.

REFERENCES

1. El Askary AE. 2nd ed. Ames, Iowa, USA: Munksgaard, Blackwell; 2007. Fundamentals of Esthetic Implant Dentistry; p. 13.
2. Misch CE. St. Louis, MO: Mosby Elsevier; 2008. Contemporary Implant Dentistry; p. 99.p. 100.
3. Thalji G, Bryington M, De Kok IJ, Cooper LF. Prosthodontic management of implant therapy. *Dent Clin North Am.* 2014;58:207–25. [PubMed: 24286654]
4. Pjetursson BE, Thoma D, Jung R, Zwahlen M, Zembic A. A systematic review of the survival and complication rates of implant-supported fixed dental prostheses (FDPs) after a mean observation period of at least 5 years. *Clin Oral Implants Res.* 2012;23(Suppl 6):22–38. [PubMed: 23062125]
5. Tourah A, Moshaverinia A, Chee WW. Mandibular implant-supported fixed dental prosthesis with a modified design: A clinical report. *J Prosthet Dent.* 2014;111:91–5. [PubMed: 24262946]
6. Drago C, Howell K. Concepts for designing and fabricating metal implant frameworks for hybrid implant prostheses. *J Prosthodont.* 2012 Jul;21(5):413–24.
7. Hemminga KW, Schmitt A, Zarb GA. Complications and maintenance requirements for fixed prostheses and overdentures in the edentulous mandible. *Implant Dent.* 1994;3(4):265.
8. Bra-nemark PI, Zarb GA, Albrektsson T, Rosen HM. Tissue-Integrated Prostheses. *Osseointegration in Clinical Dentistry* [Internet]. Vol. 77, Plastic and Reconstructive Surgery. 1986. p. 496–7.
9. Sertgöz A, Güvener S. Finite element analysis of the effect of cantilever and implant length on stress distribution in an implant-supported fixed prosthesis. *J Prosthet Dent.* 1996 Aug;76(2):165–9.
10. Rodriguez AM, Aquilino SA, Lund PS. Cantilever and implant biomechanics: a review of the literature. Part 1. *J Prosthodont.* 1994 Mar;3(1):41–6.





FIGURES:

Figure 1- showing pre-operative surgery profiles of the patient, followed by 3D CT scan of PSI, milling the PSI and surgical insertion of the PSI followed by post-surgical CT scan. After 2 months, follow up pre-operative intraoral picture before second surgery. Implant placement along with healing caps and impression copings, later transferred to the impression. Design of metal bar is done using computer software followed by metal bar milling and adjusting in stone model. Try-in was done for the metal framework followed by try-in of the finished hybrid prosthesis. The final framework had improved facial contour dramatically.