IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 23, Issue 6 Ser. 8 (June. 2024), PP 43-51
www.iosrjournals.org

"Rehabilitating C-h Type Bone in the Posterior Region with Full Mouth Implant-Supported Hybrid Prosthesis: A Case Report"

Dr. Unnati Agarwal[1], Dr. Puja Saha[1],
Dr. Shitij Srivastava[2], Dr. Shivansh Mohan Saxena[3]
[1](*MDS Post Graduate Student, Department of Prosthodontics, Crown & Bridge, Sardar Patel Post Graduate Institute of Dental and Medical Sciences, India)*
[2](*Head of the Department, Department of Prosthodontics, Crown & Bridge, Sardar Patel Post Graduate Institute of Dental and Medical Sciences, India)*
[3](*Senior Lecturer, Department of Prosthodontics, Crown & Bridge, Sardar Patel Post Graduate Institute of Dental and Medical Sciences, India)*

Abstract
An acrylic resin complete fixed dental prosthesis with a metal substructure that is supported by implants is known as an implant supported hybrid prosthesis. In extreme situations where a restoration is required for speech, lip support, function, or appearance, this type of prosthesis may be an option. The purpose of this clinical study is to describe the functional and esthetic prosthetic rehabilitation of a hybrid prosthesis-supported in a borderline patient. On clinical examination, an excessive intra-arch dimension with C-h type bone was seen in the posterior region of all four quadrants. This case report indicates that in situations when a porcelain-fused metal fixed restoration cannot be planned because of greater cantilever requirements and increased occlusal loads, implant-supported hybrid prostheses can be a dependable alternative treatment approach.[1]

Keywords: *Dental implants, hybrid prosthesis, intra-arch distance, cantilever, surgical guide, occlusal load.*

Date of Submission: 10-06-2024 Date of Acceptance: 22-06-2024

I. Introduction

The aim of contemporary dentistry is to reinstate the typical structure, functionality, comfort, appearance, speech, and well-being, irrespective of any atrophy, illness, or damage to the stomatognathic system. However, achieving this goal with standard dentistry becomes more challenging the more teeth a patient has lost. Dental implantology is a word used nowadays to describe anchoring of alloplastic material into the jaws to give support and retention for prosthetic replacement of teeth that has been lost. Thus far, favorable experiences and the creation of fresh information have pointed to the near future as the moment when endosteal dental implants will become a commonly used treatment option in dentistry.[2]

The primary goals of implant therapy are to either increase the stability and retention of removable complete dentures or prevent the need for complete removable dentures by installing implant-supported fixed prostheses. In general, there are two methods for creating a fixed prosthesis supported by an implant. The first is a metal ceramic implant supported fixed prosthesis, which is made of a cast metal framework with a ceramic layer fused to it. It can be fastened with prosthetic retention screws or cemented to transmucosal abutments. An alternative to this type of fixed prosthesis is an implant supported hybrid prosthesis. Originally known as a hybrid prosthesis, an implant-supported metal acrylic resin complete fixed dental prosthesis was designed to solve issues with mandibular dentures that were painful and unstable. The amount of inter-arch space is the main criterion that affects the method of restoration. Furthermore, it is important to assess other clinically significant aspects of the patient, such as lip support, a high maxillary lip line when smiling, a low mandibular lip line during speaking, or the patient's higher aspirations for aesthetics.[1]

A different treatment regimen is needed for different bone volumes when placing dental implants. A system of classification for the accessible bone was provided by Misch and Judy (1985), along with treatment choices for each category.[2]

The purpose of this clinical report is to present with a treatment modality in rehabilitating atrophic posterior region of maxillary and mandibular arches with implant therapy by means of the implant-supported hybrid prosthesis.

Patient information

A 69-year-old male patient reported to the department of prosthodontics, crown and bridge with the chief complaint of difficulty in chewing food due to multiple missing teeth and wanted fixed teeth. Patient gave a dental history of loosening of multiple teeth followed by removal in the last 2 years. Patient also gave history of type 2 diabetes mellitus since last 3 months and was on medications for the same. Pre-operative profile pictures of the patient (Figure 1).

Figure 1: Pre-operative Profile Pictures

Clinical findings

The maxillary arch showed periodontally compromised teeth from 15 to 22 region and remaining missing teeth. And an edentulous mandibular arch. Pre-operative intraoral pictures of the patient (Figure 2). Pre-operative orthopantomogram of the patient (Figure 3).

Figure 2: Pre-operative Intraoral Pictures

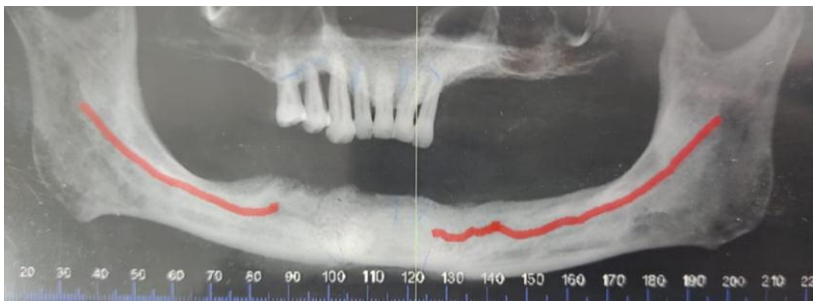

Figure 3: Pre-operative Orthopantomogram

Diagnostic Assessment

Diagnostic impressions were made and diagnostic casts were obtained. Occlusal rims (Figure 4) were fabricated to do a diagnostic facebow transfer and jaw relation to obtain the available inter-arch distance.

Figure 4: Diagnostic casts with Occlusal rims

Treatment Plan

Since patient desired fixed teeth so an Implant Supported Prosthesis was planned. Due to inadequate bone height in both maxillary and mandibular posterior region (C-h type bone according to Misch & Judy 1990 classification), 5 implants were planned in the maxilla in relation to 15, 13, 11, 22 and 24 region with indirect sinus lift in relation to 15. And 5 implants were planned in the mandible in relation to 34, 33, 31, 42 and 44 between the mental foramen to be placed using an universal surgical guide.

The type of prosthesis planned were Hybrid Prosthesis with short dental arch for both arches. Hybrid dentures are a hybrid of acrylic dentures with a metal framework as a substructure. Hybrid dentures were planned so as to reduce the impact forces on the cantilever prosthesis.

Surgical Phase

Standard implant surgical protocol was followed. 5 maxillary implants were placed in the maxilla in relation to 15, 13, 11, 22 and 24 region and indirect sinus lift was done in relation to 15.

5 implants were placed in the mandible with the help of a universal surgical guide in relation to 34, 33, 31, 42 and 44. implants were placed between the mental foramen and the two distal most implants were placed at an angulation of 30 degrees (Figure 5).

Figure 5: Mandibular implants placed with the help of Universal Surgical Guide

Universal Surgical Guide

The use of universal surgical guide helps in eliminating complex procedures like nerve repositioning and extensive grafting in posterior regions.

This method advocates tilting distal implants in edentulous arches which enables us in the placement of longer implants, that improves prosthetic support with shorter cantilever arm, improved inter implant distance and improved anchorage in the bone. It was given by Paulo Malo and is used in the All on 4 Concept as well.
The guide is placed into a 2mm osteotomy site that is made in the midline of the maxilla or mandible and the band follows the contour of the arch. The vertical lines are used to place parallel anterior implants and an angulation marking of 17, 30 or 45 degrees is used for the placement of posterior distal most implants.

Rehabilitation Phase

After 4 months of implant placement, a second stage surgery was done to expose the implants and healing caps were placed (Figure 6) and an orthopantomogram was obtained (Figure 7).

Figure 6: Healing caps placed on all 10 implants

Figure 7: Orthopantomogram after second stage surgery

Close tray impression copings were placed and close tray impressions were made on stock trays using putty and light body consistency of addition silicon (Figure 8).

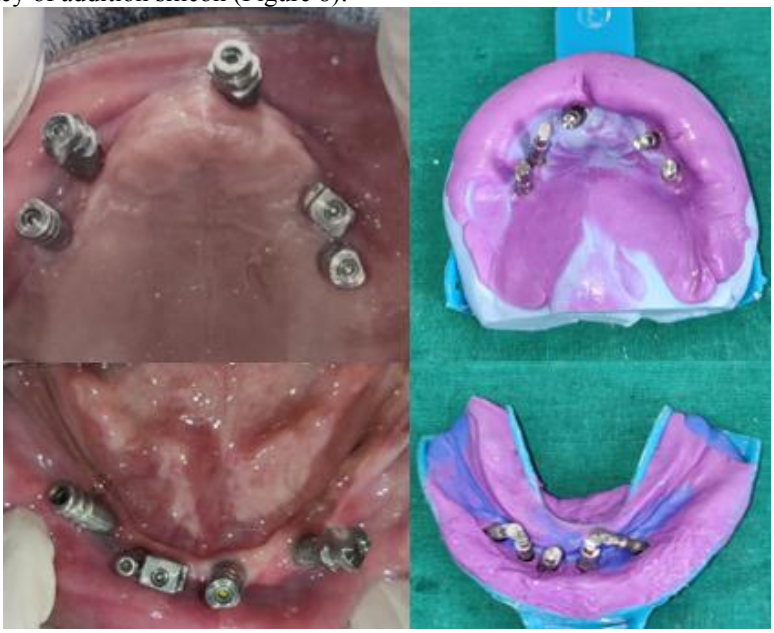

Figure 8: Close Tray Impressions

Close tray impressions were poured and casts were obtained. Jig fabrication was done on open tray impression copings using pattern resin and custom trays were fabricated (Figure 9).

Figure 9: Jig and Custom Tray Fabrication

Open tray copings were placed and jig verification was done intraorally. Open tray impressions were made on custom trays using putty and light body consistency of addition silicon (Figure 10).

Figure 10: Open Tray Impressions

Open tray impressions were poured and casts were obtained. Occlusal rims were fabricated on the casts for both arches (Figure 11).

Figure 11: Occlusal Rims fabricated on Open Tray Casts

Orientation jaw relation was done using facebow and facebow was transferred on to a semi adjustable articulator. Vertical jaw relation was done and casts were mounted (Figure 12).

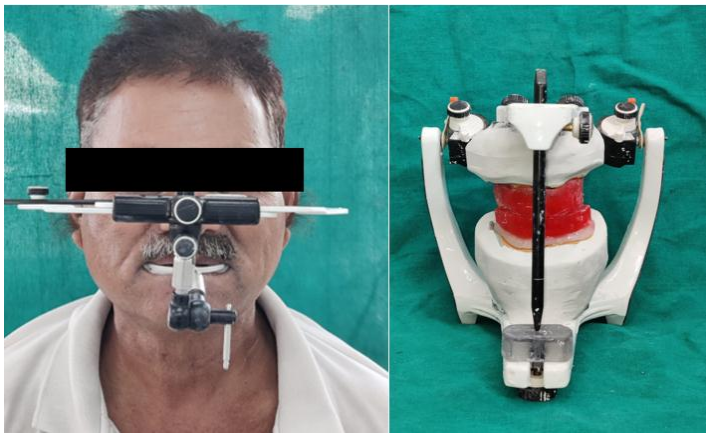

Figure 12: Facebow Transfer and Jaw Relation

Digital designing of the metal framework was done at Panna Dental Lab, Lucknow and a metal framework was fabricated using DMLS (direct metal laser sintering) (Figure 13).

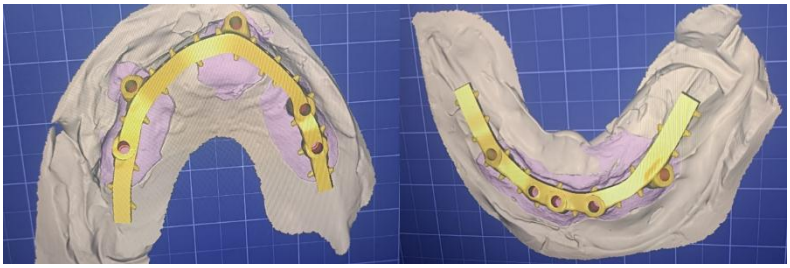

Figure 13: Digital Designing of Metal Framework

The DMLS metal framework was tried in the patient's mouth and checked for its passive fit using the Shiefield's test or the 1 screw test (Figure 14a and 14b). Lack of passivity will interfere with the bone's ability to mature and remodel under occlusal load. Verification of proper seating of the framework was checked using RVG. Due to the rigidity of the connection between osseointegrated implants and surrounding bone, any stresses caused by framework misfit will be transmitted to the implant components and implant bone interface.

Figure 14a: Metal framework trial for maxillary arch

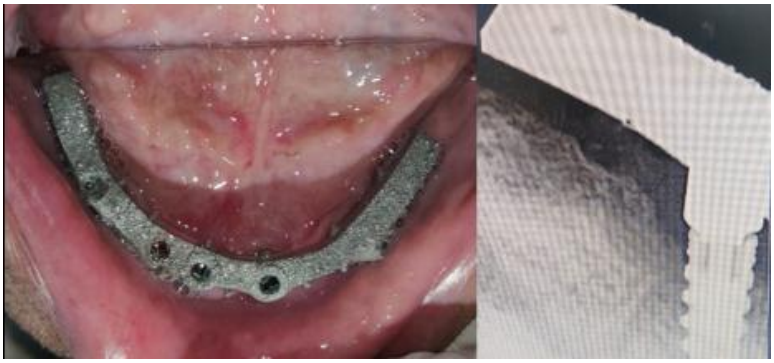

Figure 14b: Metal framework trial for mandibular arch

Teeth setting was done on the articulator over the metal framework (Figure 15). Try in dentures were tried intraorally and occlusion was checked (Figure 16). Final prosthesis were fabricated after acrylization (Figure 17).

Figure 15: Teeth Setting on Semi-adjustable articulator

Figure 16: Try-In

Figure 17: Final Prosthesis

Hybrid prosthesis were delivered. Post rehab OPG of the patient was obtained (Figure 18).

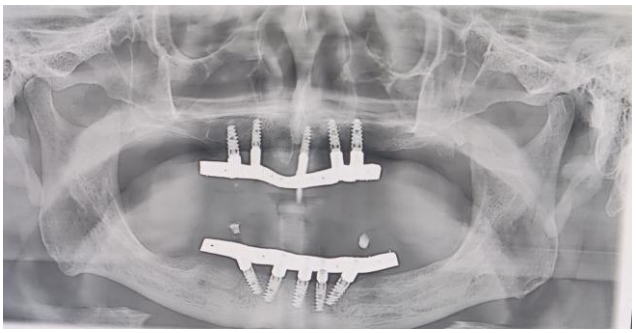

Figure 18: Post Rehab OPG

Patient was recalled after one week for follow up, final torque of 25 N was given to the prosthesis and the screw holes on posterior teeth were sealed using type 2 glass ionomer cement, screw holes on the gingiva were sealed using pink self-cure resin and the anterior screw hole on 21 was sealed using flowable composite (Figure 19). Final post rehab profile pictures of the patient (Figure 20).

Figure 19: Post Rehab Intraoral Pictures

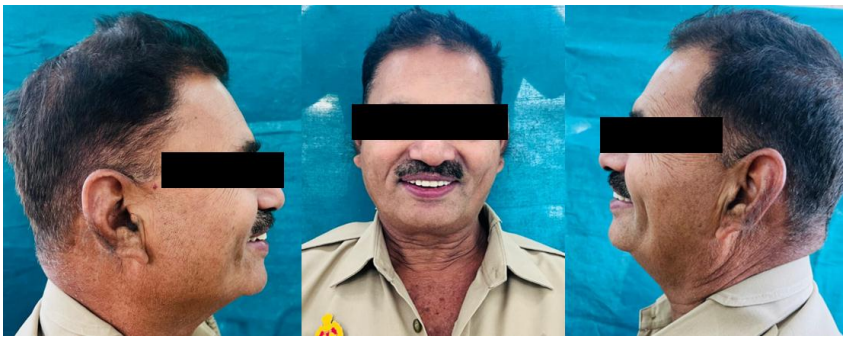

Figure 20: Post Rehab Profile Pictures

II. Discussion

The advantage of implant dentistry is that more foundation units can be made to achieve the desired prosthodontic outcome. Therefore, most individuals who are partially or completely edentulous have access to a variety of treatment alternatives. Previously, there has been a more focus on the bone that is accessible for implant placement, as this influences the placement and quantity of implants and, in turn, the final prosthesis design. But the preferred implant treatment plan is patient- and problem-centered, necessitating a change in this conventional methodology. Only when the patient is given all of the possibilities for the final prosthesis after the dentist has examined them all can the benefits of implant dentistry be fully realized. In order to assess the type and quantity

of implants required to support the proposed prosthesis, it is crucial to first plan the final prosthesis that will be used as a basis for evaluating the existing bone. Misch (1989) presented the FP-1, FP-2, FP-3, RP-4, and RP-5 as different prosthesis alternatives.[2]

The primary issue with porcelain-metal restorations is the additional bulk of metal needed in the substructure to maintain the porcelain's optimal 2 mm thickness. This quantity of metal creates porosities and raises the possibility of fracture following loading by acting as a heat sink throughout the casting process. In these cases, a hybrid prosthesis is an alternate choice. Acrylic serves as a bridge between the metal substructure and porcelain teeth, which may lessen the impact force during dynamic occlusal loading. Therefore, generally speaking, hybrid prostheses are recommended in large inter-arch spaces (FP-3).[2]

Among the many benefits of hybrid prosthesis are their ability to lower the impact force of dynamic occlusal loads, lower fabrication costs, and extremely esthetic restorations. Additionally, partial edentulism in the posterior region of the resorbed maxilla and mandible may benefit from their successful use in conjunction with axially and tilted implants.[1]

We chose to fabricate an implant-supported, screw-retained hybrid prosthesis with artificial teeth and a minimalized framework encased in a bulky acrylic resin denture base to avoid overloading the implants and to guarantee a more esthetically pleasing result by offering sufficient lip support. Significant benefits of its design were a reduction in the number of implants needed in cases of severe maxillary or mandibular atrophy, better occlusal load distribution, enhanced implant prosthetic hygiene, and esthetics. They also compensated for negative intermaxillary discrepancies.[3]

III. Conclusion

In this particular case, the patient recalled for follow up after seven days, one month, three months, and six months into the six-month follow-up period. It was discovered that the gingival tissues surrounding the abutments were in good health. Patients now feels more confident due to significant improvements in his masticatory function, phonetics, and esthetics. The hybrid prosthesis posed no complications, and the level of patient satisfaction was remarkably elevated.[3]

Acknowledgements
All authors contributed equally to this article.

Conflict of Interest
All authors declare no conflict of interest.

Funding
This study was fully self-funded.

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