

FULL MOUTH REHABILITATION WITH FIXED IMPLANT-SUPPORTED PROSTHESIS : A CLINICAL REPORT

Dr. Saurav Banerjee*, Dr. Shresth Kumar Bhagat**
Dr. Debabrata Biswas***

ABSTRACT

Full mouth rehabilitation with implant supported fixed prosthesis has become very popular due to increased survival rate of the implants and predictability of the treatment. It is an alternative to patients who are not interested in using a removable prosthesis and are willing to maintain proper oral hygiene. Proper diagnosis is of utmost importance before starting a case. This clinical report highlights the rehabilitation of a patient with implant supported fixed prosthesis.

KEY WORDS

implant, prosthesis, survival

ABOUT THE AUTHORS

*Assistant Professor, Dept. of Prosthodontics, Burdwan Dental College and Hospital, Purba Bardhaman, W.B.

**Associate Professor, Dept. of Prosthodontics, Sarjug, Dental College and Hospital, Darbhanga, Bihar

****Associate Professor, Dept. of Prosthodontics
Burdwan Dental College and Hospital, Purba Bardhaman, W.B.

CORRESPONDING AUTHOR

Dr. Saurav Banerjee

Assistant Professor, Dept. of Prosthodontics
Burdwan Dental College and Hospital, Purba Bardhaman, W.B.

INTRODUCTION

Patient care has greatly changed with advances in implant research, design and their various clinical applications. Full arch implant supported prosthesis have become popular in spite of the fact that patients are not psychologically ready for multiple extraction at one visit.^{1,2} A survival rate of implant supported prosthesis has been reported to 95% over 5 yrs.³ Tooth mobility resulting from chronic periodontitis is often associated with systemic conditions and the remaining infection often prevents simultaneous tooth extractions and bone grafting or immediate placement of implants.⁴ Heavy smoking is linked to the degree of severity of periodontal disease. Restoring the oral function and aesthetics in these patients becomes a challenge and requires major bone grafting or artificial gingival tissue.⁵ Implant-supported fixed prostheses in patients with posterior edentulous conditions improved nutrient intake.⁶ Tilted implants have similar success and survival rates compared to axial implants. They also minimize the need of hard tissue grafting procedures, marginal bone levels maintained and anatomical structures are avoided.⁷

CASE REPORT

A 60-year-old male patient presented with multiple missing teeth and advanced periodontal disease. Preoperative clinical and radiographic examination revealed that all his remaining teeth were periodontally compromised with mobility. He had no history of allergies or any other medical illness. A treatment plan was constructed including removal of all his remaining teeth followed by fixed implant-supported prosthesis. The patient was very keen on having a fixed prosthesis in order to avoid wearing the conventional removable dentures. The positioning of maxillary and mandibular incisal edges, lip support, smile line and lip length, contour and emergence were ascertained. The restorative space measured was about 16 mm.

Surgical Procedures and Interim Prostheses

To minimize the number of surgeries and the

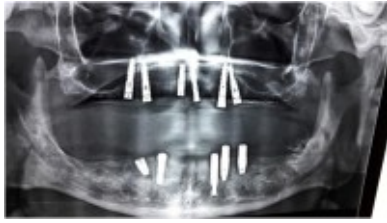


FIGURE 1- IMPLANT PLACEMENT OPG



FIGURE 2- OPEN TRAY IMPRESSIONS



FIGURE 3- MANDIBULAR JIG TRIAL



FIGURE 4-MAXILLARY JIG TRIAL



FIGURE 5-DMLS FRAMEWORK ON CAST



FIGURE 6 -TRY IN OF DMLS FRAMEWORK



FIGURE 7 – ABUTMENTS TIGHTENED INTRORALLY



FIGURE 8–FINAL PROSTHESIS ON CAST



FIGURE 9 - POST OPERATIVE VIEW OF SMILE

length of healing time, removal of his natural teeth and placement of dental implants were done on same day. All remaining natural teeth were extracted and eleven implants (Noris Medical, Israel) were placed. Five implants in the mandibular arch (4.2x 13 mm for #23 region, 4.2 x 11.5 for #13, #24, #25 and 4.2 x 8 mm for # 15 region) and six implants in the maxillary arch (3.75 x 13 mm for #11 region and #12, 3.75 x 13 mm for #14, #15, #24 and #25, 4.2 x 13 mm region was placed. Few implants were placed at approximate tilt of 15 degrees. Alveolectomy and ridge reduction to obtain an optimum prosthetic platform was done before implant placement. Healing abutments were placed on implants which had insertion torques of 40 N/cm² and on the rest healing screw was placed. Interrupted sutures were performed and an immediate denture with tissue conditioner (Coe Comfort, GC) was deliver to reduce the occlusal loads on the implants.

After 4 months, the second-stage surgery was performed on the implants having the healing screw. The #25 implant in the maxillary arch was lost when trying to un cover the healing screw. The implants were uncovered with a small crestal incision and the

healing abutments were placed. After the implant placement and second-stage surgery, interim complete dentures were again relined with tissue conditioner (Coe Comfort, GC).

Fabrication of Final Prostheses

Open tray impressions were taken with impression copings splinted together using pattern resin for both maxillary and mandibular arch. The lab analogues were attached and the impressions were sent to the lab. The positioning jig received from the lab was tried in the patient's mouth to confirm its accuracy.

Due to the added cost, multi-unit abutments were not used instead angle correction was done by 15-degree angulated abutments and modification of standard abutments. A direct metal laser sintering (DMLS) prosthesis was fabricated. This system uses the computer aided design (CAD) data to fabricate the desired frame by selectively sintering the alloy powder layer by layer. It offers an enhanced tensile strength and highly biocompatible. The problem of

shrinkage associated with casting is completely eliminated here.

The prosthesis was fabricated with mutually protected occlusion with minimum vertical overlap, no interference in lateral excursions and there was cross arch stabilization. Occlusal contact was present from canine to canine only with shimstock drag on the posterior teeth. Due to cost, gingival colour porcelain was not added. The prosthesis had a passive fit with no tension on any abutment. The occlusal contacts were evaluated and adjusted. The vertical dimension of occlusion was evaluated using existing interim dentures. The prostheses screws were tightened to 25 N/cm². The screw access holes were filled with composite resin (Tetric N-Ceram-Ivoclar/Vivadent). The prosthesis was cemented with Glass ionomer luting cement (GC Corporation Gold Label Type 1, GC corporation, Tokyo, Japan). Care was taken to remove excess cement. Hygiene instructions were also provided to the patient. The patient was instructed to wear the occlusal splint at night to prevent implant overloading from possible parafunction.

The patient was followed up one week, one month, three months, six months, one, two, and three years after the prostheses were delivered. The patients had a six-month-hygiene recall. There has been no clinical mobility. The patient reported improvement of masticatory function and aesthetics. No complications including fracture of prostheses, loosening of prostheses, abutments, or implants were found.

DISCUSSION

The advantages of using fewer implants and a unitary prosthesis are documented in literature and complications commonly involve are fracture or detachment of acrylic teeth and reduced access for proper oral hygiene and related biologic complications.⁷ Implant location, type of restoration, and implant number do have an influence on the estimated implant loss rate.⁸ Implant-supported fixed prostheses are a safe and predictable treatment method with high survival rates, However 33.6% of biological and technical complications have been reported.⁹ The mechanical and technical complications were associated with implant diameter, abutment-implant connection and retention system. Loss of screw access filling was the most frequent prosthetic complication, followed by the fracture of the porcelain. Full-arch metal-ceramic prostheses show a high prevalence of implant and prosthesis survival, with few biological and mechanical-technical complications.¹⁰

Four-implant-supported fixed prostheses with the All-on-4 concept and four-implant-retained overdentures present similar marginal bone loss and quality of life scores after 2 years of function¹¹. However, patients found overdentures easier to clean

but more painful in comparison with the fixed prosthesis.¹²

Metal-acrylic hybrid prosthesis are one of treatment protocols for full arch implant cases due to simplicity of use, reduced cost. However, their high complication rates for denture teeth debonding, veneering acrylic fracture and screw/abutment loosening are time consuming for both patient and clinicians. Fracture or wear of the reconstruction materials in resin-based superstructure prosthesis should be considered a risk when considering these types of restorations leading to inconveniences and financial challenges for both patient and clinician.¹³⁻¹⁵ Bruxism is an important contributor to implant and prosthesis failure and also increases the prevalence of technical complications in implant supported fixed prosthesis so the patient was advised to wear an occlusal splint.¹⁶ The limitations of this case was the use of non-retrievable cement retained prosthesis and not using a one-time definitive abutment. One time abutment minimizes the marginal bone loss but increases the cost factor. Cement retained ensured that the prosthesis is completely passive again excess cement should be completely removed otherwise it can lead to future peri-implantitis.

CONCLUSION

Existing literature demonstrated that maxillary and mandibular edentulism may be treated successfully using alternative approaches involving four, six, or more implants. Proper diagnosis, treatment plan and maintenance require advanced knowledge and careful execution on the part of the clinician. The prosthesis requires maintenance, repair in case of ceramic fracture and possible multiple replacements in the future.

REFERENCES

1. Avivi-Arber L, Zarb GA. Clinical effectiveness of implant-supported single-tooth replacement: the Toronto Study. *Int J Oral Maxillofac Implants.* 1996 May-Jun;11(3):311-21.
2. Scheller H, Urgell JP, Kultje C, Klineberg I, Goldberg PV, Stevenson-Moore P, Alonso JM, Schaller M, Corria RM, Engquist B, Toreskog S, Kastenbaum F, Smith CR. A 5-year multicenter study on implant-supported single crown restorations. *Int J Oral Maxillofac Implants.* 1998 Mar-Apr; 13(2):212-8
3. Rammelsberg P, Schwarz S, Schroeder C, Bermejo JL, Gabbert O. Short-term complications of implant-supported and combined tooth-implant-supported fixed dental prostheses. *Clin Oral Implants Res.* 2013 Jul;24(7):758-62
4. Kfir E, Kfir V, Kaluski E. Immediate bone augmentation after infected tooth extraction using

- titanium membranes. *J Oral Implantol.* 2007;33(3):133-8
5. Heasman L, Stacey F, Preshaw PM, McCracken GI, Hepburn S, Heasman PA. The effect of smoking on periodontal treatment response: a review of clinical evidence. *J Clin Periodontol.* 2006 Apr;33(4):241-53
 6. Fukahori S, Kondo Y, Nodai T, Aonuma F, Tamura A, Tsuka S, Mukaibo T, Masaki C, Hosokawa R. Implant-supported fixed prosthesis improves nutrient intake in patients with partial edentulous posterior regions. *J Prosthodont Res.* 2019 Oct;63(4):411-414.
 7. Kim KS, Kim YL, Bae JM, Cho HW. Biomechanical comparison of axial and tilted implants for mandibular full-arch fixed prostheses. *Int J Oral Maxillofac Implants.* 2011 Sep-Oct;26(5):976-84
 8. Gallucci GO, Avrampou M, Taylor JC, Elpers J, Thalji G, Cooper LF. Maxillary Implant-Supported Fixed Prosthesis: A Survey of Reviews and Key Variables for Treatment Planning. *Int J Oral Maxillofac Implants.* 2016;31 Suppl:s192-7.
 9. Kern JS, Kern T, Wolfart S, Heussen N. A systematic review and meta-analysis of removable and fixed implant-supported prostheses in edentulous jaws: post-loading implant loss. *Clin Oral Implants Res.* 2016 Feb;27(2):174-95.
 10. 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 Oct;23 Suppl 6:22-38
 11. Mumcu E, Dayan SC, Genceli E, Geckili O. Comparison of four-implant-retained overdentures and implant-supported fixed prostheses using the All-on-4 concept in the maxilla in terms of patient satisfaction, quality of life, and marginal bone loss: a 2-year retrospective study. *Quintessence Int.* 2020;51(5):388-396.
 12. Gonzalez-Gonzalez I, deLlanos-Lanchares H, Brizuela-Velasco A, Alvarez-Riesgo JA, Llorente-Pendas S, Herrero-Climent M, Alvarez-Arenal A. Complications of Fixed Full-Arch Implant-Supported Metal-Ceramic Prostheses. *Int J Environ Res Public Health.* 2020 Jun 14;17(12):4250
 13. Barootchi S, Askar H, Ravidà A, Gargallo-Albiol J, Travan S, Wang HL. Long-term Clinical Outcomes and Cost-Effectiveness of Full-Arch Implant-Supported Zirconia-Based and Metal-Acrylic Fixed Dental Prostheses: A Retrospective Analysis. *Int J Oral Maxillofac Implants.* 2020 Mar/Apr;35(2):395-405
 14. Ravidà A, Barootchi S, Tattan M, Saleh MHA, Gargallo-Albiol J, Wang HL. Clinical outcomes and cost effectiveness of computer-guided versus conventional implant-retained hybrid prostheses: A long-term retrospective analysis of treatment protocols. *J Periodontol.* 2018 Sep;89(9):1015-1024
 15. Fischer K, Stenberg T. Prospective 10-year cohort study based on a randomized, controlled trial (RCT) on implant-supported full-arch maxillary prostheses. part II: prosthetic outcomes and maintenance. *Clin Implant Dent Relat Res.* 2013 Aug;15(4):498-508
 16. Chrcanovic BR, Kisch J, Larsson C. Retrospective evaluation of implant-supported full-arch fixed dental prostheses after a mean follow-up of 10 years. *Clin Oral Implants Res.* 2020 Jul;31(7):634-645.