

Rehabilitation of Edentulous Mandible with Endosseous Implant Supported Fixed Prosthesis - A Case Report

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INTRODUCTION

Treatment of the edentulous dental arches with endosseous implant supported fixed prosthesis has gained popularity in dentistry. It has many advantages compared to a removable denture, including increased patient satisfaction, improved speech, aesthetics, function and confidence. Correct diagnosis and accurate implant planning lead to successful complete arch implant rehabilitation and hence, provide the patient with desirable aesthetic and functional outcomes.

Edentulism can lead to complications in aesthetic, functional and psychological aspects of an individual. In earlier days, conventional complete denture prosthesis served as the sole line of treatment option for such cases. Nevertheless, most of the patients using conventional removable denture find it difficult in adapting to their prosthesis due to psychological issues. Now a days, implant supported prosthesis give them an opportunity to lead a normal healthy life fulfilling their functional and aesthetic requirements.^[1]

One of the well documented treatment modalities in implant dentistry for patients with edentulous arches is the fixed implant rehabilitation with an implant-supported complete dental prosthesis. Beyond four decades of clinical experience emphasize the effectiveness of this technique.^[2]

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A patient with a completely edentulous mouth with compromised bone height and width can be successfully rehabilitated using an implant-supported fixed prosthesis as hostile to implant-supported over dentures. Younger patients benefit tremendously within the long run as the implants conserve bone,^[3] enhance aesthetics and phonetics,^[4] and reinstate the patients' masticatory efficiency and confidence.^[5] However, the success of full arch prosthetic rehabilitation depends upon stability and retention. Instability, leading to diminished function and discomfort are the frequent complaints of patients with removable mandibular prosthesis. In this scenario, implant supported prosthesis can significantly reduce discomfort and improve masticatory function thereby, quality of life. The treatment concept for a full arch edentulous patients should consider the following parameters such as a minimum of four implants per arch should be placed in the anterior mandible or pre maxilla and care should be made to tilt the posterior implants to bypass the anatomic structures such as maxillary sinus and inferior alveolar nerve, other factors to consider are reducing the length of distal cantilever; cross arch stabilization of the implants that are splinted; providing a provisional prosthesis, and if required, immediate loading of the provisional prosthesis postoperatively.^[6]

Furthermore, decision to treat an edentulous arch using an implant supported fixed prosthesis could also be influenced by five crucial factors: number of implant abutments, location of placement, quality of the host tissue, quantity of the host bone or the amount of residual ridge and amount of circum-oral activity or generosity of patients smile line.^[7] The constant research conducted on diagnostic tools, treatment planning, design of the implants, materials and techniques; rehabilitation of many challenging situations showed predictable success.^[8]

Nevertheless, rehabilitation of completely edentulous patient constantly presents challenge to the dentist. According to literature, the fixed implant supported prosthesis showed high success rates and relatively low postoperative complications.^[9] Hence, the purpose of this article is to report a case of full-arch rehabilitation with endosseous implants following the standard surgical and prosthetic protocols.

PRESENTATION OF CASE

A 58-year-old male patient reported to a private dental clinic with a chief complaint of missing teeth in the lower arch along with a non-functional crown and bridge placed few years back and he wanted to replace it by fixed prosthesis. Proper case history was recorded for the patient including medical history which was non-contributory, with relevant laboratory tests, and intraoral examination. Patient was advised to undergo full mouth radiography (orthopantomogram- OPG) and cone beam computed tomography (CBCT).

Patient was educated and motivated for the placement of implant supported fixed prosthesis. Impressions were made and diagnostic casts were fabricated. Using CBCT the length of available bone was calculated and appropriate sized implants were selected. It was decided to place 8 endosseous implants for the edentulous jaw (Figure 1).

DISCUSSION OF MANAGEMENT

Surgical Phase

Patient consent was taken prior to surgery. Two-stage surgical protocol was planned and patient was put on antibiotics and analgesics prior to surgery. All the remaining teeth in the arch (45, 34, 34) were extracted prior to surgery under anaesthesia. Crestal incision was given from the mandibular left second molar to right second molar under local anaesthesia and mucoperiosteal flap was raised. A pilot drill followed by sequential drills was made in the third quadrant second molar region, two implants of size 5 × 10 mm and 5 × 8 mm (NR LINE DENTIUM Endosseous Implants with Internal Hex) were placed in the adjacent osteotomy site and wrenched with the help of a torque wrench. Cover screw was placed after achieving primary stability. The remaining six implants, two each, were placed at the bilateral canine (4.2×13 mm) and the fourth quadrant second molar area (5×10 mm) (Figure 2). Interrupted sutures were given and the patient was advised to take postoperative medications. Implants were submerged and allowed for osseointegration for 4 months.

After four months, patient was recalled and OPG was advised to evaluate osseointegration; one of the implants in the third quadrant showed signs of failure with inadequate osseointegration and it was removed. Based on radiographic analysis second stage surgery was planned.

Second Stage Surgery

Crestal incision was placed under local anaesthesia; mucoperiosteal flaps were then reflected followed by removal of cover screws, which was then replaced by healing abutments. Sutures were placed, which was removed after one week. Impression was made after two weeks to allow for the formation of gingival emergence profile (Figure 3).

Prosthetic Phase

After two weeks, healing abutments were removed and impression copings were placed in position (Figure 4). Open tray impression was made with elastomeric impression material and was sent to the laboratory for further processing. Occlusion and occlusal plane were established by jaw relation on the occlusal rim prepared using modelling wax. Later, jig trial (Figure 5a, 5b) and teeth setting trial (Figure 6) was carried out to refine occlusion, followed by metal trial (Figure 7a, 7b, 7c), before final fixing of porcelain fused to metal screw retained segmental (5+5+3 units) implant supported fixed partial denture (Figure 8). Oral hygiene instructions were reinforced and patient was kept on follow up.

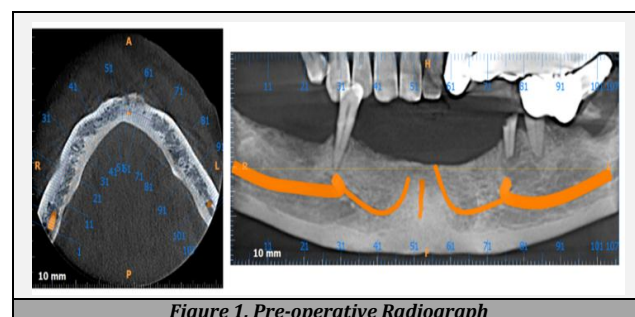


Figure 1. Pre-operative Radiograph

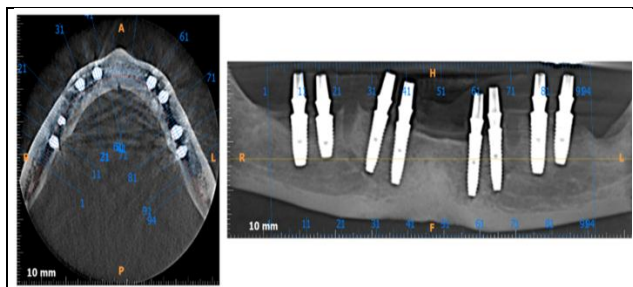


Figure 2. Post-operative Radiograph



Figure 3. Gingival Emergence Profile



Figure 4. Impression Copings



Figure 5a. Jig Trial Prepared



Figure 5b. Jig Trial on Patient



Figure 6. Teeth Setting Trial



Figure 7a. Metal Trial Prepared



Figure 7b. Metal Trial on Patient



Figure 7c. Metal Trial Bite

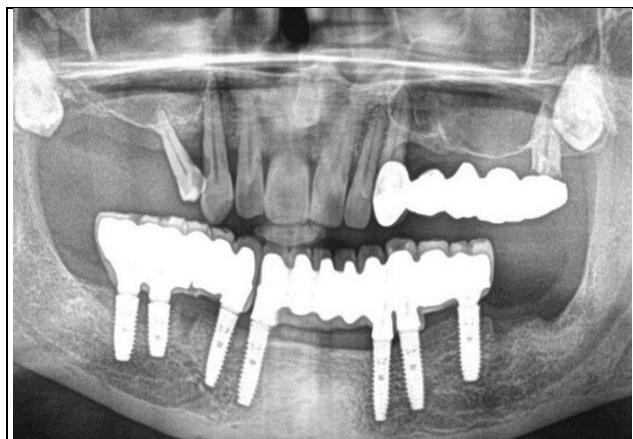


Figure 8. Post Rehabilitation Radiograph

DISCUSSION

Complete edentulism is considered as a potential health problem and a complete denture is the conventional therapy for edentulous arches. Besides there are numerous problems associated with dentures which include inability in chewing, complications with articulation, physiological strain and social impairment. Fortunately, the progress achieved by dentistry, especially in the field of dental implants, offers many revolutionary treatment options for edentulous patients. Among these are full arch implant reconstructions using implant supported removable denture (overdenture), implant supported fixed denture and combination of both. Acceptance, circumstances and financial capacities are often prime concerns in decision making. Anatomic considerations and surgeon's knowledge govern the success of the procedure. Therefore, goal of the treatment should be based on clear concept and expertise.^[10]

There are countless benefits for implant-retained prostheses when compared to conventional, edentulous restorative options. Comparing conventional denture treatment, patients wearing implant-retained prostheses manifested improved neurosensory and tactile sensitivity over conventional therapy, replicating the sense of a real dentition.^[11]

Moreover, fixed implant supported prosthesis can be used to satisfyingly rehabilitate edentulous mandible with sufficient width and height of bone. A common approach followed is the placement of implants in the inter foraminal region and a complete arch fixed implant supported prosthesis using a distal extension cantilever.^[12] Nevertheless, due to the unfavourable arms, high level of stress can be induced on the bone by this type of prosthesis eventually leading to implant failure. This can be resolved by improving the distribution of stresses, favouring implant support, by the use of multiple implants in anterior and posterior mandible.^[13] Further, it was discussed that biomechanical effects of median mandible flexure are caused due to accumulation of stress in implant supported prosthesis. To counteract median mandibular flexure of mandible, the segmental prosthesis is preferred.^[14]

In this case report, the edentulous mandible was restored with endosseous implant retained fixed prosthesis. According to the preliminary clinical and radiographic examination, eight implants were surgically placed in the mandible adhering to the manufactures' guidelines. After four months second stage

surgery was carried out following the removal of one failed implant. Finally, a screw retained segmental PFM crown was delivered. Furthermore, full arch segmented screw retained prosthesis is preferable over cemented prosthesis considering the ease of detachment and repair.

CONCLUSIONS

Full-arch rehabilitation, as proposed by many dental practitioners, as a restorative option for edentulous arches in dental settings, has gained popularity in the clinical practise. Countless reports in literature have substantiated the use of fixed and removable, full-arch implant-supported prostheses. Precise diagnosis and treatment planning are fundamental for successful outcome of implant rehabilitation, to bring forth patients with desirable aesthetic and functional results.

Declaration of Patient Consent

The authors certify that they have acquired all relevant patient consent form. In the form the patient has given his consent for his images and other required 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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