

# Implant supported overdenture in the patients with history of radio and chemotherapy for the prostate malignancy

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## ABSTRACT

The success of dental implants in patients that have undergone chemo and radiotherapy for a region other than head and neck remain unclear, although some local and systemic factors could be contraindications to dental implant treatment. As there are very few absolute medical contraindications to dental implant treatment, but a number of conditions may increase the risk of treatment failure or complications. The case report describes the successful survival of dental implants placed in maxilla and mandible of a patient who had undergone radio and chemotherapy for prostate cancer.

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## INTRODUCTION

In the past two decades, replacement of missing teeth with implant supported prosthesis has become a widely accepted treatment for the oral rehabilitation of partially or fully edentulous patients. Osseointegrated implants have provided long-term success in complete and partially edentulous patients. Treatment options can be broadly divided into the fixed implant-supported prosthesis and removable implant-supported prosthesis. Fixed implant supported prosthesis have various advantages over a removable implant-supported prosthesis like improved functional capability, less food entrapment, less maintenance, longevity, etc., and fixed prosthesis can be cement-retained or screw retained.

In the general population, long-term success rates of dental implants over 90–95% are considered to be realistic treatment outcomes. Proper diagnosis and

treatment planning determines the correct number of implants, their location, and angulation, thus aiding in the success of prosthesis. However, clinicians must temper their enthusiasm for implant dentistry with thorough knowledge and understanding of the physiologic implications of existing systemic diseases or systemic therapies for treatment outcome and patient well-being. Before considering any form of endosseous implant therapy in any patient, the medical history must be thoroughly reviewed and, if appropriate, a physical examination should be performed. An existing systemic disease or ongoing systemic therapy may complicate or contra-indicate the implant dentistry. An increased knowledge of the underlying disease process can improved the management of patients suffering from bone metabolism abnormalities, diabetes mellitus, xerostomia, and antineoplastic chemotherapy.<sup>[1]</sup>

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As dental management of patient under radiation therapy is a serious undertaking since the standard of care has a direct effect on quality of life of the patient. This case report described the placement of two endosteal implants in the inter-foraminal region with locator attachments in mandible and placement of four implants in the anterior maxillary region with bar and clip attachment for implant supported overdenture in the patient who has undergone chemo and radiotherapy for prostate cancer 5 years ago.

## CASE REPORT

A 60-year-old male patient reported to the Department of Prosthodontics, Seema Dental College and Hospital with the chief complaint of difficulty in chewing, worn out multiple teeth in maxillary and mandibular arch and wanted treatment for the same. Dental history revealed that the patient had undergone uneventful extractions 7 years back due to periodontal involvement and did not have any past denture history. The patient was a chronic smoker, and medical history revealed that he had undergone three cycles of chemotherapy with cabazitaxel and radiation therapy 5 years back for hormone-refractory metastatic prostate cancer. He was currently on oral bisphosphonates therapy since 2 years. All vital signs and apart from total leukocyte count, rest of the blood investigation was normal. Intraoral examination revealed chronic generalized periodontitis with carious and severely attrited teeth [Figure 1]. For radiographic investigations, denta-scan was taken. After thorough intraoral examination, it was planned to extract the remaining teeth followed by the placement of two implants in the inter-foraminal region of the mandible, locator abutment assembly were used to retained the mandibular denture and four implants in the premaxillary region was planned, over which hader-clip bar assembly is used to support the maxillary denture. After taking consent from the patient and clearance from his oncologist, the treatment was carried out.

## CLINICAL PROCEDURE

- Diagnostic impressions and casts were made and studied, full mouth extraction was planned, followed by placement of two implants in mandibular inter-foraminal region and four implants in the premaxillary region for implant supported overdenture. Denta-scan was used to identify the volume of available bone and to standardize length and width of the implant being used [Figure 2]
- The patient was instructed to discontinue bisphosphonate therapy 3 months before and after surgery and was also asked to avoid aspirin, Vitamin E, glucocorticosteroids 1-week prior, to the surgery
- Prior to surgery an antibiotics coverage tablet

Augmentin-625 mg two times a day, tablet Aceclofenac SP-3 times a day, capsule zevit - once in a day for 7 days were prescribed to the patient

- One or two ounces of chlorhexidine mouthwash 2 times daily was advised
- Bilateral maxillary and the mandibular block were administered to the patient lidocaine 2% with 1:200,000 adrenaline
- After extraction of all mandibular teeth, two implants of 13.5 mm length and 3.35 mm width were selected and placed immediately at planned A and E site in the inter-foraminal region [Figure 3]. Healing abutment were placed over implants and closure of the surgical wound was done with 4-0 vicryl suture material
- For maxilla, a crestal incision was given in the labial sulcus approximately 1 cm from alveolar crest with



Figure 1: Preoperative view

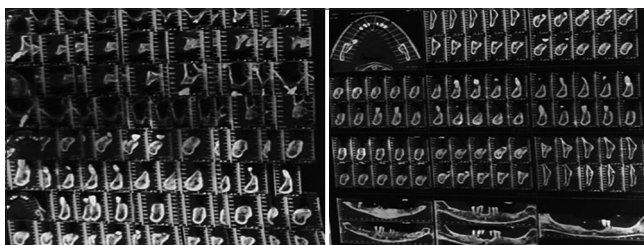


Figure 2: Denta-scan



Figure 3: Implant placed at A and E site

B.P handle no. 3 and blade no. 15; the flap was reflected with a periosteal elevator. The twist drill of diameter 0.2 mm was used as a starter drill with a speed set at 2500 rpm with copious irrigation of normal saline 15 mL per min. The force direction indicator (parallel pin) of 0.2 mm diameter was placed in the prepared hole, and angulation was checked to aid in parallel implant site preparation. After checking parallelism, the depth drills of diameter Ø 2.8 mm, Ø 3.2 mm and Ø 3.65 mm and Ø 4 mm were used

- Four implants of 13.5, 13.5, 10, 10 mm length and 3.35, 3.35, 4, 4 mm width respectively were selected for the premaxillary region. Two implants in lateral incisor region of the maxilla were placed, and two implants in first premolar region were placed after extraction of remaining teeth. Healing abutments were placed over the implant and closure of the surgical site was done with 4-0 vicryl suture material [Figure 4]
- The patient was given postoperative antibiotics for 7 days along with chlorhexidine mouthwash 4 times daily until the sutures were removed. The patient was recalled for follow-up
- After 6 months of postoperative healing [Figure 5], radiographic examination showed well-osseointegrated implants with no evidence of any resorption around the implant [Figure 6]
- After that, preliminary impressions were made, and the casts were poured [Figure 7]

- The custom trays were fabricated on the primary cast to be utilized for the open-tray impression technique [Figure 8]
- Border molding for maxillary and mandibular arches was done [Figure 9]
- Transfer copings were attached to the maxillary implants and secured with floss and pattern resin [Figure 10]
- The final impressions were made using poly-vinyl siloxane impression material and master casts were prepared [Figure 11]
- For the maxillary denture, plastic milled hader-clip bar was fabricated, and locator attachment assembly was incorporated in the mandibular denture in the laboratory [Figure 12]
- The milled bar and two locator abutments were screwed to the maxillary and the mandibular implants respectively [Figure 13]
- The finished and polished maxillary and mandibular implant-supported overdentures were inserted [Figure 14]
- Oral hygiene maintenance instructions were given. The patient was recalled, and necessary postinsertion adjustments were done regularly. Follow-up was done for 2 years. There was increased patient acceptance and improvement in retention, stability, function, a high degree of satisfaction, and improved esthetics was observed with mandibular and maxillary implant-supported overdenture in place [Figure 15].



Figure 4: Suture placed

## DISCUSSION

Radiation and chemotherapy have been a boon to the medical profession for the treatment of patients with

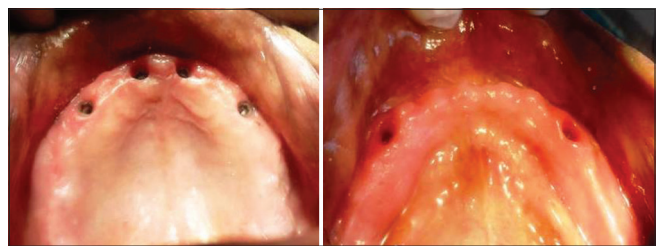


Figure 5: Intra oral view showing 6 months of postoperative healing

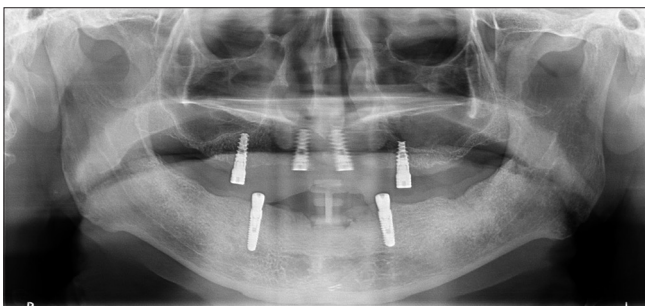


Figure 6: Six months postoperative view



Figure 7: Primary impressions of maxillary and mandibular arches



Figure 8: Custom trays



Figure 9: Border molding done for maxillary and mandibular arches

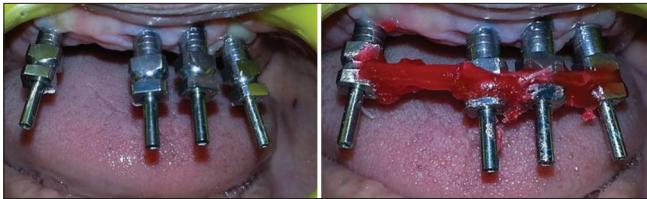


Figure 10: Transfer copings were attached to implants and secured with pattern resin



Figure 11: Combination of putty and medium body addition silicon was used for secondary impressions made with open-tray transfer copings



Figure 12: Master cast with plastic milled bar for maxillary overdenture



Figure 13: Milled bar in maxilla and locator abutments in mandible

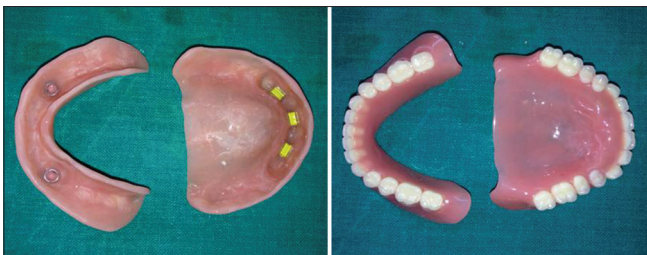


Figure 14: Finished and polished mandibular implant supported overdenture showing o-ring with metal housing and maxillary overdenture denture showing clips for bar attachment

malignant conditions. As a prosthodontist, we can become a helping hand to the oncologists and radiation therapists in improving the quality of the treatment rendered to such patients. Thorough knowledge and skills of prosthodontist can improve the quality of life for patients undergoing radiation and chemotherapy therapy.

Bisphosphonates are used as a chemotherapeutic agent and as an adjuvant to therapies for the treatment of prostate cancer. In past chemotherapeutic agent was thought to be an absolute contraindication for implant patients. However, the increased successes of this therapy

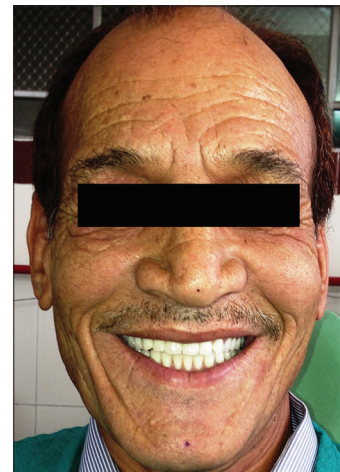


Figure 15: Postoperative view

and increasing quality of life patient have been reported.<sup>[1]</sup> Hoff *et al.* suggested that the fact should not be overlooked

that Bisphosphonates offer major therapeutic benefits to individuals with metastatic and metabolic bone disease.<sup>[2]</sup> Bisphosphonate therapy should remain an important medical treatment yet there are a number of implications for dentistry. Wang *et al.*<sup>[3]</sup> reported the first case of osteonecrosis of the jaw associated with bisphosphonate therapy in cancer patients. Bisphosphonates bind and accumulate in bone and remain there for months after therapy is discontinued. Hence, discontinuation before the surgical procedure is necessary, and care must be taken to evaluate the timing of the chemotherapy. The latest study shows that oral bisphosphonate have a very low probability of causing osteonecrosis.<sup>[4]</sup> So, it is necessary to evaluate the risk versus benefits of dental treatment that must be discussed with the patient in detail for successful treatment. It is intricate to reach a definitive conclusion regarding the influence of chemotherapy on the survival of dental implants so long-term studies are needed that will be more revealing of the influence of chemotherapy-related to peri implantitis and bone loss around the implant.

In cases of mandibular overdenture prostheses that are supported by both implants and mucosa, fewer implants may be needed, as the number has been shown to be of minor importance for the treatment outcome of the patients.<sup>[5]</sup> Batenburg *et al.*<sup>[6]</sup> did a study on 60 patients which were divided into two groups: First group was treated with 2 implants and other with 4 implants and found no significant difference in peri-implant health. Even with increasing the number of implants from 2 to 4 there is only a slight improvement in retention, stability and function as reported in retrospective study done by Mericske-Stern and Zarb<sup>[7]</sup> in 1993, Sadowsky proposed placement of two implants in edentulous mandible with success rate of 98%.<sup>[5]</sup> Implant supported mandibular overdentures using two isolated abutments are successful treatment options, but they can be demanding in periodic continuing care.<sup>[8,9]</sup> It is mostly used as it is economic, less technique sensitive and easy to clean when compared to bar attachment.<sup>[10-12]</sup> A study done by Krennmair and Ulm evaluated that when the bar-clip attachment was retained by two implant mandibular dentures at initial evaluation and follow-up of 10 years of function showed no marked increase in satisfaction level. Generally, a minimum of 5–6 mm of vertical space is needed to accommodate the implant attachment. When the amount of inter arch space is not adequate the locators abutments can be a better option than the ball attachments.<sup>[13]</sup> Magnets can be used as an attachment system in the cases having less interarch space. It is cost-effective and there is ease of placement (automatic seating) but they are less retentive when compare to other attachment systems even have poor corrosive resistance within oral fluid which makes it less demanding than other systems used.

A variety of techniques have been reported in the literature for the incorporation of attachments in implant-supported overdenture with unsplinted or individual abutments. Uludag and Sahin described a two stage impression technique that records mucosa in a functional state and placement of implant components.<sup>[14]</sup>

In the maxilla, an average of four to six implants is used to support bar overdenture. Yet the edentulous maxilla has the lowest implant survival for either fixed or removable implant restorations compared with a mandibular prosthesis. The provision of lip support due the flange of a denture and reduced processing fee are the primary advantages of maxillary implant-supported over denture over a fixed prosthesis and moreover the biomechanical disadvantage of the maxilla that is poor bone quality and distribution of forces favor the use of RP-5 prosthesis.<sup>[1]</sup>

A technique for successful survival of dental implants for a patient that had undergone radio and chemotherapy for prostate cancer was discussed in this case report. The implants were in relatively parallel position, and minimal alveoloplasty was performed and technique was less expensive, and the seating of attachments was confirmed instantly<sup>[15]</sup> without compromising esthetic state and function.<sup>[16]</sup>

Even the patient with implant supported maxillary and mandibular overdenture was highly satisfied and showed increased masticatory performance, improved esthetics appearance, nutritional intake, and marked increase in retention, stability, and support.

## CONCLUSIONS

Restoration of total/partial edentulism with dental implant was found to be osseointegrated and remains functionally stable in patients that had undergone radio and chemotherapy for prostate cancer. In such compromised condition, the extra precaution should be taken into consideration to assess the patient's well-being for the survival and success of dental implants. Here a procedure was discussed that offers distinct advantages to many patients who benefit from two or more carefully placed implants. With fewer implants and increased access, the overdenture worked well for the patient with limited hygiene maintenance ability.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other 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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### Conflicts of interest

There are no conflicts of interest.

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