Oral rehabilitation of segmental mandibulectomy patient with osseointegrated dental implant

Archana Singh, Atul Bhatnagar, Rajesh Bansal, B. P. Singh

Abstract

Surgical management of oral cancer lesions results in explicit aesthetic and functional disfigurement, including facial deformity, loss of hard and soft tissue, impaired speech, swallowing and mastication, which modify the patient's self-image and quality-of-life. Recent advances in head and neck reconstruction techniques and dental implant based prosthetic rehabilitation may significantly improve the quality-of-life and self-esteem for such post-surgery patients. This clinical report describes rehabilitation of oral cancer patient having segmental mandibulectomy with implant-supported fixed partial denture.

Keywords: Dental implant, oral cancer, segmental mandibulectomy

Introduction

Prosthodontic rehabilitation of oral cancer patients with osseointegrated dental implants may considerably improve their contentment, happiness, physical and mental health, and also enhances quality-of-life. Oral and oropharyngeal cancer accounts for 3-5% of all cancer occurring in the body. Approximately, 50% of these are located in the oral cavity, and more than 90% are squamous cell in origin.

Dependent upon clinical stage of oral cancer, surgical resection, radiotherapy or a combination may be the treatment plan. Complete or partial resection may result in mandible discontinuity, muscular disbalance, and dissymmetry in mandibular movements. Prospect to achieve proper stability and retention for conventional mandibular prosthesis are critically hampered due to the change in intra-oral conditions.[1] Recently, endosseous implants are often used for prosthetic support in patients, treated for oral cancers.[2] In non-irradiated mandibles. The implant survival rate is at least 90% (mean 96.1%, range 74.8-100%).[3,4] The aim of this case report is to describe the oral rehabilitation of non-irradiated oral cancer patient with implants, who underwent segmental mandibulectomy.

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Case Report

A 68-year-old male patient diagnosed with squamous cell carcinoma of verrucous variety of buccal mucosa ($T_3N_0M_0$) involving labial sulcus, angle of mouth and patches in retromolar space was referred to the Department of Prosthodontics, Banaras Hindu University. The patient underwent surgery in 2001, and after that due to recurrence of disease, in 2009 a segmental mandibulectomy with modified radical neck dissection was undertaken, which resected right side of the mandibular structure; only a portion of ascending ramus and condyle remained. According to Jewer classification[5] it was type L" segmental mandibulectomy. Surgical reconstruction was done only with a metal plate without bone graft reconstruction [Figure 1]. His chief complaints were impaired mastication, speech, and swallowing after extensive resection of mandible in 2009 [Figure 2a]. Clinical and radiographic examination showed roots stump and only one molar tooth was present on the left side of remaining half mandible. Segmental mandibulectomy rendered conventional denture provision, nonfeasible. Patient was unwilling to undergo bone grafting and reconstruction on defect side. The patient was willing and keen at having fixed prosthetic treatment on nonresected mandibular segment only. Pre-surgical radiographic evaluation was carried out with panoramic radiograph and CT dentascan [Figure 2b] for appropriate treatment planning.

Treatment plan of placing four endoosseous implant (Hi-Tec tapered self-threaded, Life Care Devices Private Limited, Israel) was selected. The diameter of implants used was 3.75, 4.2, and 5 mm with variety of lengths (8-13 mm), depending on the bone morphology.

An injection of local anesthetic (2% lidocaine with 1:100,000 epinephrine) is administered. Surgical stent was placed, and after sequential drilling implant was placed in bone with the insertion torque of 35-45 N cm [Figure 3a]. Appropriate antibiotic (amoxicillin 500 mg, 3 times daily for 7 days) and analgesic (ibuprofen 800 mg, every 4-6 h as needed) were prescribed and postoperative instructions were given. A 2-3 month of the healing period was allowed to ensure osseointegration prior to exposure of the submerged implants. After healing Impression was made by open window tray technique using vinyl polysiloxane impression material (Aquasil, Milford, DE).

The master cast obtained was mounted on a semi adjustable articulator. The abutment was prepared outside the mouth on the working cast. The working cast was then sent to laboratory for fabrication of cement retained fixed prosthesis. The trial of metal ceramic bridge was made; occlusion was corrected and cemented onto the implant [Figure 3b]. Follow up was carried out at 6, 12 and 18 months interval and it was observed that implants were adequate in function and esthetics.

Figure 1: Segmental mandibulectomy and reconstruction with a metal plate

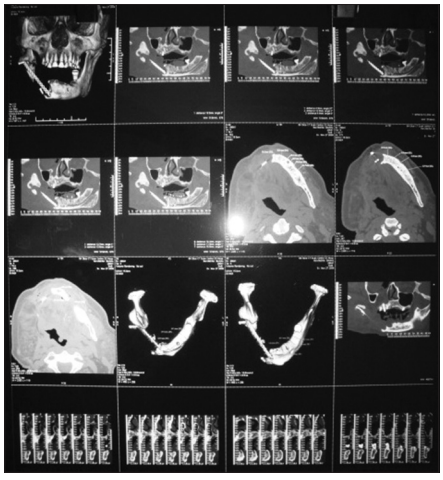

Figure 2b: Pre-operative dentascan showing available bone width and height

After 36 months, patient reported with slight mobility with respect to prosthesis. On clinical examination a screw fracture in one of the implant was detected [Figure 4a]. The implant retained prosthesis was removed, and implant with screw fracture was made a sleeper implant, and the case was restored with remaining three implants supporting cement-retained fixed prosthesis [Figure 4b]. Follow up was done at 3, 6, and 12 months [Figure 4c].

Discussion

Verrucous carcinoma is a variant of SCC but shows different clinicopathological behavior of local invasiness, low-grade malignancy and rarely shows distant metastasis.[6] The most common site is the buccal mucosa (57.9%), followed by the tongue (13.2%), and T3 lesions are the most common type (34.2%). The reported 3-year overall survival rate is 94.7% and tumor control rate is 100%.[7,8] Surgical treatment of oral-cancer often results in an unfavorable anatomic and

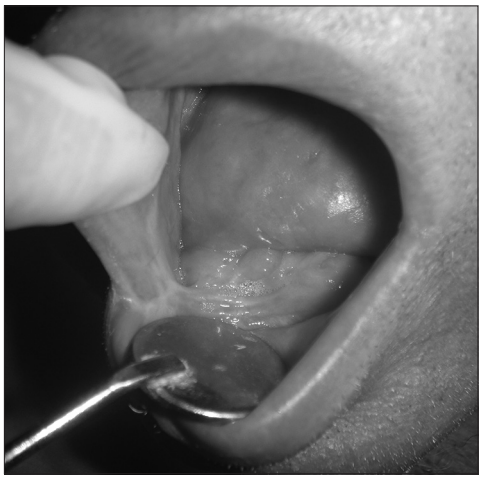

Figure 2a: Pre-operative intraoral view

Figure 3a: Four tapered self-threaded implant (Hi-Tec tapered self-threaded, Life Care Devices Private Limited, Israel) of varying diameter 3.75, 4.2 and 5mm and lengths (8-13 mm) was inserted to desired depth after sequential osteotomy

Figure 3b: Metal ceramic bridge is trial and cemented on implant abutment

Figure 4b: The implant-retained prosthesis is removed, make implant with screw fracture as sleeper implant, and restored the remains three implant with cement-retained fixed prosthesis

Figure 4a: Intra-oral view of fracture abutment screw

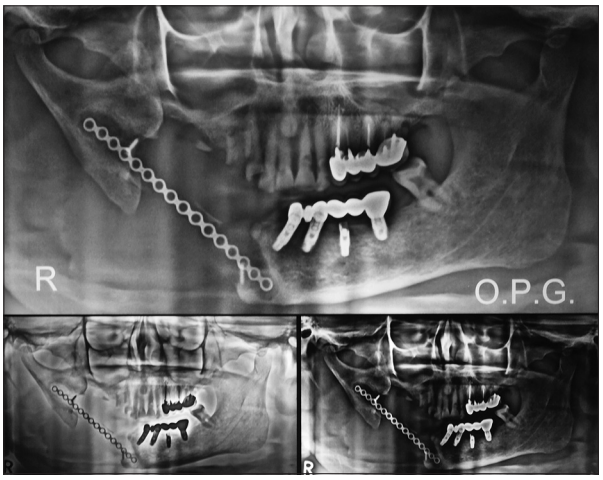

Figure 4c: Orthopantomogram 1 year after rehabilitation

biomechanical situation, like limitation of mouth opening from scarring, impaired function of the tongue, loss of labio-lingual sulcus, deviation of mandible, lack of underlying bony support for the facial features, and adequate soft-tissue for restoration of speech and swallowing.

Lateral defects, in which posterior component of dentition remains only on one side of the arch, are particularly difficult partial dentures to design. The extremely long lever arms and compromised edentulous bearing surface contribute to excessive movement of the prosthesis during function. In this patient, only second molar was present on remaining segment of the mandible, thereby a cast-partial denture with a good prognosis was ruled out.

McGill consensus[9] in 2002 suggests that the restoration of the edentulous mandible with a conventional denture is no longer the most appropriate first choice prosthodontic treatment. There is now overwhelming evidence that a 2-implant overdenture should become the first choice of treatment for the edentulous mandible. Mandibular 2-implant overdentures have been shown to be superior to conventional dentures in randomized and nonrandomized clinical trials that ranged in duration from 6 months to 9 years. Studies of several populations have shown that ratings of quality of life are significantly higher for patients who receive 2-implant overdentures (opposing complete maxillary conventional dentures) than for those with new conventional dentures.

The patient refused bone graft reconstruction, and was unenthusiastic because of cited reasons of missing teeth on opposing maxillary arch, additional economic burden, time requirement and further surgical intervention and accompanying discomfort. The attitude showed negligible change even after counseling. Patient opted for rehabilitation of intact side of the jaw with implants.

The patient was opted for fixed treatment option and rejected the implant supported overdenture option. Fixed implant supported prosthesis, however is limited to patients who have an adequate amount of remaining mandible. A fixed restoration provides the psychological advantage of acting and feeling similar to natural teeth, whereas an overdenture, even if fully implant supported, remains a removable prosthesis.

The length of the cantilever in the final prosthesis is also a point of discussion.

The choice of distally implant supported fixed partial denture was made keeping in mind the altered muscular force vector and change in chewing cycle envelope. A cantilever anterior implant supported fixed partial denture design may not be advisable due to altered force dynamic.[10]

Conclusion

Dental implants have a significant role in the treatment of oral cancer patients in terms of an oral prosthesis. Various factors can influence the healing and survival rates of implants, but it positively improves happiness, physical and mental health, and enhances quality of life of oral cancer patients.

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