Prosthodontic rehabilitation in cancer patients: Various treatment modalities available

C. Gyan Kumar¹, K. Sounder Raj¹, D. Kalpana², D. P. Shruthi³, D. R. Prithviraj¹, Srinivas Kumar⁴

¹Department of Prosthodontics and Implantology, Govt. Dental College and Research Institute, Victoria Hospital Campus, Bengaluru, Karnataka, India, ²Department of Prosthodontics, Dayanand Sagar College of Dental Sciences, Bengaluru, Karnataka, India, ³Private Practitioner, No.260, 4th Main, N R Colony, Basavangudi, Bengaluru, Karnataka, India, ⁴Department of Prosthodontics, Gitam Dental College, Vishakapatnam, Andhra Pradesh, India

Abstract
Patients with head and neck cancer suffer highest morbidity. Patients suffer physically and psychologically. Cancer and its various treatments disable the patients, thorough evaluation, presurgical planning, and post-treatment rehabilitation play an important role. The patients overall well-being, optimal restoration of health, and function should be the goal.

Keywords: Mandibulectomy, maxillectomy, obturator

Introduction
Quality of life of patients suffering with cancer is highly compromised due the disease itself, postsurgical disability or limitation, ill effects of radiation, and side effects of chemotherapeutic drugs. The primary goal of treating disabled cancer patients depends on the quality of life which has a physical function, social interaction, psychological function, and treatment of disease as parameters. The cosmetic, functional, psychological results of cancer treatment produce devastating effects on the patient’s quality of life. The goal of cancer treatment should not only be on survival, but rehabilitation, which aims to improve multiple impairments’ and quality of life. The goal is to relieve suffering and minimize morbidity by doing, so the quality of life is assured and upholds self-image during psychological adjustments.

Patients with head, neck cancer suffer from jaw deviations due to mandibulectomy and maxillectomy in various forms like from total to segmental which ultimately impairs masticatory function, speech, xerostomia due to radiation, nasal reflux due to oronasal fistula, cosmetic disfigurement, and radiation caries.¹ ² Patients often require rehabilitation for swallowing, mastication, speech, cosmetics to lead happy social life. Prosthodontic rehabilitation requires coordinated integration with a multidisciplinary team. Members of this team include a surgical oncologist, radiation oncologist, prosthodontist, oral maxillofacial surgeon, speech therapist, otolaryngologist, and social worker to treat and make patients comfortable.³ An important and critical member of this team is prosthodontist who coordinates with team members in every stage of patients treatment. Prosthodontist is involved in the diagnosis, examination, treatment, maintenance of oral function, speech, cosmetics, and health of patients undergoing cancer treatment.⁴

The scope of services provided by a maxillofacial prosthodontist presents a wide array of rehabilitative challenges. Maxillofacial prosthetic treatment does not substitute for plastic or reconstructive surgery and in certain circumstances it is an alternative.⁵ With recent developments in three-dimensional printing and rapid prototyping technologies, accurate and precise impression of the tissues can be recorded without causing
Maxillofacial prosthodontic rehabilitation as an integral facet of cancer care is required by patients undergoing therapy. Restoration of speech, deglutition, mastication and restoration of facial defects, and control of saliva are the primary goal of maxillofacial rehabilitation. The strategy and techniques of rehabilitation are directly related to the cancer characteristics, type of surgical intervention, and treatment modalities used. The process of rehabilitation begins at the time of initial diagnosis and treatment planning. Devan stated preservation of remaining sound structures is more important than the meticulous restoration of missing structure. Hence, the preservation of remaining sound teeth is an important asset in prosthodontic treatment. Planning should adopt the philosophy of prevention and conservation to achieve best functional, psychological, physical, and cosmetic outcome.

Factors influencing the treatment plan include prognosis and systemic status of the patient, site and size of the defect, nature of functional and cosmetic defect, adjunct therapy that may compromise the surgical result anticipated changes to function and cosmetics.

Surgical resection will create defects of the maxilla, palate or adjacent soft palate ranging from small perforations to extensive resections leading to variety of sequelae. This leads to incomprehensible speech, impaired masticatory function, difficult deglutition, uncontrolled oral secretions, and facial disfigurement. Mandibulectomy leads to jaw deviation, esthetic impairment, impaired speech, drooling of saliva. Glossectomy, either total or partial leads to impaired speech, lack of cleansing ability, etc. Prosthodontic intervention is utmost important from initial diagnosis and treatment planning to prevent or minimize the sequelae. Aramany and cantor cutis classification of maxillofacial and mandibular resection will help us in future planning of prosthesis in a planned manner, rather doing...
resection in an unplanned manner. Prosthodontic intervention with maxillary obturator is required to restore the contours of the resected palate and restore the functional separation of the oral and nasal cavities. Immediate surgical obturator placed at the completion of surgery provides support for remaining soft tissues of the cheek and lip and minimizes wound contamination and enables patients to speak and swallow. This is possible through thorough planning presurgically such that stability for immediate and final prostheses in enhanced and simultaneously remaining tissues are protected throughout the treatment. The definitive obturator prosthesis is more permanent prosthesis designed and fabricated when the surgical site is stable. Soft palate speech bulb prosthesis can be used for patients who have soft palate insufficiency to allow speech swallowing. The palatal lift prosthesis can be provided for patients with speech disorders due to palatopharyngeal incompetence after oncological therapy [Figure 1].

Mandibular and tongue defects
Disabilities resulting from resections of the tongue, floor of mouth or mandible would include impaired speech articulation, swallowing, and deviation of the mandible during functional movements, poor control of salivary secretions, and often cosmetic disfigurement [Figures 7 and 8]. Bony mandibular resections if continuity is not restored surgically through free fibro-osseous fibular flap, a mandibular guidance appliance like guiding flange or palatal ramp to direct mandible to an intercuspal position can be made. The severity of morbidity associated with composite resection of the tongue, floor of the mouth, and mandible is greatly reduced by the introduction of microvascular free flap transfer and use of osseointegrated implants. A free tissue transfer with fibula allows the placement of dental implants to support the prosthesis.

Extra oral defects
Rehabilitation of facial defects in patients who have lost an eye, ear, nose or sustained damage to intraoral structures by an artificial prosthesis can immensely change the quality of life.
There has been a shift in the use of retention mechanisms as the conventional retention system had its own limitations due to availability of the materials, movable tissue beds, and patients coping ability to accept the results. Retention mechanisms of prosthesis depend on spectacles, hair bands, adhesive retained or implant retained. Improved retention enhances patient comfort, changed daily maintenance, and increased life span of the prosthesis.\(^{[3]}\) Silicone elastomers have achieved wide clinical acceptance. Currently many facial and craniofacial defects are reconstructed with a combination of the free microvascular free flaps, tissue expanders, and use of a maxillofacial prosthesis.\(^{[13-16]}\)

**Dental Care Prior to Radiation and Chemotherapy**

Complete oral and dental evaluation, including radiographs, hard and soft tissue, periodontal caries examination is mandatory. Hopeless teeth with questionable prognosis, including root fragments in the area of radiation should be removed, caries teeth should be restored. Pre-prosthetic surgery may be needed to remove a potential source of infection or anatomic interferences for future prosthetic placement.\(^{[15]}\) Oral prophylaxis and home care instruction like fluoride mouth washes and tooth pastes should be provided, topical fluorides, and radiation stents made up of lead may be used to protect other tissues from radiation hazards.

**Uses of Prosthodontic Splints and Stents in Radiotherapy**

Radiotherapy is increasingly being used as an adjunct treatment in the management of head and neck cancer post-surgery, with or without combination with chemotherapy. Unfortunately, this procedure causes complications by increasing morbidity to the adjacent normal tissues. As a preventive measure, radiotherapy protective devices/stents can be fabricated and used during the treatment.\(^{[16]}\) These stents are used to protect or displace vital structures, locate diseased tissues in repeatable position during treatment, position the beam, carry radioactive material or a dosimeter device to the tumor site, and to recontour tissues to simplify dosimetry and shield tissues. Radiation of maxillary and hard palate often include the temporomandibular joint and muscles of mastication followed by trismus.\(^{[19,20]}\)

**Patient Education**

Communication and education are key factors in the key success of prostheses. Successful use of prostheses may depend on the patient’s psychological acceptance. Patient’s participation in the decision-making process is of vital significance, they should be educated about treatment choices and instructed toward use and care of the prosthesis.\(^{[21]}\)

**Trends**

Biomaterials, implants, free microvascular free flap tissue transfers, bone grafting hyperbaric oxygen therapy technological advances in imaging modalities, use of implants has collectively enhanced rehabilitation outcomes.\(^{[22-24]}\) With rapid prototyping a life like prosthesis of defect can be fabricated. The software allows virtual designing of the prostheses enhancing outcomes and thus improving the quality of life.

**Conclusion**

Prosthodontic rehabilitation broadens the range for recovery after head and neck oncology therapy,\(^{[21]}\) brings about image restoration and confidence to patients who have suffered the consequences of head and neck cancer.\(^{[26,27]}\) The scope of prosthodontic services can be improved by education public awareness professional practice and availability of services.

**References**