

Implant rehabilitation of  
the edentulous irradiated mandible.

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## LIST OF ABBREVIATIONS

WHO	World Health Organization
ICD	International Classification of Diseases
SCC	Squamous Cell Carcinoma
H&N	Head and Neck
Gy	Gray
ORN	Osteoradionecrosis
PEG	Per Endoscopic Gastrostomy
HBO	Hyperbaric Oxygen
ATA	Atmospheres Absolute
QOL	Quality of Life
HR-QOL	Health-related Quality of Life

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## **ABSTRACT**

**Background:** The successful oral rehabilitation of edentulous head and neck cancer patients following oncologic treatment continues to be a difficult area to address. Ablative surgery combined with the adjunctive effects of radiotherapy, results in a patient who requires structural, functional and aesthetic rehabilitation, but for whom few treatment options exist.

Prosthesis stabilization through the use of endosseous implants has greatly improved the reconstructive options available. The ability of the irradiated mandible to accept implants has been extensively evaluated, with radiotherapy no longer considered to be an absolute contraindication. Adjuvant hyperbaric oxygen therapy has been advocated as a method of potentially maximizing implant osseointegration, and reducing the risk of osteoradionecrosis. Implant overdentures have the potential to enhance quality of life by improving oral function as well as overall self image through enhanced aesthetics.

### **Objectives:**

The purpose of this study is to evaluate the success of implant overdentures in the irradiated and edentulous head and neck cancer patient. In particular changes related to appearance, masticatory ability, speech legibility and quality of life will be assessed.

### **Methods:**

From July 2006 all edentulous patients who attended the Special Needs Unit of the Adelaide Dental Hospital and who had been treated for head and neck cancer with radiotherapy, either alone or in combination with surgery, chemotherapy or both were approached to be included in the study.

In total 32 patients were included, with 14 patients electing to receive an implant mandibular overdenture (Group 1). Eighteen patients were placed in the control group (Group 2), either because they declined implant treatment or they had a history of osteoradionecrosis. Research participants in both groups completed the quality of life questionnaires [EORTC QLQ-C30, EORTC H&N35 and OHIP-14] at commencement of the study (T<sup>0</sup>).

A total of 28 cylindrical thread type endosseous implants were placed in 14 patients. Prior to stage 1 implant surgery each patient received 20 sessions of hyperbaric oxygen therapy at 2.4 atmospheres

absolute for a 90 minute interval. Antibiotic prophylaxis was provided 1 hour prior to stage I implant surgery, followed by an additional 10 hyperbaric oxygen sessions. Stage II implant surgery was performed 6 months later. Implant overdentures were inserted approximately one month after stage II surgery.

A standardized clinical examination of all participants in Group 1 was conducted in August 2008 (T<sup>1</sup> - range 1 month to 15 months post overdenture insertion). In addition research participants in both groups again completed the quality of life questionnaires [EORTC QLQ-C30, EORTC H&N35 and OHIP-14].

### **Results:**

Implant survival is calculated at 92.9% while implant success is calculated at 57.1%. Eight of the 14 participants in Group 1 were able to successfully achieve oral rehabilitation.

In Group 1 at time T<sup>1</sup>, four implants in two patients were put to sleep; two implants in one patient did not progress past stage I implant surgery due to the subsequent diagnosis of a second cancer; two implants failed in one patient due to insufficient osseointegration with early signs of osteoradionecrosis (ORN), while another two patients developed ORN. One patient developed ORN adjacent to the implants while the other patient developed spontaneous ORN unrelated to the implants. A greater risk of implant failure and ORN was identified in patients who had a significant past and current history of smoking and alcohol.

In patients who achieved successful oral rehabilitation, statistically significant results suggested an improvement in some aspects of quality of life.

### **Conclusions:**

This study shows that most patients are able to achieve successful oral rehabilitation with implant overdentures, resulting in improvements in eating ability, aesthetics and quality of life.

Future research in this area would benefit from the development of a randomised, longitudinal study with a larger participant cohort, and preferably involving multi-centre clinics.

## THESIS DECLARATION

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

I give consent to this copy of my thesis, when deposited in the university library, being made available for loan and photocopying, subject to the provisions of the Copyright Act 1968.

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Sharon Liberali

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Dated

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## THESIS FORMAT

This thesis presents an introductory chapter that provides background information on oral cancer and the impact of oncology treatments. Ablative surgery and radiotherapy are discussed, together with an outline of oral rehabilitation using an implant prosthesis in the edentulous head and neck cancer population. It also includes a conceptual framework, thesis rationale, aims and hypothesis.

The second chapter reviews the literature on head and neck cancer including current statistical data, oncology treatment options and their sequelae. Current knowledge and requirements for oral rehabilitation through the use of mandibular implant overdentures to restore function, in particular mastication, speech legibility, and aesthetics are outlined. In particular osseointegration in the context of the irradiated mandible is discussed, and the impact of head and neck cancer on quality of life. Quality of life assessment tools are also briefly discussed.

The third chapter describes the study design, sampling frame and data collection methods including details of quality of life questionnaires utilised. Data management includes data weighting and analytical approaches.

The fourth chapter outlines results from the study including quality of life questionnaires and oral assessments of treatment provided.

The final chapter discusses the major findings of the study, where possible, comparing them with previous studies. It also includes the strengths and limitations of this study and the significance and implications of findings. It concludes with recommendations for future research and/or directions based on the findings of this study.

Tables and figures are presented together with their corresponding text, where possible. References to published work are in the text numbered in parenthesis. The complete list of references is listed in the bibliography at the end. Relevant background data is included in the Appendices.