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Original research

A clinical study of 103 dental implants in oral cancer patients after jaw resection

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ABSTRACT

Purpose: The reliability of dental implant treatments in oral cancer patients remains incompletely defined. The purpose of this study is to retrospectively investigate dental implants in oral cancer patients after jaw resection.

Methods: A total of 103 implants had been placed in 23 patients. We examined the clinical factors (gender, age, jaw location, implant position, bone augmentation, radiation therapy, chemotherapy, free flap reconstruction, osseous reconstruction) to predict the probability of implant removals. In addition, we examine about peri-implantitis and prosthetic systems.

Results: During the follow-up period, the 2 year survival rate was 91.3%, and the 5 year survival rate was 83.3%. We noted no serious adverse effects like malignant tumor recurrence or osteoradionecrosis from the implant site. Male patients, chemotherapy, and radiation therapy was identified to be significant risk factors associated with implant removals in the univariate analysis, and radiation therapy was identified to be a significant risk factor in the multivariate analysis. There were no significant differences between the each groups of prosthetic systems in implant removals. Free flap reconstruction was not demonstrated to be a significant risk factor for peri-implantitis.

Conclusion: The results of this study suggest that radiation therapy was associated with an increased risk of dental implant removals in oral cancer patients after jaw resection.

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1. Introduction

Dental prostheses after surgical resection of oral cancer is often unsuccessful, because it leads to oral defects that reduce stable prosthetic retentions. But, stable prosthetic retentions in some cases can only be achieved with the use of dental implants [1]. Dental implant treatments in non-cancer patients is a highly anticipated therapy [2–4], and survival rates of dental implant treatments in non-cancer patients are reported to ranged 96.3%–98.9% after 5-year follow-ups [5–7]. The prosthetic of patients with continuity defects after tumor resection including the loss of several teeth is very challenging, and additionally, implants in this population are often placed into osseous free flaps [8] or irradiated bones [9]. Several investigators have reported mainly the association with dental implants and reconstructive surgery [10,11] and radiation therapy [12,13]. But other factors, such as peri-implantitis

and prosthesis system, should be considered for more reliability. It has been reported that non-cancer patients with dental implants can develop peri-implantitis, which is an oral inflammatory disease that leads to loss of the supporting tissues, predominately the bone [14]. It is essential that patients can maintain oral hygiene to prevent peri-implantitis, but the patients after jaw resection have technical difficulties to maintain oral hygiene because of their defects. It is also hard to make decision to choice the prosthetic system in this population because of their defects. The purpose of this study is to retrospectively investigate these factors of dental implants in oral cancer patients after jaw resection.

2. Methods

This is a retrospective review of investigate dental implants in oral cancer patients after jaw resection. All implants were placed at our hospital from January 1999 to January 2016. A total of 103 implants had been placed in 23 patients. This study was performed in conformity with the Declaration of Helsinki, and approved in accord with the IRB standards of Kobe University School of Medicine. We asked all participants to sign an agree-

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Table 1

The background features of all patients.

Primary tumor type	Ablative surgery	Reconstruction	Chemotherapy	Radiation therapy	Bone augmentation	Prosthetic treatment
1, Syringomatous carcinoma	Total maxillectomy				Sinus lift	Magnet-retained overdenture
2, Squamous cell carcinoma	Hemimandibulectomy	Pectoralis major muscle flap			Socket lift	Implant-supported telescope retained denture
3, Squamous cell carcinoma	Partial maxillectomy					Magnet-retained overdenture
4, Squamous cell carcinoma	Partial maxillectomy	Rectus abdominis flap				Overdenture with bar attachment
5, Squamous cell carcinoma	Hemimandibulectomy	Rectus abdominis flap				Implant-supported fixed denture
	Partial maxillectomy		CDDP, 5-FU, Peplomycin, TXT, Nedaplatin	66 Gy for the primary tumor in the maxilla 52 Gy for the tumor recurrence in the orbit	Sinus lift, Only graft	Magnet-retained overdenture
6, Squamous cell carcinoma	Marginal resection of the mandible	Radial forearm flap	CDDP, 5-FU			Implant-supported fixed denture
7, Squamous cell carcinoma	Segmental resection of the mandible	Fibular flap				Traditional complete denture (after the removal #35) Magnet-retained overdenture
8, Squamous cell carcinoma	Partial maxillectomy		CDDP	66 Gy for the primary tumor in the mandible		Magnet-retained overdenture (after the removal #43) The prosthetic treatment was not performed
9, Squamous cell carcinoma	Segmental resection of the mandible	Scapular flap	CDDP	66 Gy for the primary tumor in the mandible		Overdenture with locator attachment
10, Squamous cell carcinoma	Segmental resection of the mandible	Pectoralis major muscle flap	Peplomycin, 5-FU, Uracil	66 Gy for the primary tumor in the mandible 58 Gy for the cervical lymph node		Overdenture with locator attachment (after the removal #35) Magnet-retained overdenture
11, Squamous cell carcinoma	Segmental resection of the mandible	Fibular flap				Magnet-retained overdenture (after the removal #45) Magnet-retained overdenture (after the removal #44) During follow-up (after the removal #45) Implant-supported fixed denture
12, Squamous cell carcinoma	Segmental resection of the mandible	Fibular flap				Overdenture with locator attachment
13, Squamous cell carcinoma	Partial maxillectomy	Radial forearm flap			Sinus lift	Overdenture with bar attachment Overdenture with locator attachment (re-making for the prosthetic retentions) Overdenture with locator attachment
14, Squamous cell carcinoma	Marginal resection of the mandible					
15, Squamous cell carcinoma	Partial maxillectomy					Magnet-retained overdenture
16, Osteosarcoma	Partial maxillectomy					Magnet-retained overdenture (after the removal) Magnet-retained overdenture
17, Squamous cell carcinoma	Segmental resection of the mandible	Pectoralis major muscle flap				Magnet-retained overdenture (after the removal #13) Magnet-retained overdenture (after the removal #11) Magnet-retained overdenture
18, Hybrid verrucous and squamous cell carcinoma	Partial maxillectomy					Magnet-retained overdenture
19, Squamous cell carcinoma	Subtotal mandibulectomy	Fibular flap	Peplomycin, 5-FU, Uracil, CDDP, Pirarubicin			Magnet-retained overdenture
20, Adenoid cystic carcinoma	Partial maxillectomy	Radial forearm flap		60 Gy for the primary tumor in the maxilla		The prosthetic treatment was not performed
21, Hybrid verrucous and squamous cell carcinoma	Partial maxillectomy					Overdenture with bar attachment
22, Squamous cell carcinoma and follicular lymphoma in both eyes	Total maxillectomy	Radial forearm flap	Bendamustine	30 Gy for the primary tumor in the maxilla 50 Gy for the lymphoma in the eyes	Sinus lift	Magnet-retained overdenture
23, Squamous cell carcinoma	Segmental resection of the mandible	Fibular flap				Magnet-retained overdenture (after the removal) Overdenture with locator attachment

A total of 103 implants had been placed in 23 patients.

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