International Poster Journal IPJ of Dentistry and Oral Medicine

Int Poster J Dent Oral Med 2001, Vol 3 No 2, Poster 75

Prediction Parameters of Implant Failure in Oral Cancer Patients

Language: English

Author(s): Thomas Weischer, Christopher Mohr
Universitätsklinik für Mund-, Kiefer- und Gesichtschirurgie Essen, Germany

Date/Event/Venue:
april 15-17, 1999
8th International Congress on Reconstructive Preprosthetic Surgery
San Diego, USA

Introduction

Endosseous implants designed to support prostheses are increasingly being placed in irradiated and non-irradiated oral cancer patients 1,2,3,6,8,9,11,12,13.
Whereas some authors speak about encouraging success rates of these dental implants in oral cancer patients6,9,13, reports about failure rates are very rare2,6,13. Indicative parameters in the prediction of implant failure in oral cancer patients are still missing. This knowledge is very important to reduce the implant failure rate, to minimize the specific risks of oral implant rehabilitations, especially in irradiated patients2,6, and to initiate preventive therapy on time.
Consequently, on the basis of our experience in oral implant rehabilitation of cancer patients, the purpose of this study was to investigate the causes of implant failure and to reveal the prediction parameters.
Forty tumor patients, treated with 175 endosseous implants, participated in the study following removal of malignant lesions of the mandible and floor of the mouth between 1988 and 1997.

Materials and Methods

Classification of the placed implants depending on the implant layer

group I	osseous implant layer: irradiation (36-72 Gy); original mandible
group II	osseous implant layer: irradiation (36-72 Gy); reconstructed mandible
group III	osseous implant layer: no irradiation; original mandible
group IV	osseous implant layer: no irradiation; reconstructed mandible

group	I	II	III	IV
patients/implants	10/50	8/33	10/41	12/51
male/female	9/1	7/1	7/3	11/1
average age at implant surgery	54y	56y	55y	55y
hyperbaric oxygen	0	0	0	0
implant type				
Brånemark	15	13	9	16
FRIALIT®-2	33	15	17	24
IMZ®	2	5	15	11
implant location				
regio 034-044	44	27	29	34
regio 035-037 / 045-047	6	6	12	17

group	I	II	III	IV
peri-implant soft tissue graft				
peri-implant skin graft	1	2	3	4
peri-implant mucosal graft	2	3	1	1
maxillofacial prostheses	10	7	10	12
telescopic copings	6	3	6	1
bar-supported overdentures	2	1	2	6
cantilevered prostheses	2	3	2	4
ball attachment overdenture	0	0	0	1
no implant prostheses possible	0	1	0	0
implant exposure after (in months)	6	5.5	3.5	3
average follow-up (in months)	36	36	38	39

Recall

1 to 3 months intervals in irradiated patients

3 to 6 months intervals in non-irradiated patients

prosthetic evaluation

radiographic examination

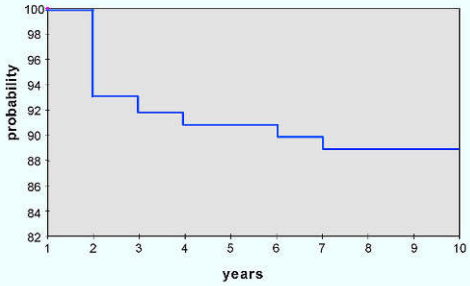
peri-implant pocket depth

implant stability

oral hygiene

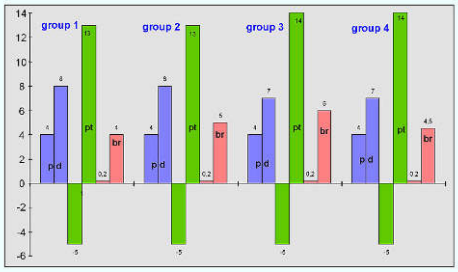
Results

Cumulative implant survival rate, defined as persistent osseointegration, was 89 % at the 10-year-interval

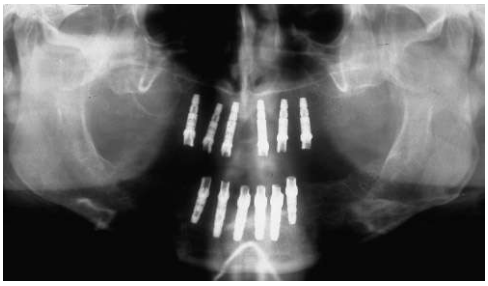


group	I	II	III	IV
osseointegrated implants	45	28	38	49
peri-implant pocket depth (mm)	2 to 7		1 to 6	
implant stability (Periotest)	-2 to -7		-1 to -6	
bone resorption (mm)	0,1 to 0,2 all groups			
oral hygiene (Quigley-Hein)	0 to 3 all groups			
peri-implant complications	3	1	2	1
failing implants	**4**	**6**	**3**	**2**
Brånemark	2	1	1	2
FRIALIT®-2	1	5	0	0
IMZ®	1	0	2	0
localization of implant failure				
regio 034-044	3	6	3	2
regio 035-037 / 045-047	1	0	0	0

Increasing peri-implant pocket depth (pd), periotest (pt) and bone resorption (br) before implant failure



group	I	II	III	IV
primary implant failure				
overloading	0	0	1	0
infection	0	0	0	0
mandibular fracture	0	5	0	0
unknown etiology	2	1	0	2
secondary implant failure				
prosthetic overloading	1	0	0	1
peri-implant infection	0	1	1	0
unknown etiology	0	0	0	0
prosthesis of failing implants				
telescopic copings	1	0	0	1
bar supported overdentures	0	0	1	0
cantilevered prostheses	0	1	0	0



Discussion

The encouraging success rates of our study concurs with other studies concerning implantation following cancer surgery and irradiation without any hyperbaric oxygene2,3,13.
However, in irradiated patients there still remains the risk of specific, implant failure-related complications, such an osteoradionecrosis7 as noted by Keller6 and Esser2. This risk forces us to investigate the reasons for implant failure and to discover parameters which announce an imminent implant failure.
In 1996 the University of Tübingen5 proposed increasing periotest values, pocket depths and peri-implant bone resorption as prognostic parameters of imminent implant failure in non-cancer patients.
The results of our study show likewise that in oral cancer patients these parameters also increase before implant failure. Thus, these parameters seem to be useful as indicative parameters in the prediction of implant failure in oral cancer patients. However, compared to non-cancer patients, pocket depth and implant stability may have different standard values10. For example, implant pocket depths may be increased, but are probably physiologic, with skin grafts. In oral cancer patients physiologic standards of pocket depth, bone resorption and implant stability are still unknown. Therefore a valuation of these parameters in oral cancer patients is only possible by comparing the actual findings to prior ones.
While the reasons for primary implant failure could frequently not be detected in our study, the reasons for secondary implant failure were biomechanical overloading and peri-implant infection. These are comparable to the causes of implant failure in non-cancer patients.
Therefore, oral cancer patients themselves, including irradiated jaws, present no contraindications for the placement of endosseous implants whenever the conceptual requirements of surgical and prosthetical treatment are maintained.
Hum and Larsen4 reported that the implant surface in irradiated jaws achieved less bone contact compared to the bone contact in non-irradiated jaws. Due to the difficult anatomical and physiological conditions implants in oral cancer patients seem to be more sensitive to peri-implant infections and overloading. Thus, short recall intervals to evaluate peri-implant tissue health and prosthetic loading are still mandatory.
Because of short recall intervals, it was possible in our patients to react at the first signs of peri-implant inflammations. Furthermore, in case of failing osseointegration the implants could be removed under clinical control. Consequently, the importance of short recall intervals involves both maintaining osseointegration and avoiding complications.

Conclusions

On the basis of this study it was concluded that the reasons for primary implant failure in oral cancer patients are frequently unknown. On the other hand, biomechanical overloading and peri-implant infections are frequently the causes of secondary implant failure.
Pocket depth, implant stability and peri-implant bone resorption seem to useful as indicative parameters in the prediction of implant failure. Due to missing standards of pocket depth, implant stability and bone resorption in oral cancer patients, these parameters can only be valuated by comparing the findings to previous measurements. Further investigations are necessary.
In order to detect peri-implant complications on time and in order to minimize the risk of osteoradionecrosis, follow-up of implant hygiene appointments at short intervals are mandatory especially with irradiated patients.
In order to avoid complications in oral cancer patients the rehabilitation strategy should connect the anatomic morphologic situations to specific surgical and prosthetical implant treatment plans. Since 1992, in irradiated patients we have used totally implant-supported constructions, primarily telescopic suprastructures, based on five to six FRIALIT-2 implants. This concept is designed to reduce treatment complications and to achieve difficult oral rehabilitations in cancer patients.

References

1. ANDERSSON G et al.: Oral implant rehabilitation without adjunctive hyperbaric oxygen. Int J Oral Maxillofac Implants 1998;13:647-654
2. ESSER E, WAGNER W: Dental implants following radical oral cancer surgery and adjuvant radiotherapy. Int J Oral Maxillofac Implants 1997;12: 552-557
3. FRANZÈN L et al.: Oral implant rehabilitation of patients with oral malignancies treated with radiotherapy and surgery without adjunctive hyperbaric oxygen. Int J Oral Maxillofac Implants 1995;10: 183-187
4. HUM S, LARSEN P: Effect of radiation at the titanium bone interface [abstract]. Dent Res 1990;69:291
5. GOMEZ-ROMAN G et al: Periimplantäre Prognosefaktoren von Implantatverlusten. Z Zahnärztl Implantol 1996;12: 225-230
6. KELLER EE et al.: Mandibular endosseous implants and autogenous bone grafting in irradiated tissue: a 10-year retrospective study. Int J Oral Maxillofac Implants 1997;12: 800-813

7. KLUTH EV et al.: A study of factors contributing to the developement of osteoradionecrosis of the jaws. J Prosthet Dent 1988;59: 194-201
8. LARSEN PE et al: Osteointegration of implants in radiated bone with and without adjunctive hyperbaric oxygen. J Oral Maxillofac Surg1993;1: 280-287
9. NIIMI A et al.: Experience with osseointegrated implants placed in irradiated tissues in Japan and the United States. Int J Oral Maxillofac Implants 1998;13: 407-411
10. SMITH DE, ZARB GA: Criteria for success for osseointegrated endosseous implants. J Prosthet Dent 1989;62: 567-572
11. UEDA M et al.: Effect of hyperbaric oxygen therapy on osseointegration of titanium implants in irradiated bone: A Preliminary Report. Int J Oral Maxillofac Implants 1993;1: 41-43
12. WEISCHER T et al.: Implant Supported Telescopic Restorations in the Rehabilitation of Oral Cancer Patients. Int J Prosthodont 1997; 10: 287-292
13. WEISCHER T et al.: Concept of surgical and implant-supported prostheses in the rehabilitation of patients with oral cancer. Int J Oral Maxillofac Implants 1996;11: 775-781

This Poster was submitted on 15.05.01 by PD Dr. med. dent. Thomas Weischer.

Correspondence address:
PD Dr. med. dent. Thomas Weischer
Universitätsklinik für Mund-, Kiefer- und Gesichtschirurgie Essen
Hufelandstraße 55
45122 Essen

Poster Faksimile: