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Ich bedanke mich bei den unten aufgeführten Kolleginnen und Kollegen für ihre wertvolle Mitarbeit, die sie in den vergangenen zwei Jahren geleistet haben.

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JANINE FIERZ<sup>1</sup>  
WALTER BÜRGIN<sup>2</sup>  
REGINA MERICSKE-STERN<sup>3</sup>

<sup>1</sup> Dr. med. dent., Clinic for Prosthodontics, University of Bern, and Private Practice, Bern, Switzerland

<sup>2</sup> Dr. med., Dr. med. dent., Senior Surgeon, Clinic for Craniomaxillofacial Surgery, Inselspital, University of Bern, Switzerland

<sup>3</sup> Prof. Dr. med. dent., Clinic Director, Clinic for Prosthodontics, University of Bern, Switzerland

#### Correspondence

Prof. R. Mericske-Stern  
Klinik für zahnärztliche Prothetik  
ZMK Universität Bern  
Freiburgstrasse 7  
3010 Bern, Switzerland  
Tel. +41 (031) 632 25 39  
E-Mail:  
regina.mericske@zmk.unibe.ch  
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# Patients with Oral Tumors

## Part 2: Quality of Life after Treatment with Resection Prostheses

### Resection Prosthetics: Evaluation of Quality of Life

Keywords: oral tumors, resection prosthetics, quality of life, EORTC

**Summary** In the present study, the oral health-related quality of life of 18 patients (13 men and 5 women) was evaluated using validated questionnaires as proposed by the European Organization of Research and Treatment of Cancer (EORTC). The patients belonged to a cohort of 48 patients, whose prosthetic treatment was performed during the years 2004–2007. In the course of tumor resection, 12 patients underwent graft surgery and 14 patients radiotherapy. One patient required a nasal epithesis since resection of the nose became necessary. Five patients underwent a full block resection of the mandible, and tumor resection in 3 patients resulted in a large oronasal communication. Prosthetic rehabilitation was performed in all patients, and the follow-up period with regular care covered a minimum of 3 years. Eleven patients

received dental implants for better support and retention of the prostheses.

In spite of compromised oral conditions, functional restrictions, and some difficulties with the prostheses, the answers to the questionnaire were quite positive. The majority judged their general health as good or even excellent. The subjective perception of the patients may contradict the objective view by the dentist. In fact, the individual patient's history and experience provide a better understanding of the impact of oral tumors on daily life. The overall assessment identified 4 items that were perceived as major problems by all patients: swallowing solid food, dry mouth, limited mouth opening, and appearance. Prosthetic rehabilitation has only a limited influence on such problems.

## Introduction

The structural and functional reconstruction of the maxillofacial area after resection of an oral tumor usually requires prosthodontic treatment. The planning and performing of prosthodontic treatment are influenced by the individual effects of the disease and the type of plastic surgical reconstruction (TAYLOR 2000). Important factors include the extent and position of the intraoral defect, degree of destruction of oral structures, side-effects of tumor therapy, general health status, life expectancy of the patients, and social, psychological, and economic aspects (MERICSKE-STERN ET AL. 1994). Besides tooth loss,

tissue deficits, mandibular dislocation, and oro-antral communication, extra-oral defects may also occur. Particularly in the prosthetic rehabilitation of tumor patients, it is clear that outcome can only be *restitutio ad similem* (HUNDEPOOL ET AL. 2008).

The esthetic improvement of facial morphology with a resection prosthesis to support lips and cheeks can have a favorable effect on the patient's psyche and social life (SCHLIEPHAKE & JAMIL 2002). However, despite the positive aspects of prosthetic rehabilitation, the consequences of tumor treatment and radiotherapy also negatively influence the treatment outcome. Prosthodontic treatment has little or no influence on these, and

they handicap the patients' daily life (WEBER ET AL. 2010). Patients' general physical and mental condition is usually compromised, and pain and discomfort remain.

Due to functional limitations, treatment is often conducted under more difficult conditions, and in functional and psychological terms, the prognosis for treatment outcome is suboptimal. Each patient is physically and mentally very individually affected by the malignoma; the baseline situations for prosthetic rehabilitation thus differ widely.

An important goal of prosthetic therapy is to improve the quality of life by improving the function and esthetics, which consequently also promotes social rehabilitation (MÜLLER ET AL. 2004). Yet it is difficult to collect long-term data, as the life expectancy of the patients is often short. One study found that 50% of patients with oral tumors died within a follow-up period of 2.3 years (MERICSKE-STERN ET AL. 1999).

In recent years, the question of oral-health-related quality of life has received increasing attention in dentistry. The Oral Health Impact Profile (OHIP) questionnaire (SLADE & SPENCER 1994) has frequently been used in various forms and languages and the treatment effects have been evaluated. Because both prosthodontic and tumor-specific problems exist in tumor patients, it makes sense to specifically survey this patient group using questionnaires on quality of life. It seems that the post-treatment general well-being of these patients is greatly reduced despite prosthetic rehabilitation, and the resulting handicaps can negatively affect their quality of life.

Employing a validated questionnaire specifically developed for tumor patients, the purpose of the present study was to document tumor patients' quality of life 3 to 6 years after prosthetic rehabilitation.

## Materials and Methods

### Patients

In the present study, 18 patients voluntarily filled out questionnaires on the quality of life after surgical and prosthetic tumor rehabilitation. They belonged to an original cohort of 46 patients who attended the interdisciplinary consultation hours of the Clinic for Prosthodontics and the Clinic for Craniomaxillofacial Surgery from 2004 to 2007, and in whom prosthetic rehabilitation was performed in the course of tumor treatment.

All 46 patients were asked to regularly participate in the recall after completion of prosthetic treatment, but 19 patients returned to their own, local dentist. Two patients died during the provisional prosthetic phase, 11 died shortly after receiving their definitive prosthesis. This explains why it was not possible to include all patients in the whole course of recall.

### Quality of life and questionnaire

Despite good planning and meticulous prosthetic treatment, the results of treatment are suboptimal from a dental perspective, because the consequences and side-effects of tumor therapy cannot be compensated prosthetically (Tab. I). In this retrospective study, 2 questionnaires were sent to 33 patients still available in 2010. To evaluate the quality of life, it seemed sensible to have the questionnaires answered only after the patients had lived for some time with the results of the completed tumor treatment. Only in this manner was it possible for them to judge their general well-being and social life under the given conditions. They were informed about and instructed on the questionnaires, but received no direct support from dentists or medical personnel while filling them out.

To determine quality of life, the 2 standardized European Organisation of Research and Treatment of Cancer (EORTC) questionnaires – EORTC QLQ-C30 and EORTC H&N35 – were used (AARONSON ET AL. 1993; FAYERS ET AL. 2001), since they are more suited to the specific situation of tumor patients than are general questionnaires on the quality of life.

The patients consented to the use of their data for the present study. One person who was not involved in treating the patients recorded and evaluated the anonymized data.

### EORTC QLQ-C30

The EORTC QLQ-C30 (Version 3.0) is the core questionnaire, and contains 30 questions on general health and well-being (Q1–Q30), both of which are especially compromised in tumor patients also by the side-effects of therapy. The questionnaire examines the quality of life in a broader context, i. e., pertaining to various physical functions, social environment, and emotionality.

There were 4 possible answers to each question:

- no, not at all
- a little
- quite a bit
- very much

Only questions 29 and 30 are answered on a scale of 1 to 7.

Some of these are single-item questions, others are multi-item questions which group several questions on a similar topic into one item. Overall, the EORTC QLQ-C30 comprises 3 general areas with subordinate question complexes:

1. general assessment of well-being
2. functional scale
3. general physical symptoms

As shown in Table II, the sequence of questions 1 to 30 does not directly reflect the general thematic areas; instead, the sequence of questions is thematically mixed.

### EORTC H&N35

The EORTC QLQ-H & N35 head-and-neck module comprises questions 31 to 65. The single-item questions 31 to 48 mostly address complaints in the jaw area and reflect the degree of handicap. Only the first section (HN31–HN48) of the EORTC QLQ H & N35 head-and-neck module was used, because simi-

**Tab. I Primary and secondary problems associated with tumor therapy**

#### Primary Problems

- Loss of normal alveolar crest anatomy after resection
- Incongruency between maxillary and mandibular alveolar crests
- Loss of mandibular continuity
- Open maxillary defects (antral communication)
- Destruction of soft-tissue structures and scar tissue formation
- Loss of individual or all remaining teeth due to resection

#### Secondary Problems

- Caries due to radiotherapy, loss of teeth
- Xerostomia (radiotherapy)
- Fibrosis, mucositis, candidiasis
- Sensation loss or disturbance, with resulting cheek and lip biting
- Motor dysfunctions: tongue mobility, swallowing
- Reduced mouth opening
- Incompetent lip closure: drooling

Tab. II Overview of EORTC QLQ-C30

Category	Item (number)	Question number
General well-being, quality of life	2	29, 30
<b>Functional scale</b>		
Physical	5	1–5
Daily activities/hobbies	2	6, 7
Emotionality	4	21–24
Cognitive ability	2	20, 25
Social functions	2	26, 27
<b>Symptoms</b>		
Fatigue	3	10, 12, 18
Nausea/vomiting	2	14, 15
Pain in general	2	9, 19
Out of breath, shortness of breath	1	8
Insomnia	1	11
Lack of appetite	1	13
Constipation	1	16
Diarrhea	1	17
Financial problems	1	28

lar to the EORTC QLQ C-30, questions 49 to 65 also deal with general well-being. Furthermore, the attempt was made to avoid overburdening the patients with too many questions, since they might otherwise have not filled out the questionnaires at all. These 18 questions directly address handicaps in the oral area, functional restrictions, pain, and general feelings of illness or social disadvantage due to the tumor treatment.

**Statistical analysis**

The EORTC QLQ C-30 questionnaire was analyzed according to the QLQ scoring manual (FAYERS ET AL. 2001) using SAS/STAT Version 8.2 (SAS INSTITUTE 2002). The thematic items can consist of 1 to 5 questions, which are in turn answered on a 4-score scale (except items 29 and 30). From these, the means and standard deviations (SD) were calculated; the minimum and maximum values were also recorded.

High general well-being scores mean a positive answer and indicate a good quality of life. High scores on the functional scale stand for positive, good functional ability. High scores on symptoms demonstrate a pronounced handicap.

On the single-item questions 31–48 of the EORTC QLQ H&N35 questionnaire, high scores also mean a handicap due to symptoms. Here, the results are given as percentages of the 4-score scale.

**Results**

Of the 33 questionnaires sent, a total of 18 (55%) were filled out completely and could be evaluated; 6 patients were unable to answer the questionnaires due to poor general condition. Of these 18 patients, 5 were women and 13 were men. Tables III and IV present detailed information on the prosthetic rehabilitation of these 18 patients. Eleven of these 18 patients received implants. Two patients with ocular enucleation and nasal amputation suffered from highly visible extraoral disfigurement.

The evaluation of the EORTC QLQ-C30 questionnaire is given in Table V. The mean values of patients with implants did not

Tab. III Tumor type and other findings

Tumor type/consequences of treatment	No. of patients 13 men	No. of patients 5 women
Squamous cell carcinoma	11	3
Other tumors	2	2
Radiotherapy	11	3
Osteoradionecrosis	5	–
Transplants	10	2
Oro-antral communication	3	–
Loss of mandibular continuity	4	1
Unilateral ocular enucleation	0	1
Nasal epithesis	0	1

Tab. IV Affected jaw and reconstruction

Tumor location	Maxilla 5+3*	Mandible 10+3*
<b>Type of prosthetic reconstruction</b>		
Obturator prosthesis	3	–
Bar prosthesis on implant (with obturator in maxilla)	3	5
Fixed prosthesis on implant	–	5
Partial prosthesis (tooth-supported)	1	1
Wire-clip provisional prosthesis	1	1
Only vacuum-drawn splint (for fluoridation)	–	1

\* 3 patients had tumors in both jaws. In the 18 patients, 21 tumor-related reconstructions were inserted.

Tab. V Answers to EORTC QLQ-C30

Category	Mean ± SD	min.	max.
General well-being, QoL*	72.1 ± 21.6	33.3	100
<b>Functional scale*</b>			
Physical	87.9 ± 74.7	16.7	100
Daily activities/hobbies	75.9 ± 28.7	16.7	100
Emotionality	76.8 ± 27.9	16.7	100
Cognitive ability	78.7 ± 25.4	33.4	100
Social functions	75.9 ± 31.4	0	100
<b>Symptoms°</b>			
Fatigue	27.7 ± 26.7	0	77.7
Nausea/vomiting	3.7 ± 9.1	0	33.3
Pain in general	22.3 ± 23.9	0	83.3
Shortness of breath	14.8 ± 32.4	0	66.6
Insomnia	24.1 ± 31.9	0	100
Lack of appetite	16.5 ± 30.8	0	100
Constipation	3.7 ± 15.7	0	66.6
Diarrhea	9.2 ± 19.1	0	66.6
Financial problems	22.2 ± 32.3	0	100

\* high values mean good QoL (quality of life) and function  
° low values mean bothered little by symptoms

differ from those without implants. The means indicate little perception of a handicap and quite a good quality of life.

However, the maximum or minimum values reflect the poor condition of individual patients.

*General well-being:* On questions 29 (health) and 30 (quality of life) all surveyed patients rated their well-being over the previous week as good to excellent. On the scale of 1–7, 56% chose one of the 2 highest scores, i.e., the best values. The assessment of quality of life was somewhat more varied, but the two lowest scores were never marked. 47% described their quality of life as very good to excellent.

*Function:* Questions 1 to 5. Where 78% of those surveyed indicated no or only slight difficulties, 3 patients had “quite a bit” of trouble and 1 person “very much”. The greatest scatter in results occurred in the assessment of physically strenuous activities (question 1). In managing daily activities or pursuing hobbies (questions 6 and 7), one patient felt highly impaired. About 75% of the patients considered their emotional condition (questions 21 to 24) good. Cognitive function was only very slightly reduced (questions 20 and 25). The answers on social relations and family life (questions 26 and 27) demonstrate that most patients had a good environment. However, 2 of the 18 patients reported that their condition had negatively influenced their family life to a moderate or great extent.

*Oral symptoms:* The majority was moderately to only slightly affected by the symptoms listed on the questionnaire. Except for 3 patients, low means were recorded.

Figure 1 depicts the percent frequency of answers (4-score scale) to the EORTC QLQ H&N questions 31 to 48, that is, on

local oral symptoms. The diagram shows that all questions were answered with the lowest scores (“not at all” or “a little”) in  $\geq 60\%$  of the cases. Nine patients (50%) even indicated values of  $\geq 80\%$ .

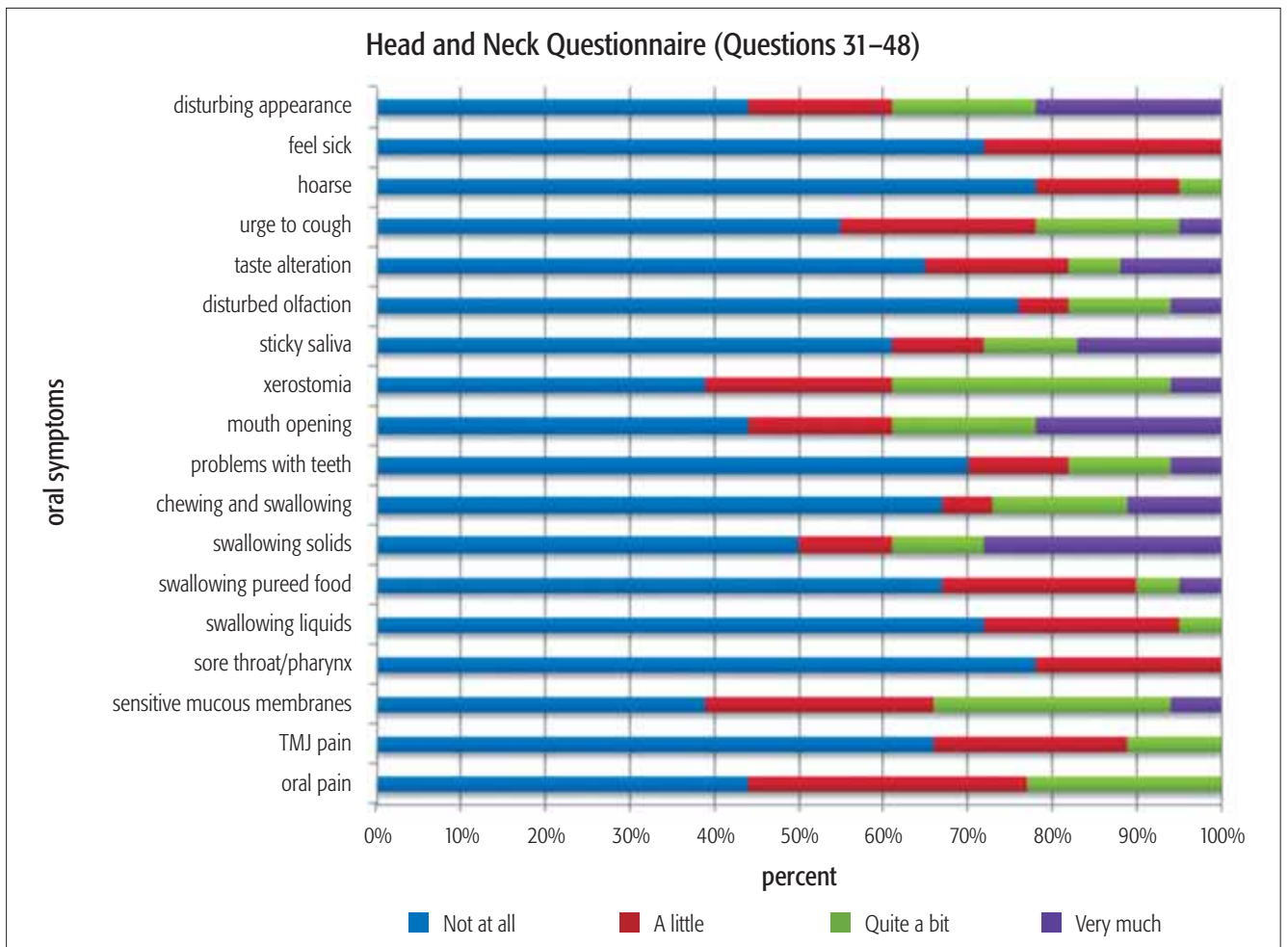
The answers also show that the greatest problem was mouth opening. Overall, most of the negative answers were found here. 39% of those surveyed had moderate or even very great problems opening their mouths wide. Many negative answers were also given for dry mouth (xerostomia): 37% suffered moderately to greatly from xerostomia. 35% of the patients complained of too little or no saliva, and 39% suffered moderately or greatly from their appearance.

**Discussion**

After invasive, radical surgery and further therapy of oral cavity carcinoma, the patients’ quality of life depends on various factors: initial findings, extent and location of the resection, type of therapy, functionality of dental prostheses, general living conditions and coping strategies. While prosthodontic care has a certain influence on reconstructing oral functions, other factors can be changed only slightly or not at all (HAHN ET AL. 2007A).

In the present study, it was not possible to compare the quality of life before and after therapy, which can sometimes be done with the Oral Health Impact Profile (OHIP) questionnaire. In this group of patients, various urgent treatments or

Fig. 1 Percent distribution of responses to the 18 questions of the EORTC QLQ (H&N 31–48).



interventions had already been performed prior to prosthetic planning, e.g., resection, extraction of severely damaged teeth, or pre-surgery radiation therapy. Taking this into account, the results thus reflect the subjective perception of tumor consequences and the experience with prosthetic reconstructions rather than a direct therapeutic effect. Moreover, the responses of only the few available patients who completely filled out the questionnaires could be evaluated. Some patients had replied that they were unable to fill out the questionnaires because they felt too sick and weak. It must therefore be assumed that primarily patients with better general condition participated in the survey. These 18 patients all still lived at home, and had not been placed in a convalescent facility, which points to more a favorable living situation and/or good coping strategies. Furthermore, over 50% of the patients had mandibular implants, an area which is often difficult to treat prosthetically. However, in regard to tumor characteristics and the type of prosthetic treatment, these 18 patients did not differ from the rest of the group. In fact, they were not the simpler cases of tumor therapy and prosthetic rehabilitation. The degree of complexity, for instance, obturator prostheses with large oro-antral communication or extensive loss of mandibular continuity, radiotherapy, etc., was similar to that of the other patients.

Compared to similar studies (KLUG ET AL. 2002, SCHLIEPHAKE & JAMIL 2002), the present results on quality of life can be considered good. Interestingly, one study with edentulous tumor patients lacking implants yielded slightly better results (SCHOEN ET AL. 2007a). Possibly, the defects in this group of patients were less pronounced, or the patients were already accustomed to complete dentures. Regarding implants, it must be borne in mind that implant surgery and the healing phase involved considerably more effort and was sometimes more invasive, and was accompanied by complications and longer treatment duration; these factors could be responsible for a worse subjective perception of an otherwise positive treatment outcome.

An overall more positive effect of prosthetic rehabilitation is apparently greater in patients who did not undergo radiation therapy than in those who did (SCHOEN ET AL. 2007b). Radiation-treated patients often suffer from xerostomia, difficulty in swallowing, and impaired speech (HAHN ET AL. 2007b). In such patients, implant-related complications and failures are more frequent and the complexity of follow-up care is greater than in healthy patients (MERICSKE-STERN ET AL. 1999, LINSEN ET AL. 2009, YERIT ET AL. 2006). Nevertheless, it must be assumed that after radiotherapy, an implant-supported prosthesis is superior to a purely mucosally worn one, since the sensitive mucous membrane is less loaded/irritated, which improves the quality of life (WEISCHER & MOHR 1999, MÜLLER ET AL. 2004).

It is noteworthy that mouth opening and xerostomia were reported by over one-third of the patients as causing moderate to great problems. Such secondary problems can hardly be influenced by prosthetic rehabilitation or not at all. As a result of surgery, scar tissue forms, which often limits mouth opening (TAYLOR 2000).

The most common maxillary prosthesis in the 18 surveyed patients was an obturator, which is indispensable for phonation, eating, and thus social life. However, when swallowing liquids, the obturator does not always close optimally (IRISH ET AL. 2009). Thus, it is remarkable that only 1 of the 5 patients with an obturator prosthesis reported difficulty swallowing. However, this patient had gone through a lengthy period of suffering after tumor therapy. She developed osteoradionecrosis, which led to a mandibular fracture. Due to radiation-caused

caries, all teeth were extracted. The other patients with oro-antral communication gave positive answers in all areas.

Some patients marked low scores for general well-being, social life, and emotionality. An 83-year-old woman marked primarily negative answers to questions on symptoms and was greatly disturbed by her nasal epithesis. Such massive facial surgery can be perceived as severe physical disfigurement. In addition, during treatment, she fell and fractured her hip; this required hip surgery, which further worsened her general well-being. A 59-year-old patient who had never regularly consumed alcohol or tobacco, and was thus not a high-risk patient, developed squamous cell carcinoma in the mandible. Not having undergone radiotherapy and equipped with a fixed prosthesis, the patient's prerequisites for a good quality of life would seem to have been met. However, a recurrence 3 years later led to depression, and she could not accept her fate.

After extensive soft-tissue surgery, one patient initially wore just a vacuum-drawn splint and complained of pain, difficulty swallowing solid food, restricted mouth opening, xerostomia, taste and olfactory alterations, and great loss of appetite. As he was greatly bothered by his appearance, he felt impaired in his interpersonal interactions. Given these complaints, it is understandable that he judged his general health and quality of life as poor.

## Conclusion

Despite lengthy treatment duration, various operations and interventions, and structural/anatomical changes in the oral region, most of the surveyed patients responded rather positively to questions about their post-treatment quality of life.

In summary, four items caused the greatest problems: swallowing solid food, mouth opening, xerostomia, and physical appearance.

The study also showed that despite shared problems, tumor patients are not a homogeneous group. Individual perception of the handicap is influenced by general health and well-being, the course taken by the malignoma and its treatment, and skills for functionally and emotionally coping with the oral situation involving a prosthetic reconstruction.

## Résumé

La présente étude évalue la qualité de vie en rapport avec la santé orale de 18 patients, dont 13 hommes et 5 femmes, par l'intermédiaire de questionnaires validés et proposés par l'Organisation Européenne de Recherche et Traitement du Cancer (EORTC). Les patients appartiennent à une cohorte de 46 patients ayant eu un traitement prothétique entre 2004 et 2007. Durant la phase de résection tumorale, 12 patients ont subi des greffes chirurgicales et 14 patients de la radiothérapie. Un patient a reçu une épithèse nasale suite à la résection nécessaire du nez. 5 patients ont subi une chirurgie interruptrice latérale mandibulaire, et 3 patients se sont retrouvés avec une perte de substance oro-nasale. Tous les patients ont reçu une réhabilitation prothétique avec maintenance et suivi clinique régulier durant 3 ans. 11 patients ont reçu des implants pour un meilleur soutien et rétention des prothèses. Malgré des conditions orales compromises, une restriction fonctionnelle et quelques difficultés avec les prothèses, les réponses des patients au questionnaire étaient assez positives. La majorité a jugé leur santé générale comme bonne, voire excellente. La perception subjective du patient est un peu en contradiction avec celle objective du dentiste. En fait, l'histoire personnelle du patient et

son expérience fournissent une meilleure compréhension de l'impact qu'a une tumeur orale sur la vie quotidienne. L'évaluation a identifié 4 facteurs considérés par tous les patients comme problèmes majeurs, à savoir la déglutition de solides,

la sécheresse buccale, la limitation d'ouverture buccale et l'apparence. La réhabilitation prothétique en soi n'a que peu d'influence sur ces problèmes.

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