

## Factors influencing rehabilitation in patients with head and neck cancer

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**Purpose.** The purpose of the prospective study was to identify the factors adversely influencing the post-treatment rehabilitation in patients with head and neck cancer.

**Patients and methods.** One hundred and ten patients with oral cavity, pharyngeal and laryngeal cancer were examined before surgical treatment in order to find unfavorable factors: hearing loss, defective teeth, impaired pulmonary function, and speech disorders. The patients evaluated the success of their rehabilitation 12 months after the treatment. The influence of possible unfavorable factors, tumor site, and type of surgery on speech, swallowing and reintegration competence was determined.

**Results.** The site of the tumor and the type of surgery did not influence the quality of rehabilitation in general. Defective teeth influenced the ability of swallowing, but not the speech. Hearing loss impaired the patient's reintegration in their home environment. Impaired pulmonary function did not affect patient's speech. Speech was the poorest in laryngectomized patients. However, about two thirds of the patients were satisfied with their capability of speech, swallowing and their rehabilitation in general.

**Conclusions.** Early identification of unfavorable factors, and individually planned rehabilitation can ensure a suitable quality of life for patients that have undergone surgery for head and neck cancer.

*Key words:* head and neck neoplasms - rehabilitation; lung volume measurements; dental status; speech disorders; hearing disorders

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### Introduction

In Slovenia, the incidence of cancer of the oral cavity, pharynx and larynx is increasing.<sup>1</sup> Unfortunately, the malignant disease is discovered in a localized stage in only 19-39 % of patients with oral cavity or pharyngeal cancer, and in 55 % of patients with laryngeal cancer.<sup>2</sup> Therefore, a combination of surgery and radiation therapy is necessary for a suc-

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cessful treatment in a majority of these patients. While such treatment can eradicate the malignant disease, it can also impair certain organs involved in the processes of chewing, swallowing and speech.<sup>3,4,5,6</sup>

A prevailing majority of the patients with head and neck cancer are older than 50 years.<sup>2</sup> In such a population, some chronic disorders influencing the quality of speech, chewing and swallowing can be expected.<sup>6,7,8</sup> For a successful rehabilitation of these important functions and reintegration of such patients in their home environment, any unfavorable factors must be identified as soon as possible and the rehabilitation must be planned individually with respect to the patient's special needs and capabilities. Therefore, a multidisciplinary approach is required.<sup>9</sup>

The aim of the present study was to identify the unfavorable factors, which could hinder the post-treatment rehabilitation of the patients with head and neck cancer before the beginning of therapy. The rehabilitation was planned according to the findings obtained. The authors tried to establish a correlation between the unfavorable factors, the sequels of treatment for malignant disease and the success of rehabilitation.

### Patients and methods

One hundred seventy-one consecutive patients with oral cavity, pharyngeal or laryngeal cancer, who were surgically treated in two successive years, were included into a prospective study. During the study, 13 patients died because of their malignant disease, 29 patients refused participation, and 19 patients were lost from follow-up; 110 patients completed the treatment and participated in the follow-up.

Before the beginning of therapy, the patients were examined by an otorhinolaryngologist, a phoniatician and a speech thera-

pist. The data about the factors influencing the success of post-treatment rehabilitation (hearing impairment, the sequels of previous neurologic, pulmonary, and gastroenterologic diseases) were obtained from the patient's history and clinical examination. The hearing acuity was assessed by audiometry. The dental status was assessed with respect to the ability of chewing and speech. In all patients, pulmonary function was assessed on the basis of clinical examination, x-ray of the lungs, and measurement of pulmonary function (spirometry). The site and stage of cancer were determined. The articulation disorders, which could hinder speech after surgical treatment, were assessed by a speech therapist.

The post-treatment rehabilitation (medicamental and respiratory physical therapy, speech and swallowing therapy, prescription of hearing aids and proper training) was planned according to the findings obtained.

Twelve months after the completed treatment, the patients assessed the success of their rehabilitation in general (excellent, satisfactory or poor). They evaluated their speech and capability of swallowing (excellent, satisfactory, or poor). The results of this subjective evaluation were compared between the groups of patients who had undergone the most mutilating surgery (laryngectomy, or excision of oral cavity carcinoma with or without segmental mandibulectomy). The influence of possible unfavorable factors (impaired hearing, pulmonary function, defective teeth, speech disorders) on speech, swallowing and reintegration competence was determined using  $\chi^2$ -test and Fisher exact test (Epi Info 6, Atlanta, USA).

### Results

There were 102 males (92.7%), and 8 females (7.3%). The patients' age ranged from 37 to 81 years, their mean age being 56.2 years, standard deviation 9.4 years and median 57 years.

Forty-eight patients (43.6%) were free of any disease that could hinder their rehabilitation after treatment for head and neck cancer. All other patients (56.4%), had different neurologic disorders (11 patients), gastroenterologic diseases (24 patients), pulmonary diseases (20 patients), and other malignant diseases (7 patients), which could influence their rehabilitation.

In 39 patients (35.5%), the history data, the clinical findings, the x-ray of the lungs and the results of spirometry (in selected cases) suggested impaired pulmonary function. In all other patients (64.5%) the findings were normal.

In 60 patients (54.5%), the hearing acuity was slightly impaired but did not hinder the patients in their every-day communication. In 10 patients (9.1%), the hearing loss was moderate and in three patients (2.7%) the loss was severe. None of the patients used a hearing aid before treatment.

A healthy and complete set of teeth was found in one patient only. Eleven patients (10%) had suitable dentures instead of the missing teeth. Twenty-one patients (19.1%) had healthy teeth, but more than one third of them were missing. In 59 patients (53.6%), very defective teeth with caries were found. Eighteen patients (16.4%) had no teeth and no dentures either.

Articulation disorders which could influence the intelligibility of speech was not found in any of the examined 57 patients.

Twenty-four patients (21.8%) had oral cavity cancer, 17 patients (15.4%) had mesopharyngeal cancer, 21 patients (19.2%) had hypopharyngeal cancer, and 48 patients (43.6%) had laryngeal cancer.

The distribution of patients according to TNM classification (10) is presented in Table 1.

In 19 patients, tumor excision was performed. In 16 patients, tumor excision and partial mandibulectomy was necessary. In 20 patients, conservative laryngectomy was performed. Fifty-five patients underwent total laryngectomy.

**Table 1.** Distribution of patients with head and neck cancer according to TNM classification (N=110)

| T     | N0 | N1 | N2 | N3 | Total |
|-------|----|----|----|----|-------|
| T1    | 4  | 1  | 2  | 1  | 8     |
| T2    | 25 | 9  | 9  | 0  | 43    |
| T3    | 15 | 4  | 9  | 1  | 29    |
| T4    | 17 | 5  | 8  | 0  | 30    |
| Total | 61 | 19 | 28 | 2  | 110   |

In 101 patients (91.8%), uni- or bilateral functional neck dissection was performed. In eight patients (7.3%) radical neck dissection on one side of the neck was necessary. Only one patient had no surgery of the neck performed.

Eighty-five patients (77.3%) received post-operative irradiation. The tumor dose ranged from 49 to 69 Gy, with mean value 55.7Gy and standard deviation 4.5Gy.

Twelve months after the completed surgical and irradiation treatment, the patients assessed their ability to swallow (Table 2) and speak (Table 3). They also estimated their rehabilitation in general (Table 4).

**Table 2.** Patients' self-assessment of their ability to swallow 12 months after the treatment (N=110)

| Swallowing   | Laryngectomized patients | Patients with oral cavity cancer | Other patients | All patients |
|--------------|--------------------------|----------------------------------|----------------|--------------|
| Poor         | 7                        | 8                                | 7              | 22           |
| Satisfactory | 16                       | 10                               | 10             | 36           |
| Excellent    | 30                       | 6                                | 13             | 49           |
| Unknown      | 2                        | 0                                | 1              | 3            |
| Total        | 55                       | 24                               | 31             | 110          |

**Table 3.** Patients' self-assessment of their ability to speak 12 months after the treatment (N=110)

| Speech       | Laryngectomized patients | Patients with oral cavity cancer | Other patients | All patients |
|--------------|--------------------------|----------------------------------|----------------|--------------|
| Poor         | 34                       | 6                                | 7              | 47           |
| Satisfactory | 11                       | 8                                | 7              | 26           |
| Excellent    | 7                        | 10                               | 17             | 34           |
| Unknown      | 3                        | 0                                | 0              | 3            |
| Total        | 55                       | 24                               | 31             | 110          |

**Table 4.** Patients' self-assessment of their rehabilitation in general 12 months after the treatment (N=110)

| Rehabilitation | Laryngectomized patients | Patients with oral cavity cancer | Other patients | All patients |
|----------------|--------------------------|----------------------------------|----------------|--------------|
| Poor           | 6                        | 2                                | 0              | 8            |
| Satisfactory   | 19                       | 3                                | 4              | 26           |
| Excellent      | 15                       | 13                               | 20             | 48           |
| Unknown        | 15                       | 6                                | 7              | 28           |
| Total          | 55                       | 24                               | 31             | 110          |

When the assessment of swallowing was compared between the laryngectomized patients and all other patients ( $\chi^2=2.64$ ,  $p=0.104$ ), and between the patients after oral cavity carcinoma treatment and all others (Fisher exact test,  $p=0.091$ ) there were no significant differences found. All the patients treated for oral cavity cancer, who had swallowing problems, had defective or missing teeth.

Speech was significantly poorer in laryngectomized patients than in all other patients ( $\chi^2=17.26$ ,  $p=0.000$ ). The laryngectomized patients evaluated their use of esophageal speech. The patients after oral cavity carcinoma treatment assessed their ability to speak as „poor“ more often than all other patients, but the difference was not statistically significant ( $\chi^2=3.56$ ,  $p=0.059$ ).

The site of the tumor and the type of the surgery did not influence the success of rehabilitation. The assessment of rehabilitation in general was approximately the same in all the subgroups (laryngectomized subjects vs. all others: Fisher exact test,  $p=0.150$ ; patients with oral cavity cancer vs. all others: Fisher exact test,  $p=1.000$ ).

Only the patients with small tumors (T1 or T2) and without metastases did not receive radiation therapy. Therefore, the influence of radiation therapy could not be exactly evaluated.

A significant influence of moderate or severe hearing loss on patients' rehabilitation was found (Fisher exact test,  $p=0.000$ ). On the other hand, no negative influence on their speech was noticed ( $\chi^2=0.22$ ,  $p=0.638$ ).

The patients' speech was not influenced by their impaired pulmonary function ( $\chi^2=0.01$ ,  $p=0.938$ ). The defective and missing teeth did not influence the patients' speech either ( $\chi^2=0.80$ ,  $p=0.372$ ).

## Discussion

The results of this study showed that in spite of the fact that in more than one half of the patients, at least one unfavorable factor was found (impaired hearing, pulmonary function, defective teeth, sequels of gastroenterologic and neurologic diseases), about two thirds of the patients were satisfied with their capability of speech, swallowing and their rehabilitation in general. We presume that such results could be attributed to the individually planned rehabilitation.

One third of the patients after the treatment of oral cavity cancer, and only one eighth of the laryngectomized patients had problems on swallowing. All the patients treated for oral cavity cancer that had swallowing problems, had defective or missing teeth and also had chewing problems. It appears that defective teeth are a characteristic feature of the population of patients with head and neck cancer. Still, the authors believe that the most important reasons for swallowing problems are postirradiation sequels<sup>11,12</sup>, and inadequate compensatory patterns in the operated field.

Almost all laryngectomized patients with swallowing problems were treated for hypopharyngeal cancer. Laryngectomy and partial pharyngectomy were required in all the cases. Loss of tissue and possible stenosis of the pharyngeal canal may be important reasons for swallowing difficulties in these patients.

Hearing loss was expected to be an important factor that could hinder the control of speech in new anatomic situation after the treatment of cancer in the head and neck region.<sup>6</sup> It turned out, however, that hearing

loss did not affect the patients' speech but it did hinder their rehabilitation in general. All the patients with moderate or severe hearing loss received hearing aids and proper training during their stay in hospital. It is possible that they were not using their hearing aids after having returned home, which rendered their communication with their relatives and friends more difficult.

The authors cannot be satisfied with the results of speech rehabilitation of the laryngectomized patients. Only one third of the patients were satisfied with their esophageal speech. The patients were taught the principles of esophageal speech during the first month after surgery. However, all the laryngectomized patients were irradiated postoperatively. During irradiation, which started usually three weeks after surgery, the increasing radiomucositis hindered further improvement in esophageal speech. A certain number of patients started to use an electrolarynx instead. No patient received a tracheoesophageal prosthesis during the time of the study.

Some authors believe that voice is not a primary determinant of the quality of life.<sup>13,14</sup> Altered speech is consistent with a satisfactory quality of life. The results of the present study were similar. Only six laryngectomized patients were not satisfied with their reintegration in their home environment; only three of them thought this was due to the loss of their natural voice.

In conclusion, early identification of unfavorable factors before the beginning of treatment, individually planned rehabilitation and intensive help of different professionals (an otorhinolaryngologist-surgeon, a phoniatician, a speech therapist) after the treatment can ensure a proper rehabilitation of the affected functions and a suitable quality of life for patients that have undergone surgery for head and neck cancer.

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