

## THE SURGICAL MANAGEMENT AND SPEECH AND SWALLOWING REHABILITATION OF PATIENTS WITH ADVANCED TONGUE CANCER IN SOUTH AFRICA

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## ABSTRACT

*Advanced tongue cancer may have a devastating effect on a person's ability to speak and to swallow. Very little is known about the surgical management and speech and swallowing rehabilitation of persons with advanced tongue cancer in South Africa. The aim of this study was to obtain information regarding clinical practices in treatment and rehabilitation. Questionnaires were distributed to 450 surgeons and 150 speech-language pathologists in South Africa. The response rate was 16% for the surgeons and 33% for the speech-language pathologists. Results showed that only a small number of surgeons and speech-language pathologists in South Africa are involved in the treatment of persons with advanced tongue cancer. Surgeons prefer combined modality treatment (surgery and post-operative radiotherapy) in the primary treatment of patients with advanced tongue cancer, but the use of radio-chemotherapy is growing. Total glossectomy is a very radical procedure, but it is sometimes used by surgeons to treat patients with advanced disease. Total glossectomy with laryngeal preservation is preferred to total glosso-laryngectomy by surgeons, in order to preserve laryngeal voice. Patients with total glossectomy form only a small part of the caseload of speech-language pathologists. Swallowing rehabilitation includes aspects such as dietary changes, compensatory swallowing techniques and airway protection mechanisms. Speech intelligibility is targeted in speech rehabilitation, but alternative communication is sometimes recommended for patients who have undergone total glosso-laryngectomy.*

## OPSOMMING

*Gevorderde tongkanker het 'n geweldige impak op 'n persoon se vermoë om te praat en te sluk. Baie min inligting is bekend oor die chirurgiese behandeling en spraak- en slukrehabilitasie van persone met gevorderde tongkanker in Suid-Afrika. Die doel van hierdie studie was om inligting te verkry aangaande die kliniese praktyk in behandeling en rehabilitasie. Vraelyste is aan 450 chirurgen en 150 spraak-taalterapeute in Suid-Afrika gestuur. Die responssyfer was 16% vir die chirurgen en 33% vir die spraak-taalterapeute. Resultate toon dat slegs 'n klein aantal chirurgen en spraak-taalterapeute in Suid-Afrika betrokke is by die behandeling van pasiënte met gevorderde tongkanker. Chirurgen verkies kombinasie behandeling (chirurgie met post-operatiewe radioterapie) in die primêre behandeling van pasiënte met gevorderde tongkanker, maar die gebruik van chemo-radioterapie is besig om toe te neem. Totale glossektomie is 'n radikale prosedure, maar word soms deur chirurgen uitgevoer om pasiënte met gevorderde siekte te behandel. Totale glossektomie word verkies bo totale glosso-laringektomie deur chirurgen ten einde laringeale stem te behou. Totale glossektomie-pasiënte vorm 'n klein gedeelte van spraak-taalterapeute se gevalslading.*

*Slukrehabilitasie sluit aspekte soos dieetaanpassing, kompensatoriese sluktegnieke en lugwegbeskermingstegnieke in. Spraakverstaanbaarheid word geteiken in spraakrehabilitasie, maar alternatiewe kommunikasie word soms aanbeveel vir pasiënte wat totale glosso-laringektomie ondergaan het.*

## INTRODUCTION AND BACKGROUND

The rehabilitation of patients with head and neck cancer has evolved into "a very complex speciality, demanding expertise in various disciplines" (Shah, 1996:iv). In South Africa many patients present with advanced head and neck cancer as a result of the large number of patients coming from rural areas. A great number of these patients need radical treatment because of the advanced stage of the cancer at the time of presentation. Very little is known about the surgical procedures and practices of South African head and neck surgeons regarding the treatment of advanced tongue cancer patients. Surgeons may choose from a variety of treatment options, or refer the patient for radiotherapy and/or chemotherapy. The nature of the medical treatment (for example surgery, radiotherapy or chemotherapy) will impact on the rehabilitation needs of the patient, including speech and swallowing rehabilitation. Little is known about speech-language pathologists' experience of treating patients with advanced tongue cancer and their knowledge of the effects of surgical treatment on communication and swallowing. Currently, there is no standard approach followed in medical institutions in South Africa regarding the surgical management and rehabilitation of patients with advanced tongue cancer. It is therefore essential to establish a database of information regarding the surgical management and speech and swallowing rehabilitation of patients with advanced tongue cancer in South Africa. For the speech-language pathologist to effectively treat speech and swallowing problems of patients with advanced tongue cancer, it is important to be acquainted with the current practices regarding the surgical management of these patients. However, patients who undergo treatment for tongue cancer have many diverse needs and a multidisciplinary team consisting of a professional nurse, physiotherapist, psychologist, social worker, surgeon, radiotherapist and oncologist thus has a crucial role to play in the management of patients with head and neck cancer.

### **Oncological and surgical management of advanced tongue cancer**

The treatment of advanced tongue cancer is a controversial issue in head and neck oncology with important implications for the patient in terms of post-treatment functioning and quality of life (Mendenhall, Stringer, Amdur, Hinerman, Moore-Higgs & Cassisi, 2000:35; Harrison, Ferlito, Shaka, Bradley, Genden & Rinaldo, 2003:101). Several treatment options are available, including surgery, radiotherapy and chemotherapy, or a combination of these procedures. Combined modality treatment (for example, surgery and post-operative radiotherapy or chemo-radiation) is required for patients with advanced disease. Surgical resection, followed by immediate reconstruction, neck dissection (unilateral/bilateral) and post-operative radiation therapy is considered the favoured combination of treatment modalities for patients with advanced tongue disease (Salibian, Allison, Rappaport, Krugman, McMicken & Etchepare, 1989:513; Sultan & Coleman, 1989:298; Shah, 1996:175; Mactay, Perch, Markiewicz, Thaler, Challian, Goldberg, Kligerman & Weinstein, 1997:495; Ruhl, Gleich & Gluckman, 1997:1316; Robertson, Gleich, Barrett & Gluckman, 2001:1364). However, the role of combined chemo-radiotherapy in the treatment of advanced tongue cancer is growing (Harrison *et al.* 2003:101).

When surgery is performed, total glossectomy is often required in cases of advanced tumours (referred to as T3 or T4 depending on the size of the tumour) that affect the whole tongue or the base of the tongue (Shah, 1996:179; Götert & Aras, 1999:75). The efficacy of total glossectomy for advanced carcinoma of the tongue remains controversial (Sultan & Coleman, 1989:297). This procedure necessarily impacts permanently upon both speech and swallowing (Davidson, Brown & Gullane, 1993:163). When the tumour involves the valleculae or pre-epiglottic space, total laryngectomy also needs to be performed to obtain clear surgical margins. This operation is known as a total glosso-laryngectomy. An important reason for performing total glosso-laryngectomy is to prevent the aspiration of food that may follow after total glossectomy. The main implication of total glosso-laryngectomy is that laryngeal voice is lost. However, the advantage is that aspiration

is eliminated. Total glosso-laryngectomy is extremely radical surgery. Harrison states that total glosso-laryngectomy should be "*viewed as a last resort, as the functional and psychological consequences are profound*" (Harrison *et al.* 2003:102).

### **Communication and swallowing problems following total glossectomy and total glosso-laryngectomy**

The general perception is that intelligible speech without a tongue is not possible. To the contrary, numerous studies indicate that fairly intelligible speech is possible after total glossectomy (Morrish, 1984:125; Morrish, 1988:13; Davidson *et al.* 1993:160; Knuutila, Pukander, Määttä, Pakarinen & Vilkmán, 1999:621; Fox & Rau, 2001:161; Furia, Kowalski, Latorre, Angelis, Martins, Barros & Ribeiro, 2001:378). According to Knuutila *et al.* (1999:622) speech can be astonishingly intelligible after a total glossectomy, even though the tongue is of central importance for the production of consonants and vowels. Speech intelligibility can be enhanced by teaching the patient compensatory speech techniques, such as overemphasis of suprasegmental aspects of speech (reduced speech rate, stress and intonation). Speech intelligibility is also enhanced by the fact that listeners "fill in" information not clearly articulated by the speaker. Perception of speech is thus facilitated by the large amount of redundancy in normal speech (Morrish, 1988:13).

Preservation of the larynx is obviously of great help in developing good post-glossectomy speech (Harrison, 1983:633). If a total glosso-laryngectomy is performed, laryngeal voice is lost. All authors agree that when the larynx is sacrificed, so is the potential for acceptable speech rehabilitation. Weber, Ohlms, Bowman, Jacob and Goepfert (1991:513) and Davidson *et al.* (1993:162) state that when the larynx is sacrificed, acceptable speech rehabilitation is not possible. Total glosso-laryngectomy causes sudden and complete loss of speech (Fox & Rau, 2001:161). Tracheo-oesophageal speech offers a possible solution to these patients and alternative communication aids can also be implemented. However, if the patient is illiterate, alternative communication may not be an option or may be restricted to picture-based communication.

Total glossectomy will not only compromise speech,

but also the patient's ability to chew and swallow food. Swallowing problems, also referred to as dysphagia, may occur. The major cause of dysphagia after total glossectomy is a lack of force to transport the bolus from the oral cavity to the pharynx, and from the pharynx to the oesophagus (Furia, Carrara de-Angelis, Martins, Barros, Carneiro & Kowalski, 2000:382). Patients who have undergone total glossectomy are usually dependent on a liquid or puree diet because of the lack of oral propulsive force. Procedures such as laryngeal suspension and cricopharyngeal myotomy that facilitate bolus transportation from the oral cavity to the oesophagus, may be useful in improving swallowing after total glossectomy (Hirano, Kuroiwa, Tanaka, Matsuoka, Sato & Yoshida, 1992:140).

General swallowing characteristics noted on videofluoroscopy after total glossectomy with preservation of the larynx are an increase in oral transit time and stasis of food in the oral cavity, pharynx and above the superior oesophageal sphincter (Ruhl, Gleich & Gluckman, 1997:1317; Furia *et al.* 2000:379). Patients who have undergone total glossectomy use compensatory swallowing techniques and swallowing manoeuvres to improve swallowing. Compensatory techniques include head tilting to direct food posteriorly, increased buccal, mandibular, pharyngeal and laryngeal activity and voluntary protection of the larynx during swallowing. Movements comprising lip protrusion, suction, and intra-oral space reduction through mandible movements also facilitate swallowing.

### **The need for a survey of the surgical management and speech and swallowing rehabilitation of patients with advanced tongue cancer in South Africa**

South Africa poses novel challenges to medical practitioners and rehabilitation team members. Patients coming from both first and second world settings have to be managed according to their needs. The treatment of advanced tongue cancer is in most instances radical and will have profound implications for the life-style of patients. Professionals have to be trained to serve this diverse population with their specific needs. At present very limited data on the surgical management and speech and swallowing rehabilitation practices are available. The present study is a preliminary attempt to determine the nature of current practices in South Af-

rica regarding surgical procedures and speech and swallowing rehabilitation, and also to determine how many surgeons and speech-language pathologists are involved in the treatment of advanced tongue cancer.

## RESEARCH

### Aim of the study

The aim of this study was to determine current practices in South Africa regarding the surgical management, and speech and swallowing rehabilitation of patients with advanced tongue cancer.

### Research design

An explorative survey design was followed (Neuman, 1997:20). The data collection tool was a mailed and self-administered questionnaire. Questionnaires were distributed to surgeons and speech-language pathologists in South Africa.

### Participants

Participants comprised two subgroups, namely surgeons (including general surgeons, ear, nose and throat surgeons, and maxillo-facial and reconstructive surgeons) and speech-language pathologists. Questionnaires were sent to each of the 220 practising ear, nose and throat specialists and each of the 90 practising maxillo-facial surgeons in South Africa. Questionnaires were also sent to a total of 140 general surgeons and plastic and reconstructive surgeons. Simple random sampling was used to select these 140 surgeons. Speech-language pathologists in private practice and at academic hospitals were included in the study. A total of 50 questionnaires were sent to speech-language therapists working in academic hospitals. All the academic hospitals in South Africa were included. Questionnaires were sent to 100 therapists in private practice. Simple random sampling was used to select the speech-language pathologists in private practice.

Questionnaires were thus distributed to a total of 450 surgeons and 150 speech-language pathologists. Seventy-three surgeons (16%) and 55 speech-language pathologists (33%) returned their questionnaires. Of the 73 surgeons, only sixteen were involved in the treatment of patients with advanced tongue cancer. Of the 55

speech-language pathologists, 13 were involved in the treatment of patients who have undergone total glossectomy.

## Material

Two questionnaires were compiled. The one questionnaire was developed to determine case load and current practices in surgical management of advanced tongue cancer by surgeons and the other questionnaire was aimed at determining case load and current practices in speech and swallowing rehabilitation by speech-language pathologists.

The surgeons' questionnaire contained questions regarding caseload, modalities of treatment (surgery, radiotherapy and chemotherapy), the utilisation of total glossectomy versus total glosso-laryngectomy in the primary treatment of patients with advanced tongue cancer, referral practices and survival rates after total glossectomy.

The speech-language pathologists' questionnaire included questions regarding caseload, speech and swallowing rehabilitation of total glossectomy patients, referral practices and the need for more intensive undergraduate training. Speech rehabilitation may entail compensatory articulation training or the implementation of augmentative and alternative communication methods. Swallowing rehabilitation refers to the techniques introduced by the speech language pathologist to aid the patient in overcoming the difficulties in swallowing created by total glossectomy. The range of methods aimed at improving swallowing may consist of various compensatory swallowing techniques, feeding aids and diet modifications. Questions on all of these aspects of rehabilitation were included in the questionnaire.

To enhance response rates, questionnaires were kept relatively short. Questionnaires were accompanied by information letters and a request for participation by two widely known head and neck surgeons in South Africa. Surgeons were reminded via electronic mail to respond to the questionnaires. Speech-language pathologists were phoned and reminded to respond to the questionnaires.

## Reliability and validity of the questionnaire

To ensure the reliability and validity (Neuman, 1997:140) of the questionnaire, experts were consulted with regard to content and formulation of questions and then a pilot study was conducted. Two surgeons (one general and one ear, nose and throat surgeon) and a speech-language pathologist experienced in the field of head and neck cancer were asked for input regarding the questions in the questionnaire. The preliminary questionnaire was then completed by two other surgeons and two other speech-language pathologists. The four pilot subjects were interviewed to discuss the aspects of the questionnaire that needed refinement. Changes were then made to the questionnaire.

## Data analysis

Each participant received a number as the questionnaires were received. The data were processed thereafter by means of descriptive statistics. A frequency table was compiled for each question. An absolute frequency analysis was applied as the aim was to determine the number of positive and negative responses to each question or to determine the number of individuals in different categories. The data were summarised in tables and figures, according to the categories of the questionnaire.

## RESULTS

### Current practices in surgical management

Surgeons were asked to indicate the number of patients with advanced tongue cancer treated annually and the surgical procedures that they perform on patients with advanced (T3 & T4) cancer of the tongue-base. They were asked to provide an estimated number and not an exact number, as it was foreseen that this would foster a higher return rate from surgeons who have been practising for a great number of years in busy practices. As there are not that many patients who undergo glossectomy, the estimated number should be fairly accurate. The results are shown in Table 1.

The number of patients with T3 or T4 cancer of the tongue or tongue-base treated by the 16 participants ranged between one and fifty annually. Participants treated an average of 10 patients with this type of can-

cer per year. The biggest annual caseload of patients (50 patients by two participants respectively) with advanced tongue cancer were reported by surgeons working in both academic hospitals and in private practice, as opposed to surgeons in private practice alone.

With regard to the utilisation of total glossectomy, six of the 16 surgeons never perform total glossectomy or any variation of it; four of the 16 surgeons only perform total glossectomy with laryngeal preservation; one of the 16 surgeons performs both total glossectomy with laryngeal preservation or total glossectomy with partial laryngectomy; two of the 16 surgeons only perform total glosso-laryngectomy (thus never preserving the larynx); and three of the 16 surgeons perform all the variations.

Five participants who perform total glosso-laryngectomy indicated that this is done to prevent chronic aspiration. Six participants who do not resect a healthy larynx justified this choice with the following reasons: surgery is unnecessary if there is no cancer in the larynx (take an adequate margin but treat the larynx on its merits); the loss of voice together with swallowing problems is tragic in view of survival; the rehabilitation of speech and swallowing after total glosso-laryngectomy in South-African black patients with disadvantaged backgrounds is very difficult; a laryngectomy can always be done at a later stage; it depends on the mobility of the epiglottis.

There are alternative modalities of treatment available for the treatment of T3 and T4 cancer of the tongue, apart from surgery. Surgeons were asked to indicate the modalities or combination of modalities used in the treatment with these two different stages of tongue cancer. The results are summarised in Tables 2 and 3.

Surgical resection (as single modality treatment) is utilised by 10 of the 16 participants (four always and six sometimes), while two participants never make use of surgical resection. Radiotherapy (as single modality treatment) is used by 12 participants (six always and six sometimes); one participant never makes use of radiotherapy. The combination of surgical resection and post-operative radiotherapy is used by 14 participants (seven always and seven sometimes). Brachytherapy (as single modality treatment) is used by six participants (one always and five sometimes), while four par-

Table 1: Annual caseload of T3 and T4 tongue cancer patients for each surgeon and indications of the surgical practices used

PARTICIPANT NUMBER	AVERAGE NUMBER OF PATIENTS WITH T3 OR T4 CANCER OF THE TONGUE TREATED ANNUALLY	TREAT PATIENTS WITH TOTAL GLOSSECTOMY AND LARYNGEAL PRESERVATION (YES/NO)	TREAT PATIENTS WITH TOTAL GLOSSECTOMY AND PARTIAL LARYNGECTOMY (YES/NO)	TREAT PATIENTS WITH TOTAL GLOSSO-LARYNGECTOMY (YES/NO)
1	12	x	x	✓
2	1	✓	✓	x
3	3-4	✓	x	x
4	20	✓	x	x
5	2	✓	x	x
6	1	x	x	x
7	3-4	x	x	✓
8	12	✓	x	x
9	4-5	x	x	x
10	50	✓	✓	✓
11	10	✓	✓	✓
12	8	✓	✓	✓
13	50	x	x	x
14	20-24	x	x	x
15	1	x	x	x
16	8-10	x	x	x
Total: 16		8 yes	4 yes	5 yes

participants never make use of brachytherapy. Chemotherapy (as single modality treatment) is used by 12 participants (six always and six sometimes).

The majority of the surgeons (14) use combined modalities of treatment (surgery and post-operative radiotherapy). As single modalities of treatment, radiotherapy is used by 12 participants, chemotherapy also by 12 participants, surgical resection by 10 participants and brachytherapy by six participants. It appears that each patient is considered individually by the surgeon

in terms of which option or options of treatment to recommend for the specific patient, as at least 12 participants make use of all the available modalities. Although the majority of surgeons prefer combined surgery and radiotherapy for treatment, literature (and the current data) shows that the use of chemo-radiotherapy (organ preservation protocols) is growing in favour of radical surgery in the treatment of advanced head and neck cancer (Harrison, Lee, Pfister, Kraus, White, Raben, Zelefsky, Strong & Shah, 1998:668; Harrison *et al.* 2003:101).

**Table 2: Modalities of treatment used in the management of patients with T3 cancer of the tongue or base of the tongue as indicated by participants**

TREATMENT MODALITY	NUMBER OF PARTICIPANTS			TOTAL NUMBER OF PARTICIPANTS
	ALWAYS USE	SOMETIMES USE	NEVER USE	
Surgical resection	4 33.33%	6 50%	2 16.67%	12/16
Radiotherapy	6 46.15%	6 46.15%	1 7.7%	13/16
Surgical resection and postoperative radiotherapy	7 50%	7 50%	0 0%	14/16
Brachytherapy	1 10%	5 50%	4 40%	10/16
Chemotherapy	6 50%	6 50%	0 0%	12/16

**Table 3: Modalities of treatment used in the management of patients with T4 cancer of the tongue or base of the tongue as indicated by participants**

TREATMENT MODALITY	NUMBER OF PARTICIPANTS			TOTAL NUMBER OF PARTICIPANTS
	ALWAYS USE	SOMETIMES USE	NEVER USE	
Surgical resection	1 16.7%	4 66.6%	1 16.7%	6/16
Radiotherapy	4 40%	5 50%	1 10%	10/16
Surgical resection and postoperative radiotherapy	6 46.15%	7 53.85%	0 0%	13/16
Brachytherapy	5 55.56%	4 44.44%	0 0%	9/16
Chemotherapy	1 9.09%	7 63.64%	3 27.26%	11/16

Different modalities of treatment may be used for patients with T4 as opposed to T3 cancers. Surgical resection (as single modality treatment) is used by five participants (one always and four sometimes), while one participant never uses surgical resection. Radiotherapy (as single modality treatment) is used by nine participants (four always and five sometimes). One participant never uses radiotherapy alone. The combination of surgical resection and post-operative radiotherapy is used by 13 participants (six always and seven sometimes). Brachytherapy (as single modality treatment) is used by nine participants (five always and four sometimes). Chemotherapy (as single modality treatment) is used by eight participants (one always and seven sometimes); three participants never use chemotherapy. The majority of surgeons (13) prefer to use combined modalities of treatment (surgery and post-operative radiotherapy). As single modality treatment, radiotherapy is used by nine participants, brachytherapy by nine participants, chemotherapy by eight participants and surgical resection by four participants. As in the case with T3 cancer, the surgeon may opt for different approaches (modalities and combination of modalities) in different patients.

Combination treatment (surgery and post-operative radiotherapy) is the preferred modality of treatment for both T3 and T4 cancers of the tongue or base of the tongue. The use of single modality treatment (surgery alone and radiotherapy alone) declines with the shift from T3 to T4 cancer. Chemotherapy is also used less in the treatment of a T4 cancer than in the treatment of a T3 cancer. Brachytherapy, however, is used more often in the treatment of a T4 cancer than a T3 cancer.

Surgeons were asked to indicate their estimation of the years of survival of patients who have undergone total glossectomy. The results are shown in Table 4. Ten surgeons indicated that patients do not survive for longer than three years after total glossectomy. Only two surgeons are aware of patients that lived longer than five years after total glossectomy.

With regard to referral of patients to speech-language pathologists, most of the surgeons (13/16) always refer their patients. However, most of the surgeons refer patients after surgery. Late referral prevents pre-operative counselling of the patient.

## **Current practices in speech and swallowing rehabilitation**

Speech-language pathologists were asked to indicate their annual caseload of patients who have undergone total glossectomy with laryngeal preservation or total glosso-laryngectomy. The results are summarised in Table 5. Only 13 of the 55 participants reported involvement in the treatment of total glossectomy patients. The number of total glossectomy patients treated annually by participants ranged between one and eight patients per year. Three of the thirteen participants did not treat patients on a yearly basis.

The majority of total glossectomy patients were treated by therapists working in academic hospitals, followed by therapists at universities and therapists in private practice. Only two speech-language pathologists in private practice have ever treated total glossectomy patients. Four speech-language pathologists working at universities said that they have treated total glossectomy patients. The number of patients for these participants ranged between two and ten (ten in 23 years).

Speech-language pathologists were asked to indicate swallowing and speech techniques used in the post-operative rehabilitation of patients who have undergone total glossectomy. The results are shown in Tables 6 and 7. The majority of speech-language pathologists always include dietary adjustments, compensatory swallowing techniques and airway protection mechanisms in their therapy management plan (See Table 6). A variety of communication aspects, such as speech intelligibility training, compensatory articulation and alternative communication are included in the communication rehabilitation of total glossectomy patients (See Table 7). The majority of participants included these three aspects of communication intervention in their therapy. Additional information gathered from the questionnaires were that slightly more participants reported the need for alternative modes of communication in total glosso-laryngectomy patients (63.64% of participants) as opposed to patients with laryngeal preservation (45.45% of participants). Augmentative and alternative communication for this population may include writing, devices such as communication boards, or high technology devices such as voice output systems. Speech-language pathologists



**Table 4: Estimation of years of survival of total glossectomy patients**

NUMBER OF PARTICIPANTS THAT INDICATED ESTIMATED SURVIVAL	ESTIMATED SURVIVAL AFTER TOTAL GLOSSECTOMY
2 (13.33%)	0-1 year
5 (33.33%)	1-2 years
3 (20%)	2-3 years
0 (0%)	3-4 years
3 (20%)	4-5 years
2 (13.33%)	5 years or more

**Table 5: Caseload of speech-language pathologists with regard to patients who have undergone total glossectomy or total glosso-laryngectomy**

PARTICIPANT NUMBER	NUMBER OF TOTAL GLOSSECTOMY PATIENTS TREATED ANNUALLY	NUMBER OF TOTAL GLOSSO-LARYNGECTOMY PATIENTS TREATED ANNUALLY
1	10 (in 23 years)	5 (in 23 years)
2	?	?
3	2	2
4	1-2	1
5	2	6
6	6-8	2-3
7	2 (in 14 years)	0
8	1 (in 11 years)	0
9	?	0
10	1-2	1-2
11	5	2
12	3	1
13	1	1

**Table 6: Feeding and swallowing techniques used in the post-operative rehabilitation of total glossectomy patients**

ASPECT OF FEEDING AND SWALLOWING INCLUDED IN THERAPY	FREQUENCY WITH WHICH ASPECTS ARE INCLUDED IN THERAPY			TOTAL NUMBER OF PARTICIPANTS
	ALWAYS INCLUDE	SOMETIMES INCLUDE	NEVER INCLUDE	
Dietary adjustments	13 100%	0 0	0 0%	13/13
Compensatory swallowing techniques	12 85.71%	1 14.29%	0 0%	13/13
Airway protection mechanisms	9 75%	3 25%	0 0%	12/13

**Table 7: Aspects of communication targeted in therapy by participants after total glossectomy with laryngeal preservation**

ASPECT OF COMMUNICATION INCLUDED IN THERAPY	FREQUENCY WITH WHICH ASPECTS ARE INCLUDED IN THERAPY			TOTAL NUMBER OF PARTICIPANTS
	ALWAYS INCLUDE	SOMETIMES INCLUDE	NEVER INCLUDE	
Speech intelligibility	7 77.78%	1 11.11%	1 11.11%	9/13
Compensatory articulation	7 63.64%	4 36.36%	0 0%	11/13
Alternative communication	5 45.45%	6 54.55%	0 0%	11/13

also reported that total glosso-laryngectomy patients who did not receive voice prostheses use voiceless speech (two participants), over-articulation (one participant), gestures (five participants) and writing (eight participants) for communication.

## DISCUSSION

### Caseload of surgeons and speech-language pathologists

Statistics regarding the caseload of advanced tongue cancer patients in South Africa at different institutions are not available. According to Hille and Shear (2002:412) the incidence of head and neck cancer is under-reported in South Africa. At the Multidisciplinary Head and Neck Oncology Clinic of the Pretoria Academic Hospital 14% of all new patients with head and neck malignancies evaluated at this clinic have malignancies of the tongue or tongue base (Pretoria Academic Multidisciplinary Head and Neck Oncology Clinic Statistics, 2003, unpublished). A total number of 96 patients were treated for cancer of the tongue in 2003 (Pretoria Academic Multidisciplinary Head and Neck Oncology Clinic Statistics, 2003, unpublished). These statistics and the results of the current study do indicate that many cases of advanced cancer of the tongue are reported and treated annually. However, only 16% of surgeons responded and, only estimated and not actual number of patients were provided. More exact numbers should be determined in future research.

The fact that the majority of patients with advanced tongue cancer are treated in academic hospitals according to the current study may be an indication that the majority of patients treated for advanced tongue cancer are from poorer socio-economic backgrounds, in need of state-funded hospital care. Risk factors for tongue cancer include a poor diet (Macek, Reid & Yellowitz, 2003:120), poor oral hygiene, poor dental care (Becker, Naumann & Pfaltz, 1994:381), poverty, HIV-infection and pre-existing leukoplakia or erythroplakia (Hille & Shear, 2002:411). These risk factors are frequently found in people from poor socio-economic environments in South Africa.

Only a small number of speech-language pathologists treat total glossectomy patients annually. The question arises as to why there are so few therapists working in this field. Possible reasons are that these patients are not always referred for treatment, or that speech-language pathologists are not confident in treating these patients due to limited experience in the different rehabilitation techniques available to treat these patients. Thus they may not accept these patients as part of their caseload. The majority of participants (84.61%) felt that their undergraduate training was insufficient to help them effectively treat total glossectomy patients. Twelve of the thirteen participants expressed the need to receive more information regarding the speech and swallowing rehabilitation of total glossectomy patients.

## **Total glossectomy versus total glosso-laryngectomy as primary modality of treatment for advanced tongue cancer**

Different treatment modalities are available for the treatment of advanced tongue cancer. The surgeon has to decide if surgery is a viable option, or refer the patient for radiotherapy and/or chemotherapy. The surgical treatment of advanced tongue cancer remains a controversial issue. Total glossectomy has a severe psychological impact on the patient and some surgeons may be hesitant to perform such a radical procedure. The majority of responding surgeons indicated that they prefer to first do a total glossectomy with laryngeal preservation, and only perform total laryngectomy as a secondary procedure if it proves necessary. Only two surgeons (working at academic hospitals) indicated that they always perform total glosso-laryngectomy in the absence of cancer infiltration of the larynx. Many studies are available debating the issue of preserving or resecting the larynx (Harrison, 1983:632; Dudley, Carter & Russell, 1992:444; Davidson *et al.* 1993:160; Fox & Rau, 2001:161; Harrison *et al.* 2003:101). It appears that the approach followed by most surgeons in South Africa, in favour of laryngeal preservation, is consistent with international trends (Harrison, 1983:638; Dudley *et al.* 1992:444; Davidson *et al.* 1993:160; Fox & Rau, 2001:166; Harrison *et al.* 2003:105).

The preservation of laryngeal voice must be weighed against the possibility of aspiration and its consequences. If the larynx is preserved, aspiration may occur (Dudley *et al.* 1992:444). Chronic aspiration, in turn, may lead to aspiration pneumonia (Logemann, 1998:5). The possibility of aspiration and its influence on the patient's nutritional status and health needs to be carefully considered. The question of whether to preserve the larynx is one with important implications given the population we serve in South Africa. Many patients do not have access to primary health care services and live great distances from specialised services such as speech and swallowing therapy (Fagan, Lentin, Oyarzabal, Isaacs & Sellars, 2002:54). A patient not able to access basic health care, may survive without a voice, but would not be able to survive untreated aspiration pneumonia. It may be that the two surgeons who indicated that they always perform total glosso-laryngectomy are not as radical as it appears. In the South African context it may be a justified choice to resect

the larynx to protect the patient from further negative consequences.

## **Communication and swallowing rehabilitation**

Responding speech-language pathologists were aware of the relevant procedures and techniques that need to be employed to address the swallowing and communication problems following total glossectomy. Speech-language pathologists focus on the use of compensatory swallowing strategies to overcome the swallowing problems associated with total glossectomy. They also focus on compensatory articulation and speech intelligibility in the communication rehabilitation of total glossectomy patients, although alternative communication is sometimes implemented in the case of total glosso-laryngectomy patients. It would therefore seem that therapists follow a holistic approach by implementing a variety of treatment strategies. Unfortunately this study did not reveal whether speech-language pathologists in South Africa make use of the available Afrikaans, English and Tswana speech intelligibility tests, or whether they only assess intelligibility subjectively. Awareness of a scientific approach to speech intelligibility assessment and treatment needs to be raised.

Speech-language pathologists stated that augmentative and alternative communication aids are implemented in the case of total glosso-laryngectomy patients. Choosing an appropriate augmentative or alternative communication aid becomes more problematic when working with illiterate patients. As they cannot read or write, these patients have to rely on gestures, voiceless speech or a picture-communication approach. However, these techniques are very limited in allowing the patients to express themselves. Furthermore, many patients cannot afford highly technological devices used in alternative communication, such as voice output systems (Harrison, 1983:638). This is particularly true for patients in South Africa dependent on state-funded hospital care.

## **Survival rates**

The poor long-term survival reported by surgeons is consistent with international reports (Harrison, 1983:632; Davidson *et al.* 1993:163; Prince & Bailey, 1999:170). Harrison (1983:162) states that "despite

enthusiastic surgery and adventurous radiotherapy", less than 50% of patients treated for advanced tongue cancer survived longer than three years. The situation has not changed much since. Five-year cure rates following total glossectomy only reach 33%, with an average of 20% (Davidson *et al.* 1993:163). This average implies that only 20% of total glossectomy patients survive for a period of five years. Ruhl *et al.* (1997:1321) reported survival of 51% and 41% at three and five years respectively for 54 total glossectomy patients.

The issue to be considered is whether total glossectomy is worthwhile considering the poor survival rates. Only the patient can make this choice. However, it is imperative that he or she receives all the available information and options before surgery. Poor survival rates make it even more important to ensure the best quality of life for patients who have undergone total glossectomy. The quality of life of patients who have undergone total glossectomy needs to be investigated to determine the patient's perception of post-operative function and well-being.

## CONCLUSIONS

Head and neck cancer is a specialised field, practised by few surgeons and speech-language pathologists in South Africa. Even though this study only determined estimated numbers of patients, it is clear that many patients are treated throughout South Africa. Medical treatment and speech- and swallowing rehabilitation is a challenge in the South African context, due to the large number of illiterate patients and patients from poorer socio-economic backgrounds. Many of these patients present with advanced cancer of the head and neck which is treated by radical surgery. Public awareness should be raised to encourage patients to seek medical help early. Increased awareness may lead to earlier diagnosis and less radical treatment of head and neck cancer.

## REFERENCES

BECKER, W; NAUMANN, HH & PFALTZ, CR 1994: Ear-, nose- and throat diseases: A Pocket Reference. New York: Thieme Medical Publishers.

DAVIDSON, J; BROWN, D & GULLANE, P 1993: A re-evaluation of radical total glossectomy. **Journal of Otolaryngology**, 22(3):160-163.

DUDLEY, H; CARTER, D & RUSSELL, RCG (Eds) 1992: Operative surgery; 4<sup>th</sup> edition. Oxford: Butterworth-Heinemann.

FAGAN, JJ; LENTIN, R; OYARZABAL, MF; ISAACS, S & SELLARS, SL 2002: Tracheoesophageal speech in a developing world community. **Archives of Otolaryngology Head and Neck Surgery**, 128(1):50-57.

FOX, LE & RAU, MT 2001: Augmentative and alternative communication for adults following glossectomy and laryngectomy surgery. **Augmentative and Alternative Communication**, 17(3):161-166.

FURIA, CLB; CARRARA DE-ANGELIS, E; MARTINS, NMS; BARROS, APB; CARNEIRO, B & KOWALSKI, LP 2000: Video fluoroscopic evaluation after glossectomy. **Archives of Otolaryngology Head and Neck Surgery**, 126(3):378-383.

FURIA, CLB; KOWALSKI, LP; LATORRE, MRDO; ANGELIS, CE; MARTINS, NMS; BARROS, APB & RIBEIRO, KCB 2001: Speech intelligibility after glossectomy and speech rehabilitation. **Archives of Otolaryngology Head and Neck Surgery**, 127(7):877-883.

GÖTERT, GE & ARAS, E 1999: Mastication, deglutition and speech considerations in prosthodontic rehabilitation of a total glossectomy patient. **Journal of Oral Rehabilitation**, 26(1):75-79.

HARRISON, D 1983: The questionable value of total glossectomy. **Head and Neck Surgery**, 6(2):632-638.

HARRISON, LB; LEE, HJ; PFISTER, DG; KRAUS, DH; WHITE, C; RABEN, A; ZELEFSKY, MJ; STRONG, EW & SHAH, JP 1998: Long term results of primary radiotherapy with/without neck dissection for squamous cell cancer of the base of the tongue. **Head and Neck**, 20(8):668-673.

HARRISON, LB; FERLITO, A; SHAKA, AR; BRADLEY, PJ; GENDEN, EM & RINALDO, A 2003: Current philosophy on the management of cancer of the base of the tongue. **Oral Oncology**, 39(2):101-105.

HILLE, J & SHEAR, M 2002: Oral cancer: An underestimated killer. **South African Medical Journal**, 92(6):410-412.

HIRANO, M; KUROIWA, Y; TANAKA, S; MATSUOKA, H; SATO, K & YOSHIDA, T 1992: Dysphagia following various degrees of surgical resection for oral cancer. **Annals of Otolaryngology and Laryngology**, 101(2 Pt 1):138-141.

KNUUTTILA, H; PUKANDER, J; MÄÄTTÄ, T; PAKARINEN, L & VILKMAN, E 1999: Speech articulation after subtotal glossectomy and reconstruction with a myocutaneous flap. **Acta Otolaryngology**, 119(May):621-626.

LOGEMANN, JA 1998: Evaluation and treatment of swallowing disorders. Austin: Pro-ed.

MACEK, MD; REID, BC & YELLOWITZ, JA 2003: Oral cancer examinations among adults at high risk: Findings from the 1998 National Health Interview Survey. **Journal of Public Health Dentistry**, 63(3):119-125.

MACTAY, M; PERCH, S; MARKIEWICZ, D; THALER, E; CHALLIAN,

A; GOLDBERG, A; KLIGERMAN, M & WEINSTEIN, G 1997: Combined surgery and postoperative radiotherapy for carcinoma of the base of the tongue: Analysis of treatment outcome and prognostic value of margin status. **Head and Neck**, 19(6):494-499.

MENDENHALL, WM; STRINGER, SP; AMDUR, RJ; HINERMAN, RW; MOORE-HIGGS, GJ & CASSISI, NJ 2000: Is radiation therapy a preferred alternative to surgery for squamous cell carcinoma of the base of tongue? **Journal of Clinical Oncology**, 18(1):35-42.

MORRISH, L 1984: Compensatory vowel articulation of the glossectomee: Acoustic and videofluoroscopic evidence. **British Journal of Disorders of Communication**, 19:125-134.

MORRISH, EC 1988: Compensatory articulation in a subject with total glossectomy. **British Journal of Disorders of Communication**, 23(1):13-22.

NEUMAN, WJ 1997: Social Research Methods: Qualitative and quantitative approaches; 3<sup>rd</sup> edition. Boston: Allyn & Bacon.

PRINCE, S & BAILEY, BMW 1999: Squamous carcinoma of the tongue: Review. **British Journal of Oral and Maxillofacial Surgery**, 37(3):164-174.

ROBERTSON, ML; GLEICH, LL; BARRETT, WL & GLUCKMAN, JL 2001: Base-of-tongue cancer: Survival, function, and quality of life after external-beam irradiation and brachytherapy. **Laryngoscope**, 111(8):1362-1365.

RUHL, CM; GLEICH, LL & GLUCKMAN, JL 1997: Survival, function, and quality of life after total glossectomy. **Laryngoscope**, 107(10):1316-1321.

SALIBIAN, AH; ALLISON, GR; RAPPAPORT, L; KRUGMAN, ME; MCMICKEN, BL & ETCHEPARE, TL 1989: Total and subtotal glossectomy: Function after microvascular reconstruction. **Plastic and Reconstructive Surgery**, 58(4):513-524.

SHAH, JP 1996: Head and Neck Surgery; 2<sup>nd</sup> edition. London: Mosby-Wolfe.

SULTAN, MR & COLEMAN, JJ 1989: Oncologic and functional considerations of total glossectomy. **American Journal of Surgery**, 158(4):297-302.

WEBER, RS; OHLMS, L; BOWMAN, J; JACOB, R & GOEPFERT, H 1991: Functional results after total or near total glossectomy with laryngeal preservation. **Archives of Otolaryngology Head and Neck Surgery**, 117(5):512-515.