

# Suprahyoid approach to base-of-tongue squamous cell carcinoma

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## Summary

**Objective.** To evaluate the suprahyoid approach to treatment of squamous cell carcinoma of the base of the tongue at Groote Schuur Hospital between 1999 and 2004.

**Design and method.** Retrospective analysis was done of patients with base-of-tongue squamous cell carcinoma treated using the suprahyoid approach.

**Results.** Seventeen patients underwent treatment for base-of-tongue squamous cell carcinoma utilising the suprahyoid approach. Complete medical records were available for 15 of these patients. The most common presenting symptoms were neck mass (40%) and referred otalgia (33%). Alcohol was a risk factor in more patients (64%) than smoking (47%). Adverse pathological findings were present in less than 50% of patients (involved margins 20%, perineural invasion 40%, vascular invasion 33%). Functional outcome in terms of speech intelligibility was excellent and there were minimal swallowing problems, with most patients using compensatory strategies and dietary modification. There were 2 subsequent deaths (13%) as a result of distant metastasis and a second primary.

**Conclusion.** The suprahyoid approach to treatment of base-of-tongue squamous cell carcinoma provides good exposure, local tumour control and excellent functional outcome.

Squamous cell carcinoma of the base of the tongue has a poor prognosis.<sup>1,2</sup> This is a result of late presentation and diagnostic difficulties. Apart from the fact that there are few early symptoms of squamous cell carcinoma of the base of the tongue, the symptoms are often nonspecific and physical examination of this area is difficult, even for the otolaryngologist.

Management of base-of-tongue squamous cell carcinoma is controversial.<sup>3,4</sup> Traditional therapeutic options include surgery alone, radiotherapy alone (external beam with

or without brachytherapy) or multimodality treatment. Aggressive chemoradiation protocols are not commonly used in developing world practice as they are expensive and require sophisticated support facilities, and long-term management such as percutaneous endoscopic gastrostomy (PEG) feeds may be too expensive. Hence there is reliance on surgery and radiation therapy. Surgical approaches to the base of tongue include the trans-oral approach (CO<sub>2</sub> laser resection or median glossotomy), mandibulotomy or the suprahyoid approach. Steiner *et al.*<sup>5</sup> have advocated the use of CO<sub>2</sub> laser for squamous cell carcinoma of the base of the tongue in selected patients with good oncological and functional results. Anterior surgical approaches with mandibulotomy can result in scars of the lower lip and chin, malocclusion, lingual nerve injury, compromised deglutition, aspiration and altered speech articulation.<sup>6</sup>

The suprahyoid approach is a well-recognised approach to treatment of the base of the tongue. Since its first description by Jeremitsch in 1895, several authors<sup>6-9</sup> have reported on its use. Ferris and Myers<sup>10</sup> described the 'secrets for success' as being accurate assessment of the tumour in preoperative planning and meticulous attention to detail intraoperatively. Their preoperative selection criteria include patients with tumour limited to the tongue base (posterior to the circumvallate papillae), T1/T2 tumours of the tongue base that may include small tumours of the posterior pharyngeal wall, tumours not involving the pre-epiglottic space and patients with good pulmonary performance. However, Moore and Calcaterra<sup>11</sup> reported oncological success even in T3 squamous cell carcinoma of the tongue base using the suprahyoid approach.

Our institution previously treated T1 and T2 tumours using anterior surgical approaches. Advanced tumours (T3 and T4) were generally treated with surgery and postoperative radiotherapy, and in selected patients with advanced tumours only radiotherapy was employed. Over the last 5 years we have used the suprahyoid approach to treat selected tumours of the base of the tongue.

We present a retrospective analysis of patients who underwent treatment for base-of-tongue squamous cell carcinoma involving use of the suprahyoid approach at the University of Cape Town, Groote Schuur Hospital between 1999 and 2004.

**Materials and methods**

A retrospective analysis was done of 15 patients with squamous cell carcinoma of the base of the tongue treated using the suprahyoid approach between 1999 and 2004 at the University of Cape Town, Grootte Schuur Hospital. Information captured included age, sex, symptomatology, duration of symptoms, risk factors, clinical stage, histological variables such as margin involvement, adjunctive radiotherapy, complications, and length of follow-up.

The speech therapist assessed speech intelligibility and swallowing status in the 13 patients who were alive at the time of the study.

**Results**

Of the 17 patients who had tumours resected using the suprahyoid approach, 2 were excluded from the study as their information was incomplete. The average patient age was 58 years (range 47 - 74 years). The male-to-female ratio was 6.5:1.

Clinical manifestations are tabulated in Table I. A neck mass and otalgia were the most common presenting symptoms. The average duration of symptoms was 14 months, ranging from 1 week to 10 years. Alcohol was a more common risk factor than smoking, and all but 1 patient both smoked and drank alcohol.

Table II summarises the tumour stages. The majority of the tumours were T2.

All patients had a minimum of a unilateral selective neck dissection, with the majority having bilateral modified neck dissections (Table III).

Histological findings are presented in Table IV. Of the 9 patients who had frozen section done intraoperatively, 2 had positive margins. No additional resections were done in these patients, as it would have further compromised oropharyngeal function. One additional patient had a positive margin on final histological examination. Overall, margins were involved in 3/15 patients. In those with clear margins the average distance to the closest margin was 2 mm.

All patients were initially fed by nasogastric tube, and all patients had a temporary tracheotomy. All underwent postoperative radiation therapy.

Functional outcome, as measured by speech intelligibility and swallowing, is shown in Table V, and reflects morbidity of both surgery and radiation therapy. Ten of 13 patients

assessed by the speech therapist had normal speech intelligibility. There were minimal swallowing problems. Most patients achieved complete swallowing by using compensatory strategies like liquid wash (a bolus of food may be eased through the oropharyngeal region by drinking some form of liquid). Swallowing problems were minimised in 2 patients by taking a liquidised diet. One patient who continued to aspirate (confirmed by modified barium swallow) had a PEG inserted. This patient had had a T4 cancer, and both hypoglossal nerves had been sacrificed. One patient developed a pharyngocutaneous fistula, which healed on conservative management.

Follow-up ranged from 11 months to 60 months (average 33 months). There were no local or regional recurrences. One patient developed distant metastases (to the brain). One patient died of an oat cell carcinoma of the lung. Six of the 7 patients who had been followed up for more than 2 years were free of disease.

**Discussion**

Oncologists have expressed concern about use of the suprahyoid approach in treatment of squamous cell carcinoma of the base of the tongue. Opponents of the procedure cite, among other reasons, violation of the pre-epiglottic space, inadequate exposure leading to inadequate resection of tumour, and approaching the tumour from the deep margin.<sup>8,12</sup> Our study supports the evidence presented in recent studies,<sup>13,14</sup> viz. that the suprahyoid approach is an oncologically sound procedure and that it produces good long-term tumour control and patient survival.

A key requirement for the suprahyoid approach is that the pre-epiglottic space should be uninvolved by tumour. This may be clinically apparent, or can be confirmed on computed tomography (CT) and/or magnetic resonance imaging (MRI) scan. If these investigations are not available, as is the case in much of the developing world, then pre-epiglottic space involvement can be assessed under anaesthesia by placing a finger in the vallecula, and a finger of the opposite hand just above the hyoid bone externally. Should the fingers meet and there is no firm tissue interposed, it is reasonable to proceed with a suprahyoid approach.

Intraoperative clinical assessment of tumour margins is difficult in the base of the tongue because of the firmness and irregularity of the normal base of the tongue. Obtaining clear resection margins is essential to optimise local tumour control and hence patient survival. Frozen section should always be employed if available. Byers *et al.*<sup>15</sup> reported that the inability of the surgeon to obtain clear margins by frozen section for whatever reason resulted in a very high incidence of local recurrence and death. Frozen section for base-of-tongue squamous cell carcinoma is therefore of great benefit, not only to obtain clear margins, but also to avoid overly aggressive surgery and to minimise functional deficits.

Almost all our patients had a minimum of an ipsilateral selective neck dissection. This reflects our proactive management of the neck in head and neck squamous cell carcinoma. This is appropriate in a developing world setting where compliance with radiotherapy and oncological follow-up may be unreliable.

As is shown in Table III, a primary layered closure can be achieved in the majority of patients. Only in large resections is reconstruction necessary in order to avoid retraction of

**TABLE I. CLINICAL MANIFESTATIONS (N = 15)**

Symptoms	Number of patients
<b>Neck mass</b>	<b>6</b>
<b>Otalgia</b>	<b>5</b>
<b>Sore throat</b>	<b>4</b>
<b>Dysphagia</b>	<b>4</b>

**TABLE II. CLINICAL TUMOUR STAGES**

T-stage	Number of patients
<b>T1</b>	<b>0</b>
<b>T2</b>	<b>8</b>
<b>T3</b>	<b>4</b>
<b>T4</b>	<b>3</b>

**TABLE III. NECK DISSECTIONS AND RECONSTRUCTIONS**

Patient	TN stage (M0)	Neck dissections	Reconstruction
1	T2N0	MND	Anterolateral thigh flap
2	T2N1	Bilateral MND	-
3	T2N1	Bilateral MND	Pectoralis major flap
4	T2N2	Extended ND, MND	-
5	T2N2	MND	-
6	T2N2c	Bilateral SND	-
7	T2N2c	Bilateral MND	-
8	T2Nx	Bilateral MND	Anterolateral thigh flap
9	T3N1	Bilateral MND	-
10	T3N2b	Bilateral MND	-
11	T3N2c	Bilateral MND	Pectoralis major flap
12	T3N2c	Bilateral MND	-
13	T4N2a	MND	-
14	T4N2c	Bilateral SND	-
15	T4N2c	Bilateral MND	-

MND = modified neck dissection; SND = selective neck dissection levels 1 - 3.

**TABLE IV. FROZEN SECTION AND ADVERSE PATHOLOGICAL PARAMETERS**

Parameter	Number of patients
<b>Permanent section: +ve margin</b>	<b>3/15</b>
<b>Frozen section: +ve margin</b>	<b>2/9</b>
<b>Perineural invasion</b>	<b>6/15</b>
<b>Vascular invasion</b>	<b>5/15</b>
<b>Differentiation: poor</b>	<b>3/15</b>
<b>Differentiation: moderate</b>	<b>12/15</b>

the oral tongue, and to improve contact between the base of the tongue and palate for speech. However, reconstruction with insensate tissue might be at the expense of swallowing. Winter *et al.*<sup>16</sup> showed that surgical resection employing different approaches can offer good functional and overall quality of life results for patients with advanced tumours when combined with reconstruction. We favour pectoralis major and free anterolateral thigh flaps.

Adverse pathological findings were identified in less than half of our patients. In 3/15 patients the margins were involved and in those whose margins were clear, the average closest margin was 2 mm. These results are similar to those in other studies (Table VI). These studies clearly show that this approach provides adequate exposure necessary for tumour excision with acceptable margins.

Functional outcome is determined not only by the surgery, but also by the effects of radiation therapy. Functional outcome after surgery significantly worsens with increasing stage of the primary tumour and more radical resection.<sup>1</sup> Of the 9 patients who had frozen section, 2 had positive margins. These 2 patients had large tumours, and further resection was not done for fear of injuring important structures and increasing morbidity. The surgeon needs to strike a balance between obtaining clear margins and extensive resection that may lead to unacceptable postoperative morbidity pertaining to speech and swallowing function.

Speech and swallowing problems are usually avoided with careful preoperative evaluation of the patient and intraoperative vigilance.<sup>10</sup> The patients at risk of swallowing

**TABLE V. POSTOPERATIVE SPEECH INTELLIGIBILITY AND SWALLOWING FUNCTION (N = 13)**

T-stage	Intelligibility*	Coughing	Oral/tube feed	Dietary modification	Compensatory strategies
T2	1	No	Oral	Normal	-
T2	2	No	Oral	Liquidised	-
T3	1	No	Oral	Normal	Liquid wash
T2	1	No	Oral	Normal	-
T2	1	No	Oral	Liquidised	Liquid wash
T2	1	No	Oral	Normal	Liquid wash
T4	3	Yes	PEG	Liquidised	Continuous cup drinking
T2	2	No	Oral	Normal	Liquid wash
T3	1	No	Oral	Normal	Liquid wash
T2	1	No	Oral	Normal	-
T3	1	No	Oral	Normal	-
T2	1	No	Oral	Normal	Liquid wash
T2	1	No	Oral	Normal	Liquid wash

\*Speech intelligibility rating: 1 = intelligible speech (normal); 2 = sometimes intelligible; 3 = almost always unintelligible. PEG = percutaneous endoscopic gastrostomy.

TABLE VI. POSITIVE RESECTION MARGINS, COMPARED WITH OTHER STUDIES

Author (year)	Number of patients	Positive margins
Weber <i>et al.</i> <sup>9</sup> (1992)	14	0
Agrawal and Barry <sup>13</sup> (2000)	41	9
Azizzadeh <i>et al.</i> <sup>14</sup> (2002)	28	3
Present study	15	3

problems are those with larger than T2 tumours as they are likely to have muscles of deglutition resected to obtain clear margins. In our study, speech function was largely preserved and there were minimal swallowing problems except for 1 patient with a T4 tumour who had had both hypoglossal nerves resected and required a PEG.

### Conclusions

Our study supports the use of suprahyoid resection for T1, T2 and selected T3 and T4 cancers of the base of the tongue. This technique provides excellent surgical access, minimal morbidity, and good oncological results. It remains an alternative to transoral CO<sub>2</sub> laser resection and chemoradiation therapy, both of which are generally unavailable in a developing world setting.

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