

Long-term Survival Outcome in Transhyoid Resection of Base of Tongue Squamous Cell Carcinoma

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Background: The transhyoid approach for the resection of squamous cell carcinoma (SCC) of the base of the tongue continues to evolve and remains controversial. We previously reported that the functional outcome of this operation is superior to that of the traditional transmandibular approaches.

Objective: To report our long-term survival rates for T1, T2, and select T3 SCCs of the base of the tongue using the transhyoid approach.

Patients and Methods: Twenty-eight patients with SCC of the base of the tongue were treated using a transhyoid approach at the University of California, Los Angeles, Medical Center between 1981 and 1998.

Results: All 28 patients underwent simultaneous neck dissection, and 27 patients underwent postoperative ra-

diation therapy. The majority of the patients had advanced stage III or IV SCC. Twenty-five of the 28 patients had clear margins in the final pathologic specimen. The overall 3- and 5-year patient survival rates were 88.5% and 80.0%, respectively. Tumor-specific 5-year survival rates were 80.0%, 84.6%, and 50.0% for T1, T2, and T3 tumors, respectively. Stage-specific 5-year survival rates were 60.0%, 100.0%, and 80.0% for stages II, III, and IV, respectively

Conclusions: The advantages of the transhyoid approach to SCC of the base of the tongue in conjunction with neck dissection and postoperative radiation therapy include excellent long-term patient survival, improved swallowing and speech function, outstanding tumor exposure, and minimal cosmetic deformity.

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SQUAMOUS CELL carcinoma (SCC) of the base of the tongue (BOT) has been associated with a poor prognosis and relatively low 5-year survival rates.¹⁻⁴ This type of tumor has been traditionally treated with combined therapy, including surgical resection and radiation therapy.⁵⁻⁸ Historically, the preferred surgical approaches for BOT SCC have included translabial composite resection or a mandibulotomy (midline or lateral). These approaches were thought to provide the widest possible exposure to the BOT. The transmandibular methods can cause significant secondary morbidity, including lip and chin scars, malocclusion, compromised deglutition, chronic aspiration, and altered speech articulation. As a result, mandible-sparing procedures or primary radiation therapy is now advocated by most centers in the management of BOT tumors.⁹⁻²⁵ One of the best mandible-sparing procedures is the transhyoid approach, which is the most common surgical alternative for limited, accessible tumors.⁹⁻¹⁴

In Blassingame's²⁶ 1952 article, he noted that in 1826 Vidal di Cassis was the first to propose a method to gain access to the BOT through the anterior pharyngeal wall. In 1895, Jeremitsch became the first surgeon to use this approach in a practical manner.²⁶ In 1946, Huet²⁷ reintroduced the transhyoid approach for removing BOT tumors, and in 1948, Rethi²⁸ described this method for accessing the lingual thyroid. Despite Blassingame's classic thesis, this approach did not become widely accepted owing to the concern of blindly approaching the deep margin of the BOT and preepiglottic space. In 1990, Moore and Calcaterra⁹ reported the successful resection of BOT tumors using a modified version of the transhyoid approach. Subsequently, Zeitels et al,^{10,11} Weber et al,¹² and Civantos and Wenig¹³ also described their excellent results with this method. These authors concluded that the transhyoid approach provides exact anatomical entry with wide exposure of the BOT, while avoiding injury to key neurovascular structures.

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At our institution, we treat small to intermediate-sized BOT tumors with combined therapy consisting of a transhyoid surgical excision, neck dissection, and, when appropriate, postoperative radiation therapy. We previously demonstrated that patients who underwent transhyoid resection of BOT tumors had significantly better speech and swallowing functions, with less aspiration, than patients who underwent transmandibular resection.¹⁴ In the current study, we present the long-term survival data in cases involving primary surgical excision of BOT SCC with this method and compare the results with those of primary radiotherapy.

PATIENTS AND METHODS

A retrospective chart review was performed in all cases involving patients who were treated for BOT SCC at the University of California, Los Angeles, Medical Center between 1981 and 1998. Twenty-eight patients with BOT SCC were treated with transhyoid surgical resection. All patients underwent preoperative laryngoscopy and advanced imaging studies (ie, computed tomography and/or magnetic resonance imaging) to evaluate the surgical feasibility of the tumor. The patients' disease was staged according to the most recent recommendations of the American Joint Committee on Cancer.²⁹ The operative technique that is used at our institution has been previously described.⁹ All patients underwent simultaneous ipsilateral or bi-

Table 1. Distribution of TNM Stage

T Stage	N0	N1	>N1	Total
T1	0	3	4	7
T2	5	5	9	19
T3	1	0	1	2
T4	0	0	0	0
Total	6	8	14	28

Table 2. Patient Demographics by Age

Stage	Age, y	
	Range	Mean
I (n = 0)
II (n = 5)	42-78	58
III (n = 8)	44-76	60
IV (n = 15)	40-68	54
Total (N = 28)	40-78	56

Table 3. Summary of Treatment*

Stage	XRT	ND	Margins		Reconstruction		
			Clear	Close	Primary	RFFF	PMC
I (n = 0)	0	0	0	0	0	0	0
II (n = 5)	5	5	4	1	4	0	1
III (n = 8)	8	8	8	0	8	0	0
IV (n = 15)	14	15	13	2	12	2	1
Total (N = 28)	27	28	25	3	24	2	2

*XRT indicates radiation therapy; ND, neck dissection; RFFF, radial forearm free flap; and PMC, pectoralis myocutaneous flap.

lateral neck dissections, and the majority also underwent postoperative radiation therapy.

The life table method was used to calculate actual 3- and 5-year survival data. There was no significant delay from diagnosis to surgical treatment in any case. Vital and tumor status at the end of the follow-up period was available either from patient records or from the Central Tumor Registry at the University of California, Los Angeles.

RESULTS

The age range of the patients was 40 to 78 years (average age, 56 years). Twenty-one patients were men and 7 were women. The median follow-up period was 52 months (range of follow-up, 15-112 months). Twenty-six of 28 patients had T1 or T2 tumors (**Table 1** and **Table 2**). Two patients had T3 tumors. A large proportion of the patients' disease was categorized into American Joint Committee on Cancer stage III or IV disease as a result of the high incidence of regional nodal metastasis. No patient's disease was categorized as stage I even though there were 7 T1 tumors. Of the 28 patients, 25 (89%) had clear margins in the final pathologic specimen (**Table 3**). Twenty-four of the 28 patients underwent primary closure. Seven patients underwent regional or distant microvascular flap reconstruction (ie, pectoralis myocutaneous flap or radial forearm free flap).

The overall 3- and 5-year survival rates with this treatment method were 88.5% and 80.0%, respectively. The respective tumor-specific (TNM) 3- and 5-year survival rates were 85.7% and 80.0% (T1), 84.2% and 84.6% (T2), and 50.0% and 50.0% (T3). The respective stage-specific 3- and 5-year survival rates were 80.0% and 60.0% (stage II), 100% and 100% (stage III), and 86.7% and 80.0% (stage IV). **Table 4** summarizes our survival results.

COMMENT

Tonsillar and BOT tumors are the most common oropharyngeal malignancies. The latter have a more aggressive biologic behavior than the former, primarily because of their propensity for submucosal extension and metastatic potential. However, with proper patient selection using advanced radiologic imaging techniques and careful clinical evaluation, therapies can be individualized to maximize control rates. In this series, we have shown that the respective overall 3- and 5-year survival

rates of selected, small to intermediate-sized BOT tumors treated with a transhyoid resection (in conjunction with neck dissection and radiation therapy) were 88.5% and 80.0%. The respective tumor-specific 5-year survival rates were 80.0%, 84.6%, and 50.0% for T1, T2, and T3 tumors. These results are comparable to those in previous reports by Weber et al,¹² who also examined the control rates using transhyoid resection of T1 and T2 tumors in conjunction with postoperative radiation therapy. Although, their follow-up period was relatively short, they did not see any recurrence in 13 patients who were treated in this manner.

The majority of T1 and T2 lesions in the current study were classified as stage III and IV tumors because of the high incidence of locoregional nodal metastases. Historically, stage III and IV BOT tumors have been associated with poor outcome. Nevertheless, we found that aggressive combination therapy resulted in excellent long-term survival for patients with these advanced-stage tumors. It has also been our experience, as with others, that the biologic behavior of BOT SCC is governed by the size and depth of the tumor rather than the nodal stage and that locoregional metastases do not significantly impair survival.^{30,31} In an elegant study, Freeman et al³⁰ reviewed 607 cases of head and neck SCC to determine this relationship. They showed that there was no significant correlation between neck stage and primary tumor control on univariate and multivariate analysis.

Our institution previously demonstrated that the transhyoid resection of BOT tumors results in significantly lower morbidity than do the transmandibular methods. Nasri et al¹⁴ compared the patients who were treated with the transhyoid approach with those who were treated with composite resection or mandibulotomy. In their study, they did not see any significant difference between the 2 groups in disease-free survival, status of surgical margins, recurrences, or operative complications. However, they did observe significantly superior postoperative speech and swallowing function in the transhyoid group. Civantos and Wenig¹³ conducted a similar comparison. They also saw no difference in surgical margins and local recurrence but did detect a significantly higher number of serious complications in the transmandibular group. Zeitels et al¹¹ also evaluated 15 patients who had mostly T3 and T4 BOT tumors that were resected via a transoral-transhyoid method. All patients had primary closure and clear margins in the final pathologic specimen, similar to the present study. None of the patients had problems with aspiration, and all patients resumed an oral diet within 3 weeks. Their only complication was a pharyngocutaneous fistula, which resolved with conservative measures.

The treatment of BOT SCC remains controversial. Over the past decade, many centers have successfully broadened the indication of primary radiotherapy to include early and advanced BOT tumors.¹⁷⁻²⁵ These groups have reported T1 and T2 5-year survival rates of 73% to 96%. Some groups have reported improved outcome with postirradiation interval neck dissection and/or brachytherapy.^{17,19,21,22,25} Proponents of primary radiation therapy argue that survival outcome and tumor control are comparable to those of surgical resection, while the morbidity

Table 4. Survival Rates According to Tumor Size and Stage

	Survival Rates, %	
	3-y Follow-up (n = 26)	5-y Follow-up (n = 20)
Tumor size		
T1 (n = 7)	85.7	80.0
T2 (n = 19)	84.2	84.6
T3 (n = 2)	50.0	50.0
Stage		
I (n = 0)
II (n = 5)	80.0	60.0
III (n = 9)	100	100
IV (n = 14)	86.7	80.0

ity associated with primary radiation is significantly less. However, these studies continue to compare the morbidity of primary radiation therapy with that of a traditional, transmandibular surgical approach. Furthermore, it is difficult to critically ascertain the results of primary radiation therapy from the literature, as outcome studies have included postirradiation neck dissection, brachytherapy, and salvage surgery.

In the present study, we report high overall 5-year survival rates in cases of BOT SCC with the use of primary surgical resection via a transhyoid approach, neck dissection, and postoperative radiation therapy. Given the excellent survival benefits and limited functional morbidity, we continue to promote this aggressive combined therapy for small BOT tumors that do not extend anterior to the circumvallate papillae or onto the mandible.

CONCLUSIONS

The advantages of the transhyoid approach to BOT SCC in conjunction with neck dissection and postoperative radiation therapy include excellent long-term patient survival, improved swallowing and speech function, outstanding tumor exposure, and minimal cosmetic deformity.

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