Tumor Debulking in the Management of Laryngeal Cancer Airway Obstruction

Eugenie Du, MD1, Richard V. Smith, MD1,2, Thomas J. Ow, MD1,2, Andrew B. Tassler, MD1, and Bradley A. Schiff, MD1

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

Abstract
Patients presenting with advanced aerodigestive malignancy and respiratory compromise often undergo tracheotomy as initial airway management. Tumor debulking is a potential alternative. We present a case series with chart review to communicate our institutional experience with this technique. T3/4 glottic and supraglottic cancers treated between 2004 and 2014 underwent review, and 14 patients were identified for this study. Of these, 5 (35.7%) required subsequent tracheotomy, and 9 (64.3%) did not. Patients requiring subsequent tracheotomy had a delay in initiating definitive treatment when compared with those who did not (83.3 vs 31.3 days, \( P = .0025 \)). No patient required a tracheotomy after initiation of definitive treatment. Our experience suggests that tumor debulking may be a viable option in select patients but that a delay in initiating treatment is associated with patients requiring tracheotomy subsequent to debulking. Further research is needed to better delineate patient scenarios in which tumor debulking alone is sufficient.

Keywords
head and neck, squamous cell cancer, airway management, debulking

Received April 4, 2016; revised June 1, 2016; accepted July 6, 2016.

Respiratory compromise from tumor obstruction can be a presenting symptom in patients with advanced aerodigestive malignancies. Traditionally, tracheotomy is used to stabilize the airway. Aside from routine risks and morbidity associated with tracheotomy placement, there is potential concern of tumor seeding.1 In addition, malpositioned tracheotomy incisions may make salvage laryngectomies difficult. Tumor debulking is a potential alternative and has been used to stabilize the airway prior to the start of definitive treatment or as a palliative measure.2-5 However, little is known regarding its overall safety and efficacy and to identify potential clinical and disease parameters associated with requiring further airway intervention despite debulking.

Methods
Operative reports of patients presented at the institutional tumor board between 2004 and 2014 with T3/4 glottic or supraglottic cancers were reviewed to identify patients who underwent tumor debulking for indications of “airway obstruction, respiratory distress or dyspnea.” Patient selection for debulking or awake tracheotomy was determined by the surgeon on basis of clinical judgment rather than strict criteria. In general, debulking was considered for patients with exophytic tumors who could be safely intubated by the surgeon fiberoptically or via direct laryngoscopy. Debulking was achieved with either microdebrioder or biopsy forceps until the airway appeared adequate (Figure 1). Awake tracheotomy was performed in patients whom the attending felt could not safely be intubated or in patients whose airway was deemed too unstable to extubate and discharge. Statistical analysis was performed with SAS 9.3 (IBM, Chicago, Illinois). Approval was obtained from the Albert Einstein College of Medicine Institutional Review Board.

Results
Between 2004 and 2014, 270 patients with advanced glottic or supraglottic cancers were presented at our institutional tumor board. Of these, 35 presented with tumor obstruction and respiratory distress requiring immediate intervention. Twenty patients (57.1%) underwent awake tracheotomy, and 15 (42.9%) underwent tumor debulking without tracheotomy. The full record of 1 patient was unavailable; thus, 14 patients were included in study analysis. Of these,
5 (35.7%) required subsequent tracheotomy prior to definitive treatment, and 9 (64.3%) did not. Thirteen patients were definitively treated with chemoradiotherapy; 1 underwent a total laryngectomy.

The clinical characteristics of the patients are listed in Table 1. The mean time from debulking to treatment initiation in patients not requiring interval tracheotomy was 31.3 days. Patients requiring subsequent tracheotomy had a significant delay in starting definitive treatment versus those who did not (83.3 vs 31.3 days, \( P = .01; \) Table 1). An average of 57.6 days elapsed between debulking and subsequent tracheotomy in patients who required tracheotomy pretreatment. Patients who required subsequent tracheotomy were also significantly less likely to complete their full course of intended treatment (\( P = .03)\), with 3 of the 5 patients either lost to follow-up or expiring before treatment completion. In contrast, all patients not needing subsequent tracheotomy completed treatment. There were no major adverse events associated with tumor debulking. No patients underwent repeat debulking, and no patients required tracheotomy after initiation of definitive treatment.

**Discussion**

Respiratory compromise can be an initial presenting symptom of advanced upper airway tumors. In a series of 109 patients with locoregionally advanced aerodigestive malignancies, 42 (38.5%) presented with airway obstruction. Of these, 28 (67.7%) underwent tracheotomy, and 11 (26%) underwent tumor debulking prior to definitive treatment. Of the 11 patients, 8 (82%) avoided a tracheotomy before, during, and after treatment. In our series specifically looking at tumor debulking for airway obstruction, 64.3% of patients avoided tracheotomy altogether.

Our study showed a significant delay in beginning definitive treatment among patients who required subsequent tracheotomy after debulking. The requisite recovery period from tracheotomy accounts for a portion of this delay. However, patients went an average of 57.6 days between debulking and tracheotomy, whereas an average of only 31.3 days elapsed between debulking and definitive treatment.

![Figure 1. (A) Representative 0° rigid laryngoscopic view of an obstructive airway mass before tumor-debulking procedure; (B) 0° rigid laryngoscopic view of the same patient’s airway after tumor debulking.](image)

**Table 1.** Clinical Characteristics of Patients Who Required Tracheotomy after Tumor Debulking before Definitive Treatment vs Those Did Not.a

<table>
<thead>
<tr>
<th>Age, y</th>
<th>Tracheotomy after Debulking before Treatment (n = 5)</th>
<th>No Tracheotomy throughout Treatment (n = 9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>59.4 (43-73)</td>
<td>59.4 (43-73)</td>
<td>66.1 (45-93)</td>
</tr>
</tbody>
</table>

Sex

| Female | 1 (20) | 2 (22.2) |
| Male | 4 (80) | 7 (88.8) |

Race/ethnicity

| Black | 4 (80) | 4 (44.4) |
| White | 0 (0) | 2 (22.2) |
| Otherb | 1 (20) | 3 (33.3) |

Presenting location

| Emergency room | 2 (40) | 4 (44.4) |
| Office | 3 (60) | 5 (55.5) |

ASA

| 2.8 | 2.78 |

T stage

| T3 | 5 (100) | 6 (66.7) |
| T4 | 0 (0) | 3 (33.3) |

Subsite

| Glottic | 4 (80) | 6 (66.7) |
| Subglottic | 1 (20) | 3 (33.3) |

Smoking status

| Ever | 3 (60) | 7 (77.8) |
| Never | 2 (40) | 1 (12.5) |

Completed full course of intended treatment

| Yes | 2 (40) | 9 (100) |
| No | 3 (60) | 0 (0) |

Time to subsequent tracheotomy, d

| 57.6 (6-150) | N/A |

Time to definitive treatment

| 83.3 (72-91) | 31.3 (15-51) |

Abbreviation: ASA, American Society of Anesthesiologists; N/A, not applicable.

aValues presented as mean (range) or n (%).
bOther includes Asian and Pacific Islander, Hispanic, and multiracial.
treatment in those who were successfully bridged. Only 2 patients required subsequent tracheotomy earlier than 31 days postdebulking. This suggests that for 3 of the 5 patients requiring subsequent tracheotomy, an initial delay in treatment may have allowed for tumor regrowth necessitating the tracheotomy. In our study, no patients needed tracheotomy after starting treatment, whereas in other series, a small percentage without initial airway symptoms did need tracheotomy due to chemoradiotherapy toxicities.2

Patients who required subsequent tracheotomy were less likely to complete the full course of intended treatment. It is difficult to draw definitive conclusions given our small sample size, but one possible explanation is that the same factors that cause a delay in initial treatment also decrease compliance with definitive therapy. Previous research at our institution showed that a diagnosis of head and neck malignancy, treatment during winter months, and low socioeconomic status are risk factors for patient noncompliance.6 These factors should be taken into consideration since patients at risk for noncompliance are unlikely good candidates for tumor debulking.

In our small cohort of patients, there were no adverse events from tumor debulking, which suggests that it may be a viable option for bridging select patients with airway obstruction to definitive treatment. Our study is limited by its small sample size and retrospective nature. Certain tumor locations or growth patterns—such as exophytic, bulky supraglottic tumors—may be more amenable to debulking than others. Other potentially valuable information, such as swallowing function and pulmonary status, was not available. As our collective experience with tumor debulking grows, such information may help in defining which patients are appropriate tumor-debulking candidates.

Acknowledgments
We thank Moonseong Heo, PhD, statistician, Department of Epidemiology and Population Health, Albert Einstein College of Medicine, Bronx, New York, for performing the statistical analysis for this study.

Author Contributions
Eugenie Du, conception of project, acquisition, analysis and interpretation of data, drafting and revising of manuscript; Richard V. Smith, conception of project, revising of manuscript, final approval; Thomas J. Ow, conception of project, revising of manuscript, final approval; Andrew B. Tassler, conception of project, revising of manuscript, final approval; Bradley A. Schiff, conception of project, interpretation of data, revising of manuscript and final approval.

Disclosures
Competing interests: Richard V. Smith, AAO-HNSF education coordinator—stipend.
Sponsorships: None.
Funding source: None.

References