

ORIGINAL RESEARCH

Transoral laser microsurgery for untreated glottic carcinoma

David G. Grant, MD, John R. Salassa, MD, Michael L. Hinni, MD, Bruce W. Pearson, MD, Richard E. Hayden, MD, and William C. Perry, PA-C, Jacksonville, FL, and Scottsdale, AZ

OBJECTIVES: To report the oncology and functional outcomes of transoral laser microsurgery (TLM) for untreated glottic carcinoma.

STUDY DESIGN: A 2 center prospective case series analysis.

SETTING: Academic, tertiary referral centers.

RESULTS: Seventy-six patients underwent TLM. Pathologic T stages were: T1, 45 (59%); T2, 21 (28%); T3, 5 (7%); and T4, 5 (7%). Five (7%) patients had neck dissections. Five (7%) patients received adjuvant radiotherapy. Mean follow-up was 42 months. Respective T1 and T2 5-year Kaplan-Meier estimates were: local control, 90% and 93%; loco-regional control, 90% and 93%; disease specific survival, 90% and 93%; and overall survival, 94% and 93%. The average hospital stay was 2 days. Two (3%) patients experienced major complications. The overall laryngeal preservation rate was 95% (72 of 76).

CONCLUSIONS: TLM is a safe and effective treatment in select carcinoma of the glottic larynx. Low morbidity and mortality and short periods of hospitalization make TLM an attractive therapeutic option.

SIGNIFICANCE: TLM is an emerging strategy in the treatment of laryngeal cancer.

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Management options for patients with early T1 and T2 glottic cancers include single modality treatment with primary radiotherapy or primary surgery. The menu of treatment choices for advanced T3 and T4 disease expands to include surgery alone or combined with radiotherapy and radiotherapy alone or radiotherapy with adjuvant chemotherapy. The argument that primary radiotherapy with or without chemotherapy is the treatment of choice for laryngeal cancer is based on a significant reduction in serious morbidity and mortality and comparable disease control compared with conventional open surgery. The emergence of transoral laser microsurgery (TLM) over the last decade has challenged this argument. TLM has distinct advantages over both open surgery and primary chemo- or radiotherapy including organ and function preservation, low morbidity

and mortality, and shorter periods of hospitalization. Since 1996, a prospective electronic database has been maintained of all patients undergoing TLM at Mayo Clinic Jacksonville (Jacksonville, Florida) and Mayo Clinic's Arizona (Phoenix and Scottsdale, Arizona). The current study forms part of Mayo Clinics's growing experience with TLM in the treatment of over 600 patients with head and neck cancer.

PATIENTS AND METHODS

Database

Since inception of the TLM database, information has been gathered concerning patient demographics, prior and subsequent treatment, primary tumor site and subsite extension, staging and histopathology. We have also recorded complications, comorbidities, tracheotomy, feeding tubes, and duration of hospital stay, treatment morbidity including speech and swallowing function before and after treatment, local and regional tumor recurrence, and overall and disease specific survival. Of 618 patients treated with TLM for upper aerodigestive malignancies between 1996 and 2005, 118 have had surgery for glottic carcinoma. Other malignant conditions including those of the supraglottic larynx will be reported separately.

Patients

Seventy-six (76 of 118) patients underwent TLM with curative intent for biopsy proven for previously untreated primary squamous cell carcinoma of the glottic larynx. Forty-two (42 of 118) patients had received treatment before TLM and form the basis of another report. No performance status exclusion criteria exist for TLM although relative anatomic contraindications to surgery include: inadequate endoscopic access, extension of tumor to involve the great vessels of the neck, significant extension of the primary tumor in the presence of significant neck lymphadenopathy such that the primary tumor and the nodal disease merged or encased

Received September 27, 2006; revised May 18, 2007; accepted May 30, 2007.

the great vessels, and tumor extension such that a complete resection would put the patient at significant risk of aspiration. All disease was staged according to the 1992 AJCC TNM staging system, current at the beginning of the study.

Treatment

Primary TLM surgery. The primary tumor was removed with the patient under general anesthesia and before any neck dissection was performed in accord with the principles of TLM laser microsurgery popularized by Steiner and Ambrosch.¹

Neck dissection. Indications for neck dissection are unaltered with TLM. For node positive necks, a selective or modified radical neck dissection was performed whenever possible. Radical neck dissection was occasionally necessary for patients with advanced regional and local disease.

Adjuvant therapy. Indications for adjuvant radiotherapy are unchanged from those of conventional open surgery. The decision to offer adjuvant therapy was based on nodal status, presence or absence of extra-capsular extension, T stage, margin status, and histology as key factors in determining the need for therapy.

Outcome Measures

End points analyzed were local control, loco regional control, recurrence-free survival, and overall survival. All end points were calculated with the Kaplan Meier method. Local and/or regional tumor recurrence was used in the estimation of local and regional control rates. Overall survival was calculated as the interval between surgery and last follow-up or date of death from any cause. Recurrence free survival was calculated with local or regional recurrence, distant metastases, and death as a result of primary disease as uncensored events. All analysis and chart review was carried out in accordance with Mayo Foundation Institutional Review Board regulations and approval. Demographic and survival information was evaluated within the TLM database itself with the use of unique integrated data analysis tools. Further analysis occurred with Microsoft Excel and SPSS v13.0.

RESULTS

Patients

The pathologic T stage distribution was: T1, 45 (59%); T2, 21 (28%); T3, 5 (7%); and T4, 5 (7%). The frequency and distribution of tumor subsite extension is shown in Table 1. Three patients presented with metastatic disease of the neck. The TNM staging was: T4N1M0, T3N2aM0, and T4N2bM0. The average patient age was 65 years (median, 66 years; range, 33 to 86 years). Men outnumbered women 7:1. The average follow-up period was 42 months (median, 39 months; range, 1 month to 113 months).

Table 1
Tumor sub-site involvement of 76 untreated glottic cancers

Primary tumors n = 76	
Subsite	Number of patients (%)
Single vocal cord	69 (90)
Anterior commissure	31 (41)
False cord/ventricle	14 (18)
Subglottis	11 (15)
Arytenoid	6 (8)
Both cords	5 (7)
Paraglottic space	5 (7)
Laryngeal framework	4 (5)
Pre-epiglottic space	4 (5)
Epiglottis	3 (4)
Extra laryngeal soft tissue	2 (3)
Aryepiglottic fold	1 (1)
Medial pyriform	1 (1)

Surgery

Margins. Seventy-four (97%) patients had a satisfactory R0 resection with negative frozen section and permanent margins. Two (3%) patients had positive tumor margins at the conclusion of TLM. One patient had a multifocal tumor that involved the thyroarytenoid musculature, resection of which was judged to put the patient at significant functional risk. The patient received adjuvant radiotherapy. In one patient, the result of a frozen section changed from negative to positive on permanent sectioning. The patient underwent further TLM with satisfactory frozen section and permanent margins obtained.

Tracheotomy. Seven (9%) patients required a temporary tracheotomy at surgery. The provision of an adequate airway at surgery (six of seven) was the main indication for a surgical airway. One (one of seven) patient with a T1 lesion required a tracheotomy to allow adequate exposure of the tumor at surgery. Two (2 of 76) patients required a temporary surgical airway for upper airway obstruction after radiotherapy. One (1%) patient became tracheotomy dependant after developing supraglottic stenosis after treatment.

Neck dissection. Neck dissections were performed in five (7%) patients. Two (two of five) patients underwent a selective neck dissection. Three (three of five) patients underwent a modified radical neck dissection. No bilateral neck dissections were performed.

Duration of hospital stay. For patients who underwent TLM for untreated glottic carcinoma, the average stay in hospital was 2 days (median, 1 day; range, 1 to 7 days).

Radiotherapy. Five (7%) patients received adjuvant postoperative radiotherapy. No patients received chemotherapy.

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