CURRENT CONCEPTS AND NEW HORIZONS IN CONSERVATION LARYNGEAL SURGERY: AN IMPORTANT PART OF MULTIDISCIPLINARY CARE

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Accepted 3 June 2009
Published online 11 August 2009 in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/hed.21208

Abstract: Background. New surgical techniques in conservation laryngeal surgery (CLS) have emerged over the past 20 years and now offer a viable “organ-preservation” approach for patients with laryngeal cancer. We review traditional and new CLS procedures and summarize the functional and oncologic outcomes of CLS in both primary and salvage settings.

Methods. We searched the literature by accessing Medline for articles from 1991 to 2007 on primary or salvage surgery (open and transoral) for laryngeal neoplasms.

Conclusion. Our review of the literature suggests that proper selection of patients for CLS can yield long-term local control rates equal to or better than those obtained using radiation-based approaches. We believe that CLS should be directly compared with radiation or chemoradiation to further refine the indications for each kind of treatment in cases of primary and recurrent/refractory laryngeal cancer. © 2009 Wiley Periodicals, Inc. Head Neck 32: 656–665, 2010

Keywords: larynx cancer; laryngectomy; carbon dioxide laser; salvage therapy; radiation therapy; supracricoid

Since the landmark publication of the 1991 Veterans Affairs Laryngeal Cancer Study,1 techniques for delivering radiation and chemotherapy have improved significantly. As a result, evidence of successful organ preservation using
radiotherapy (RT) alone or with chemoradiotherapy (CRT) has mounted.²,³ However, it is also clear that these larynx-preservation approaches are also associated with significant acute and long-term side effects.⁴–⁶ Worse still, for patients treated with RT or CRT who later require salvage surgery, conservation surgical options are usually lost, and postoperative complications are increased, with significantly diminished survival.⁷ Despite these limitations, radiation therapy continues to be the primary treatment (alone or with chemotherapy) for laryngeal cancer in most centers across North America. Yet many of these patients treated with “organ-preservation” approaches are also candidates for conservation laryngeal surgery (CLS).

Thus, we advocate establishing CLS as an important aspect of the multidisciplinary management of the patient with laryngeal cancer. For selected patients, surgery can preserve normal laryngeal function while still achieving complete tumor resection. In addition to the time-honored open surgical approaches of vertical partial laryngectomy and supraglottic laryngectomy, transoral laser microsurgery (TLM) and supracricoid partial laryngectomy (SCPL) have emerged as function-preserving approaches for patients with laryngeal cancer.

In contrast to RT-based organ-preservation, portions of the laryngopharynx are resected but the crucial infrastructure necessary for native speech and swallowing is preserved. With TLM and SCPL, oncologic control can be achieved while avoiding the long-term functional debilitation that sometimes follows radiation (RT or CRT) of the larynx. These “new” options for functional organ-preservation expand the boundaries of conservation laryngeal surgery and should play a greater role within the multidisciplinary care of laryngeal cancer.⁸

However, since there are no prospective data comparing functional outcomes of both organ-preservation nonsurgical therapy and CLS, careful preoperative evaluation and selection of the appropriate surgical technique are instrumental in achieving optimal outcomes. Therefore, we searched Medline for articles from 1991 to 2007 on primary or salvage conservation surgery (open and transoral) for squamous carcinoma of the larynx, including studies with more than 20 patients with an average follow-up of 24 months. The search terms used were “larynx cancers,” “laryngectomy,” and “salvage therapy.” The indications and contraindications for relevant procedures, functional results, complications, local control rates, and recurrence-free survival rates were reviewed.

PART I: PREOPERATIVE EVALUATION

To achieve the potentially favorable outcomes that come with laryngeal preservation surgery as either primary or salvage therapy, the surgeon must have an in-depth understanding of the indications and contraindications for each procedure. Thus, a careful preoperative laryngeal examination is paramount, whether by mirror laryngoscopy, flexible fiberoptic exam, or videostroboscopy.⁹ For early-stage tumors, preoperative laryngeal videostroboscopy should be performed to evaluate the mucosal wave. Abnormalities or disruption of the mucosal wave may correlate with the depth of the tumor’s invasion and may thus correlate with voice outcome after microsurgical resection.¹⁰,¹¹

During preoperative laryngoscopy in the clinic, careful attention should not only be paid to mobility of the vocal cord but also that of the arytenoid cartilages. Fixation of the vocal cord has long been appreciated as an important negative prognostic finding¹² and this clinical finding helps to distinguish T3 tumors in the American Joint Committee on Cancer (AJCC) tumor staging schema.¹³ But it was Brasnu et al¹⁴ who first called attention to the assessment of arytenoids mobility. Arytenoid cartilage mobility can still be preserved even when the ipsilateral vocal cord is immobile. In this case, conservation surgery such as SCPL or TLM might still be possible.¹⁵ However, if the vocal cord and arytenoid cartilage are both fixed, the chance for laryngeal preservation with surgery or chemoradiation may in fact be diminished. Thus, careful assessment of not only the vocal cord but also the arytenoid cartilage is a crucial part of the preoperative evaluation in the outpatient clinic.

However, intraoperative laryngeal assessment, with both visualization and palpation, is mandatory in evaluating a patient’s candidacy for conservation surgery. Laccourreye et al¹⁶ and Steiner and Ambrosch¹⁷ are both outspoken proponents of rigid endoscopic examination of the larynx in the unintubated patient under general anesthesia. This assessment allows for unobstructed visualization of the entire laryngeal mucosa as well as evaluation of the cricoarytenoid unit’s mobility without impediment by
an endotracheal tube. Laryngeal examination using endoscopes with 0, 30, and 70 degree optics is the only means by which the ventricle and subglottis can be evaluated fully. The ability to palpate the tumor directly also cannot be overemphasized. By using both endoscopic and manual techniques, therefore, the surgeon can determine tumor extent and carefully evaluate the uninvolved larynx, which are essential for planning the surgical approach.

Imaging the larynx is often helpful but does not replace endoscopy. Dynamic imaging is extremely helpful in assessing laryngeal function. Modified barium swallow studies should be considered preoperatively on all patients to help identify those at risk for dysphagia and aspiration. Results from these studies also provide a guide for posttreatment rehabilitation.

Because rehabilitation of swallowing ability can be time intensive, patient selection for CLS must consider not only functional status and pulmonary health but also the patient’s ability to actively participate in the rehabilitative process and the strength of his/her support system. Explaining the rehabilitation process to the patient and their support group preoperatively will typically speed the patient’s return to normal functioning.

Finally, preoperative assessment and staging must also consider certain limitations of the current TNM staging system. While the AJCC’s TNM staging system provides a platform from which to generalize medical therapies and RT, it is inadequate in characterizing the needed information for surgical planning. For instance, the current TNM scheme takes into account extension to the tongue base and vallecula, as well as involvement of the pre-epiglottic space, but it does not include other crucial parameters, such as the extent of infraglottic spread, cricoid involvement, or ventricular involvement, which are critical in determining which patients are appropriate for CLS.

The recently issued American Society of Clinical Oncology (ASCO) Clinical Practice Guidelines for the Use of Larynx Preservation has highlighted the difficulty of treating certain “unfavorable” T2 supraglottic and glottic laryngeal cancers. A T2 glottic squamous cell carcinoma (SCC) is defined as a tumor that “extends to the supraglottis and/or subglottis, or with impaired vocal cord mobility.” Impaired vocal cord mobility may be caused by a diverse array of lesions. For instance, a large exophytic lesion that grows into the airway may, by its sheer bulk and weight, limit cord movement, but so might an endophytic lesion that has burrowed silently into the paraglottic space.

Thus, according to the ASCO criteria, unfavorable T2 glottic tumors are endophytic lesions, clinically without subglottic extension and with impaired cord mobility, suggesting subtle lateral paraglottic spread. Exophytic T2 supraglottic tumors with transglottic spread may be unfavorable as well as those with extensive involvement of the aryepiglottic fold, or those in patients at high risk for occult tumor invasion into the pre-epiglottic space. Optimal local control over 5 years, even with altered fractionation RT, is only 79% for these stage II tumors. Garden et al reviewed records for 230 patients (from 1970 to 1998) who received RT alone in 2 fractionation schedules and found that with once-daily dosing, 5-year local control rates were as low as 67%. To compensate for these dismal results, many have turned to altered fractionation or concurrent CRT. However, the Radiation Therapy Oncology Group’s prospective study RTOG 91-11 found that this strategy improved 5-year rates of laryngeal preservation only to 84% for 2002 AJCC stage II and III laryngeal cancer. Since the toxicity of platinum-based concurrent therapy can compromise function in a sizeable minority of patients, perhaps as high as 15% to 20%, we advocate here an alternative approach: that selected patients be considered for conservation laryngeal surgery as upfront primary therapy. For patients who are candidates for conservative laryngeal surgery, surgical options include open surgical methods or transoral laser microsurgical techniques.

PART II: OPEN CONSERVATION LARYNGEAL SURGERY

Traditional Open Approaches to Glottic and Supraglottic Tumors. Open approaches in the treatment of laryngeal carcinoma are subdivided into procedures for glottic and supraglottic tumors. While TLM “follows the tumor” and can bridge this concept, open procedures and the need for reconstruction of a functional valve necessitate adherence to the more time-honored principles upon which CLS was founded. Glottic tumors confined to the vocal fold can be removed by means of laryngofissure and cordectomy. While excellent results have been reproducibly
obtained, in the era of TLM, this procedure has become uncommon. For more advanced glottic tumors, vertical partial hemilaryngectomy extends beyond cordectomy by also removing a portion of the ipsilateral paraglottic space and lateral thyroid cartilage. This procedure can be extended further to manage tumors of the anterior commissure and contralateral vocal fold by way of frontolateral vertical partial laryngectomy. While these procedures are oncologically sound and function preserving, they do not address the supraglottic larynx and the pre-epiglottic space. Instead, supraglottic or horizontal hemilaryngectomy procedures have been developed to access tumors in this region. Resection may be limited to the epiglottis in a transthyroid epiglottectomy; conversely, all of the supraglottis anterior to the arytenoids, including the pre-epiglottic space, may be removed in a traditional supraglottic laryngectomy. Limited tumor extension into the base of the tongue can even be addressed in an extended supraglottic laryngectomy. All these approaches require a significant level of surgical experience, not only to ensure sound oncologic resection but also to accommodate the complexity of the reconstruction. Again, TLM has replaced many of these procedures as surgeons have gained confidence in treating larger, more advanced tumors.

Newer Conservation Open Technique: Supracricoid Partial Laryngectomy. Although SCPL was first proposed in 1959 by Majer and Rieder,22 it has only recently gained acceptance in the United States. SCPL has expanded the treatment options for laryngeal cancer by bridging the gap between time-honored open procedures: hemilaryngectomy, supraglottic laryngectomy, and total laryngectomy (TL). SCPL allows for excellent local control when there is strict adherence to surgical indications. It also allows for the maintenance of physiologic speech and swallowing without the need for a permanent tracheostomy (Figure 1). This approach successfully addresses the paraglottic spaces as well as the pre-epiglottic space, along with reconstruction by cricohyoidoepiglottopexy.23

SCPL is based on the concept that the functional anatomic unit of the larynx is the cri-coarytenoid unit (arytenoid cartilages, intact cricoarytenoid joint, posterior cricoarytenoid muscles, and recurrent and superior laryngeal nerves).23,24 The preservation of 1 intact cricoarytenoid unit and an intact cricoid cartilage is the absolute minimum necessary to perform the operation successfully.

For selected T1b and T2 lesions, the 5-year actuarial local control estimate has been reported as high as 98.2% (61 of 62 patients).25 Chevalier et al26 reported a 5-year actuarial local control estimate of 94.6% for 112 previously untreated patients with vocal cord motion impairment (T2, n = 90) or fixation (T3, n = 22).

SCPL is indicated for selected T1b, T2, T3, and T4 carcinomas of the larynx. SCPL also plays an important role in the surgical salvage of selected T1b and T2 tumors in which RT has failed.27,28 Makeieff et al29 studied 23 patients (T1b = 12 cases, T2 = 11 cases) that underwent SCPL as salvage treatment. The local control rate with conservation surgery was 66%. The overall survival rate at 3 years and 5 years was 82.9% and 69.04%, respectively. As noted earlier, surgical management is dictated by the findings.
on preoperative assessment and not T stage. This concept is especially important in SCPL.

The mortality rate for SCPL is 1%, with a postoperative morbidity rate of 11.7%.30 A speech and language pathologist familiar with rehabilitation after SCPL is essential to maximize the functional outcome. As one would expect, the rates of swallowing complications are slightly higher in patients receiving either preoperative or postoperative RT than in other patients. After RT, patients may need a feeding tube and tracheostomy longer than their nonirradiated counterparts. Postoperative laryngeal stenosis appears to be more common in women than in men because of their typically narrower cricoid cartilage.31 It is also more common in previously irradiated patients and those who keep their tracheostomy tube for a prolonged period.30 Despite the fact that only 3 sutures are used to repair the laryngeal defect, the pexy rarely ruptures after SCPL.32

PART III: TRANSORAL LASER MICROSURGERY

The concept of TLM encompasses the laser-based surgical resection of tumors of the larynx, pharynx, and oral cavity through the mouth. For the purposes of this paper, we will limit this terminology to TLM of the larynx. This surgical approach is founded upon the historic evolution of the field of otolaryngology and reflects the practitioner’s ability to look through the transoral window into the body and treat myriad conditions. Traditionally, TLM is done using a line-of-sight CO2 laser beam aided by a microscope. With continued advances in lasers, robotics, and visualization technologies, further TLM evolution is expected. Use of the operating microscope with the laser has greatly facilitated complete tumor excision. While CO2 laser resection has been used for 30 years, the dedicated work of Steiner et al.,17 Rudert et al.,33 and other surgeons18,34,35 expanded on the early limited resections and evolved into today’s radically more complex resections of advanced tumors. By developing new equipment for access and resection, creating better endoscopic hemostasis techniques, and challenging long-held Halsteadian principles, investigators have made significant advances in laser surgery capabilities. The concepts of following the tumor across traditional anatomic boundaries, bisecting the tumor to assess depth of invasion and margins, and removing the tumor piecemeal so that even large tumors can be excised in a confined working area have expanded the indications for endoscopic tumor treatment.

Transoral Laser Microsurgery for Glottic Laryngeal Squamous Cell Carcinoma. Many centers consider RT the standard therapy for early glottic cancer. RT alone, properly administered in doses of 66 to 70 Gy, will cure 80% to 90% of patients with T1 cancer of the true vocal cord (TVC). When salvage surgery is added, the overall cure rate approaches 95% in some studies.36 RT is most effective for small lesions involving the midportion of the membranous vocal cord; unfortunately, this therapy delivers curative radiation doses to the uninvolved, contralateral TVC as well, which may compromise long-term function and increase the risk of second cancers. In addition, RT effectiveness diminishes when the anterior commissure, vocal process, or arytenoid are involved; the lesions are bulky; or vocal cord mobility is limited.36–38 Control rates for T2 cancers treated with radiation alone are not as high as those for T1 tumors treated the same way,39 although with surgical salvage, an overall 5-year survival rate of approximately 80% to 90% is achieved.40 Nevertheless, RT represents a common therapy for these early lesions in many centers since it preserves a high-quality voice in most patients without compromising the chance for a cure.

Unfortunately, edema and histologic sequelae of RT impair both visual and histologic examination in the posttreatment period.40 Hence, the use of RT for every patient may result in delay of diagnosis of recurrent disease and may increase the chance that surgical salvage would require a TL rather than CLS. Large reviews of RT failures in T1 and T2 laryngeal cancer, have shown that nearly 70% of patients present with recurrences for which TL is the only option for salvage treatment.41,42

Clinical studies that include histologic correlation suggest that errors in staging based on clinical criteria alone are commonplace and may explain the failure of radiation to control “limited” disease. In addition, 6 weeks of daily therapy are required, and the success of this modality is highly dependent on the RT team’s skill and experience. Biopsy after RT carries a risk of chondritis, hence the admonition to perform any biopsy of the irradiated larynx with caution. Another shortcoming of using RT as the
primary treatment is that it forestalls the opportunity to obtain histologic confirmation of disease extent. For these and other reasons, many centers treat selected patients with T1 and T2 carcinoma of the TVC with laser excision, despite the occasional poorer outcome in terms of voice quality.

TLM for microinvasive and early T1 carcinoma of the larynx is an established modality and can be performed with minimal morbidity. Grant et al.\(^43\) in their study of 76 patients undergoing TLM for glottic cancer found a 5-year local control rate of 90% for T1, 93% for T2 cancers. Five-year recurrence-free survival was 90% and 93%, respectively, for these patients and the overall survival rate was 94% and 93%, respectively. While these results are comparable to published rates of local control with radiation only,\(^44\) the overall larynx-preservation rate for the whole surgical cohort was higher: 95% (72 of 76).

The postoperative voice can approximate that achieved by curative RT and is often not worse than the preoperative voice. A major advantage of TLM is that the excision can usually be performed in 1 session and provides a specimen that can be used for pathologic staging of the disease process. Most surgeons maintain that optimal results from laser excision result when the tumor is confined to the TVC. Steiner et al.\(^45\) and Hinni et al.\(^46\) however, reported excellent results after TLM of larger tumors, even when the tumor involved the arytenoid, extended into the ventricle, or crossed the anterior commissure (Figure 2). Histologic confirmation of the tumor margin on frozen sections is necessary to ensure removal of the disease, and close follow-up is required.

**Transoral Laser Microsurgery for Supraglottic Laryngeal Squamous Cell Carcinoma.** CO\(_2\) laser resection of supraglottic cancer was first described in 1978 by Vaughan.\(^47\) Since then, several reports have been published on endoscopic laser surgery of supraglottic cancer. In 1994, Zeitels et al.\(^48\) reported on 45 patients with supraglottic and hypopharyngeal cancer. Twenty-two patients with T1 and T2 tumors were treated by TLM alone, and none developed any local recurrence during a median follow-up time of 58 months. Of the other 23 patients with T2 and T3 tumors treated with TLM and postoperative radiation, 4 developed local recurrence, with subsequent salvage therapy consisting of TL. In 1997, Eckel\(^34\) reported on 46 patients with T1 and T2 supraglottic cancers. Four patients (8.7%) developed a local or regional recurrence in the first 2 years after surgery. In 1998, Iro et al.\(^35\) reported on 141 patients with supraglottic cancer (Union Internationale Contre le Cancer [UICC] stage distribution: I, 23.4%; II, 25.5%; III, 16.3%; and IV, 34.8%) who were treated with TLM. The 5-year recurrence-free survival rates (by stage) were: I, 85.0%; II, 62.6%; III, 74.2%; and IV, 45.3%. Ambrosch et al.\(^49\) reported on 48 patients with T1 and T2 supraglottic cancers treated with TLM. The reported 5-year local control rate was 100% for those with T1 and 89% for those with T2 cancers. More recently, in 2004, Motta et al.\(^50\) reported on 124 patients with T1–T3 supraglottic cancers treated with TLM. The reported 5-year overall survival rates were 91% for those with T1 tumors, 88% for those with T2 tumors, and 81% for those with T3 tumors. As might be expected, this is 1 of very few reports on T3 supraglottic cancers treated with TLM. Grant et al.\(^51\) reported...
on 38 patients with supraglottic carcinoma treated with TLM in pathologic T stages I–IV. Their 5-year local control rate was 97%, and 5-year overall survival rate was 61%. The overall laryngeal function preservation rate was 79%.

Complication rates following TLM are low. In supraglottic cancers, postoperative hemorrhage after laser surgery is reported in between 3% and 6% of cases, while the incidence of vestibular stenosis following laser surgery is reported to be between 2% and 5%.33,51,52

Functional results after TLM are superior to those attained after open supraglottic partial laryngectomy.53 Tracheostomy rates and incidence of aspiration pneumonia are also lower after TLM, and the hospitalization and swallowing rehabilitation periods are shorter. In summary, numerous reports confirm that for T1 and T2 supraglottic cancers, TLM is an oncologically safe treatment modality (Figure 3).

PART IV. SURGICAL SALVAGE FOLLOWING RADIOTHERAPY

RT is a well-established treatment for early laryngeal cancer, with good oncologic and functional results. However, the recurrence rate after RT is 5% to 13% for T1 and 25% to 30% for T2 glottic laryngeal cancers.54 Once a recurrence is confirmed by histologic examination, a surgical salvage procedure is the only chance for cure. This can be either a TL or a partial laryngectomy, the latter of which may be done using an external approach or TLM.

The treatment of recurrent laryngeal cancer after RT poses a challenge for the head and neck surgeon. It is difficult to determine the extent of cancer clinically and histopathologically because of radiation-induced changes in the surrounding tissue. This has led head and neck surgeons to support TL as the soundest treatment in this setting. However, SCPL and TLM have gained acceptance as sound oncologic procedures for recurrent glottic laryngeal cancer, even with minimal transglottic spread, as long as the original tumor stage and extent of RT are considered carefully.

Open Conservation Laryngeal Surgery as Surgical Salvage. The oncologic considerations for primary SCPL also apply in the salvage setting. Flexible fiberoptic examination performed during an office visit provides critically important information about laryngeal function. Limitation or fixation of vocal fold motion should be noted, as should arytenoid mobility. Direct laryngoscopy performed with the patient under general anesthesia allows for evaluation of the subglottis and appreciation of tumor extent beyond the confines of the endolarynx. Tumors with minimal supraglottic extent can be considered for SCPL with cricohyoidopexy. Patients who have vocal fold fixation with preserved arytenoid mobility warrant arytenoid resection to fully resect the paraglottic space. In our experience, functional outcomes for patients with complete arytenoid resection are the same as those for patients who undergo primary SCPL with 1 arytenoid resected.55 The patient should understand that rehabilitation may be prolonged because of the previous RT, and a tracheostomy tube and feeding tube likely will be needed for 1 to 2 months after surgery. It takes a motivated patient and dedicated speech pathologist to...
complete the rehabilitative exercises required for an optimal functional outcome. The patient and others assisting the patient must be ready for this arduous rehabilitation process, which requires a multidisciplinary effort. Weinstein et al. demonstrated that from a quality-of-life standpoint, maintenance of stomal hygiene, and the stigma of having a stoma are significant detractors from TL. Thus, SCPL provides an excellent alternative to TL for selected patients with recurrent laryngeal cancer by allowing them to maintain physiologic speech and swallowing and avoid a permanent tracheostomy.

**Transoral Laser Microsurgery as Surgical Salvage for Laryngeal Cancer.** Several papers have described the use of TLM as salvage surgery for recurrent laryngeal cancer. Quer et al. described 24 patients with recurrent supraglottic and glottic cancer who underwent salvage TLM. The 6 patients (25%) who were being treated for a second recurrence underwent TL. The larynx was preserved in the other 18 patients (75%), whose cancer had recurred only once. The disease-free survival rate after 5 years was 100%. Steiner et al. reported on 34 patients with early (T1–2, n = 21) or advanced (T3–4, n = 13) recurrent glottic carcinoma after full-course RT. Twenty-four patients (71%) were cured after 1 or more TLM. With a median follow-up of at least 3 years, 15 of 21 patients (71%) with early recurrent carcinomas (rT1–rT2) and 9 of 13 patients with advanced cancer (rT3–rT4) remained disease free. Patients with early-stage recurrent carcinomas had lower rates of local recurrences and salvage laryngectomies than did patients with advanced recurrent cancers; the overall 3-year survival rate was 74%, and the 5-year survival rate was 53%, with no significant difference between early and advanced recurrent cancer. A review of 145 patients by Motamed et al. found that 24-month local control rates after salvage CLS ranged from 51% to 87%. In 25% of patients, a TL was ultimately necessary because residual or recurrent disease was present or for poor swallowing function.

After salvage TLM, tracheostomy or nasogastric feeding tubes are not common, and the hospitalization time is usually brief. However, Steiner et al. reported that 24% of their patients required nasogastric tubes for 2 to 6 days and 8% had a temporary tracheostomy. In this particular series, the recurrences were more advanced than in some of the other studies, which might explain the higher rates. Complications are reported in less than 5% of patients. The most commonly reported complications are laryngeal edema, anterior commissure webbing, and granuloma formation, which can be treated by a further laser procedure. More serious complications, such as laryngotracheal stenosis and chondronecrosis, have also been described. Larger resection margins are needed to obtain optimal oncologic results in salvage TLM than in primary TLM. This is particularly true for post-RT TLM because the tumor border may be difficult to determine, both grossly and microscopically.

For early glottic laryngeal cancer, salvage TLM seems to be a good treatment option, with good oncologic and functional results with fewer complications. However, if the anterior commissure is involved, the oncologic outcome declines. In these cases, another procedure, such as external partial laryngectomy or TL, might be more appropriate. Overall, with salvage TLM, functional organ preservation was achieved in the majority of the surviving patients.

**CONCLUSIONS**

Transoral laser microsurgery and SCPL have emerged as important new approaches in conservation laryngeal surgery. In carefully selected patients, TLM and SCPL offer oncologic outcomes equivalent to radiation-based treatment approaches while maintaining laryngeal function. While there are no studies directly comparing surgery to RT-based approaches for laryngeal cancer, we feel that such a prospective clinical trial is absolutely necessary for future multidisciplinary efforts. Yet without a National Institutes of Health–funded cooperative group to study and support head and neck surgery, this seems unlikely.

Still, the preponderance of published data suggests that for patients undergoing CLS, survival is at least equivalent and functional outcomes comparable. Thus, to provide genuine multidisciplinary care, patients with laryngeal cancer ought to be evaluated by a surgeon capable of performing CLS.

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