

The management of early laryngeal cancer: options for patients and therapists

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Purpose of review

To evaluate the optimal treatment of early laryngeal cancer and to highlight new developments.

Recent findings

The use of hyperfractionation and acceleration of radiotherapy may result in improved outcomes for patients with respect to cancer cure and preservation of the larynx. Options for surgical treatment include endoscopic resection and open partial laryngectomy. The use of endoscopic vertical partial laryngectomy may overcome the difficulties encountered in exposure with transoral laser resection of anterior commissure tumors. The microdebrider may be a useful alternative to CO₂ laser in endoscopic resection in selected cases. A further treatment option that shows promising results is photodynamic therapy, which has some important advantages over the other treatment modalities. Further larger studies are needed to assess the efficacy of these treatment modalities to ascertain the treatment modality of choice.

Summary

Different treatment modalities are available for early laryngeal cancer. The treatment choice should take into account the likely post-treatment morbidity, quality of life, patient preference, and voice quality. The cost of treatment, not only to the treating institution but also to the patient and those involved in the patient's care at home, is also an important issue. Well-designed randomized multicenter controlled trials are now necessary to influence patients' and clinicians' decision in the choice of the most effective and predictable treatment plan.

Keywords

early laryngeal cancer, radiotherapy, surgery, treatment

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Abbreviations

MO no distant metastasis
NO no nodal involvement

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Introduction

The incidence of laryngeal cancer is estimated to be approximately 12,000 annually in the United States and approximately 2300 annually in the United Kingdom [1,2]. These are usually squamous cell carcinomas, and they most commonly arise from the glottis. Three quarters of these patients present with early laryngeal cancer, defined by the American Joint Committee on Cancer as a T1 or T2 tumor without nodal involvement or distant metastasis (T1N0M0 and T2N0M0) [3,4]. The most important goals of treatment for early laryngeal cancer are cure with laryngeal preservation, optimal voice quality, and minimizing the risk of serious complications. The selection of treatment depends on the location and extent of the tumor, the patient's comorbidity, the philosophy of the therapist and institution, and the wishes of the patient. Radiotherapy tends to be the treatment of choice in northern Europe, Australasia, and Canada, whereas surgery tends to be the treatment of choice in southern Europe and many centers in the United States [5].

Early laryngeal cancer generally has a good prognosis, with a 5-year disease-specific survival rate of more than 90% for T1 tumors (Table 1). Treatment is usually by single-modality therapy. Radiotherapy has historically been the gold standard for the management of early laryngeal cancer, but primary treatment options now also include surgery, either open or endoscopic with or without the laser. Radiotherapy, transoral resection, and open partial laryngectomy result in similar rates of local control, laryngeal preservation, and survival in early laryngeal cancer (Table 1), but the optimal treatment with regard to voice quality, anterior commissure involvement, and cost is more controversial. Some studies reporting the treatment results of early laryngeal cancer include carcinoma *in situ*, which may result in better outcomes and skew comparisons between different series.

The aim of this study is to review the recent pertinent literature, compare outcomes between the different-treatment modalities, discuss the optimal management of early laryngeal cancer, and highlight new developments.

Early glottic cancer

Early glottic cancer has been treated by radiotherapy, transoral excision or open partial laryngectomy. Treatment with photodynamic therapy or chemotherapy are new developments.

Table 1. 5-year local control rates, overall survival rates, and disease-specific survival rates in early glottic cancer for radiotherapy and transoral excision

Study	Radiotherapy	Transoral excision
LC	T1 85–94%	T1 83–93%
Franchin <i>et al.</i> [6]	T2 68–80%	T2 73–89%
Barthel <i>et al.</i> [7]		
Lee <i>et al.</i> [8]		
Gowda <i>et al.</i> [9]		
Chen <i>et al.</i> [10]		
Zouhair <i>et al.</i> [11]		
Hinerman <i>et al.</i> [12]		
Mendenhall <i>et al.</i> [13*]		
Stoekli <i>et al.</i> [15]		
Gallo <i>et al.</i> [17]		
Smith <i>et al.</i> [18]		
Eckel <i>et al.</i> [19]		
Pradhan <i>et al.</i> [20]		
Zeitels <i>et al.</i> [21]		
Steiner <i>et al.</i> [22]		
Brandenburg [23]		
OS	T1 70–88%	T1 85–99%
Franchin <i>et al.</i> [6]	T2 64–78%	T2 68–83%
Barthel <i>et al.</i> [7]		
Chen <i>et al.</i> [10]		
Haugen <i>et al.</i> [14]		
Stoekli <i>et al.</i> [15]		
Gallo <i>et al.</i> [17]		
Eckel <i>et al.</i> [19]		
Pradhan <i>et al.</i> [20]		
Brandenburg [23]		
Peretti <i>et al.</i> [24]		
Jones <i>et al.</i> [25]		
DSS	T1 93–98%	T1 96–99%
Barthel <i>et al.</i> [7]	T2 70–88%	T2 83–97%
Chen <i>et al.</i> [10]		
Hinerman <i>et al.</i> [12]		
Stoekli <i>et al.</i> [15]		
Eckel <i>et al.</i> [19]		
Markou <i>et al.</i> [26]		

LC, local control rate; OS, overall survival rate; DSS, disease-specific survival rate.

Radiotherapy

In early glottic cancer, treatment to the cervical lymph nodes is rarely required because the incidence of cervical lymph node metastasis is very low [1]. The 5-year local control rates, 5-year overall survival rates, and 5-year disease-specific survival rates for radiotherapy are summarized in Table 1.

Several studies report hyperfractionation with acceleration to be beneficial. Garden *et al.* [16], at the University of Texas M.D. Anderson Cancer Center in Houston, evaluated the results in patients treated with radiotherapy for T2N0 glottic cancer. This retrospective study found that patients given twice-daily fractionation (1.2 Gy/fraction, total dose 74–80 Gy) had a better local control rate (79%) than those treated with once-daily radiotherapy (1.8–2.26 Gy/fraction, total dose 32–75 Gy), who had a local control rate of 67%. Haugen *et al.* [14] in Sweden gave 45 T2N0 patients hyperfractionated accelerated radiotherapy to a total of 64.6 Gy in 4.5 weeks and compared

the results with those in 91 T1N0 patients receiving 6.5 weeks of once-daily fractions to a total of 62.4 Gy. The actuarial 5-year local control was 85% for the T1 group and 88% for the T2 group. Hyperfractionated accelerated radiotherapy therefore proved beneficial for T2N0 glottic cancer, giving local control rates comparable with those of T1N0 tumors treated with conventional radiotherapy. The hyperfractionation group had more serious acute toxicity reactions, but the serious late complications were few and were comparable between the two groups. Gowda *et al.* [9], at the Christie Hospital in Manchester and Royal Marsden Hospital in London, used an accelerated radiotherapy regimen for 200 patients with T1 glottic cancer, comprising a once-daily dose of 3.12 to 3.28 Gy 5 days a week to a total dose of 50.0 to 52.5 Gy over 21 days. The 5-year local control rate was 93%, and after salvage surgery for 7 of the 14 patients who experienced recurrence, the ultimate local control rate was 96%.

Some studies have suggested that anterior commissure involvement may adversely affect outcomes in early laryngeal cancer [10,11]. Chen *et al.* [10], who treated 134 T1–T2 glottic cancers (anterior commissure involvement: T1 38%, T2 63%) and Zouhair *et al.* [11], who treated 122 T1–T2 glottic cancers, found that anterior commissure involvement significantly negatively influenced local control. Chen *et al.* [10] found that the 5-year survival rates with and without anterior commissure involvement were 55% and 90%, respectively, for T1 glottic cancer. Their study also showed that increasing the fraction size to more than 2 Gy could overcome the negative impact of anterior commissure involvement.

By contrast, Gowda *et al.* [9], treating 200 T1N0 glottic cancers (anterior commissure involvement: 37.5%), Franchin *et al.* [6], treating 410 T1–T2 glottic cancers (anterior commissure involvement: T1N0+T2N0 30.5%), and Stoekli *et al.* [15], treating 75 T1–T2 glottic cancers (anterior commissure involvement: T1N0 29%, T2N0 33%) with radiotherapy did not find anterior commissure involvement to be a negative prognostic factor. In all the above studies, anterior commissure involvement was assessed by endoscopy and biopsy, and most patients underwent CT as well.

Transoral excision

Endoscopic resection has benefited from improved technology, such as modification of rigid endoscopes to improve access, digitally enhanced cameras, endoscopic cautery, microspot laser, and powered instrumentation. Microendoscopic resection may be performed with traditional cold steel instruments or with a CO₂ laser, which has the advantages of precise control of resection, minimal bleeding, and absence of significant postoperative edema [17]. A much-debated point is the importance of tumor-free margins around the excised specimen when the

tumor is removed from the vocal cord. The removal of 2 to 5 mm of healthy tissue surrounding the cancer has been suggested as an adequate excision margin [17]. The 5-year local control rates, 5-year overall survival rates, and 5-year disease-specific survival rates for transoral excision are summarized in Table 1.

There is some controversy about the applicability of transoral laser surgery to cancers with involvement of the anterior commissure. The anterior commissure is not always easily visualized endoscopically, and therefore safe excision margins may be compromised. Furthermore, anterior commissure lesions may be understaged because of unrecognized microinvasion or macroinvasion of the thyroid cartilage, so that a true T4a cancer may be treated as an early glottic cancer, with consequently poor results. Several recent case studies have shown poorer outcomes with transoral laser surgery when there has been anterior commissure involvement [20,27]. Pradhan *et al.* [20], at the Tata Memorial Hospital, Mumbai, reported local recurrence in 5 of 18 patients with anterior commissure involvement (27.7%) and local recurrence in 10 of 77 patients with no anterior commissure involvement (13%). By contrast, Zeitels *et al.* [21] found that anterior commissure involvement (22 of 32 cases) did not influence local control rates. Steiner *et al.* [22] specifically assessed the impact of anterior commissure involvement on the outcome of early glottic cancer treated by transoral laser microresection. In 28 cases staged as T1a with anterior commissure involvement, they reported a 5-year local control rate of 84% and a larynx preservation rate of 93%. In 130 T1a cases without anterior commissure involvement, the local control rate was 90% and the larynx preservation rate was 99%. Similar local control and larynx preservation rates were reported in cases staged as T1b or T2, with or without anterior commissure involvement.

An alternative to laser cordectomy in cases in which the anterior commissure is involved has recently been described by Davis *et al.* [28]. They performed endoscopic vertical partial laryngectomy on 26 patients with early glottic cancers, 15 of whom had anterior commissure involvement. In this procedure, exposure is improved by resection of the false vocal cords and aryepiglottic folds and by partial epiglottectomy as needed. The tumor excision is similar to that used in open vertical partial laryngectomy but with much lower morbidity. No patients required tracheostomies, they rarely needed a postoperative feeding tube, the hospital stay was between 2 and 3 days, and they maintained a voice that was subjectively moderately dysfunctional but useable. The local control rate and overall survival rate for the total group were 92% and 88%, respectively, and anterior commissure involvement in more than 50% of these patients did not result in lower local control or overall survival rates.

Flint [29], from the John Hopkins University School of Medicine in Baltimore, describes the technique of using the microdebrider as an alternative to CO₂ laser for endoscopic resection of selected lesions such as superficial mucosal cancers and rapid debulking of large, obstructing lesions. A tissue trap is attached to the suction canister to capture tissue for pathologic analysis. Margin control is not possible with this technique, however, and resected material cannot be oriented for pathologic analysis. Therefore, sharp excisional biopsy should be performed if depth of invasion or surgical margin is required. The advantages of this technique are that it may provide improved access to the anterior commissure, and it eliminates the risk of surgical fire and thermal injury associated with the CO₂ laser.

Open partial laryngectomy

Open partial laryngectomy as a primary treatment for early laryngeal cancer is usually reserved for more extensive T2 lesions or for salvage surgery after failed radiotherapy or local recurrence after transoral resection. Our literature search between 2001 and 2004 showed only one significant paper by Giovanni *et al.* [30], which discusses open partial laryngectomy as a first-line treatment for early glottic cancer. In this paper, partial frontolateral laryngectomy with epiglottic reconstruction is described. The selection criteria were as follows: glottic carcinoma with less than 0.5 cm of anterior subglottic involvement, no involvement of the supraglottic space or laryngeal surface of the epiglottis, involvement of only one arytenoid, and good mobility of both arytenoids even if vocal cord mobility was decreased. The 5-year local control rate was 100% for T1 tumors (n = 62) and 92% for T2 tumors (n = 65). The 5-year overall survival was 91% for T1 tumors and 86% for T2 tumors. In the T1 group there were no recurrences, and in the T2 group there were 5 local and 3 regional recurrences. All patients had an uneventful postoperative recovery, but the main drawback was subjective deterioration of voice quality. Partial frontolateral laryngectomy with epiglottic reconstruction may therefore be an effective therapeutic option for treatment of T1 and T2 glottic cancers extending laterally toward the anteroinferior edge of the ventricle.

Photodynamic therapy

Several studies have shown photodynamic therapy to be effective in the treatment of T1 and T2 cancers of the larynx [31,32]. In particular, these series demonstrate the efficacy of Photofrin-mediated photodynamic therapy as a curative treatment for T1 (85–91% of cases) and T2 (62% of cases) squamous cell carcinomas of the larynx. Further advantages of photodynamic therapy are no scarring, excellent voice preservation, repeatability, minimal side effects, and performance as a single outpatient procedure.

Chemotherapy

Laccourreye *et al.* [33] retrospectively analyzed the local recurrence rates in 35 patients with glottic cancer (9 T1, 21 T2, 5 T3, all N0M0) treated with a platinum-based (cisplatin and fluorouracil) chemotherapy-alone regimen. Of 231 patients, 77 achieved a complete clinical response with this induction chemotherapy regimen, and 35 of these 77 were treated with chemotherapy alone for cure. The 5-year actuarial survival rate in these 35 was 88.6%, and the 5-year local control rate was 64.8%. Salvage treatment for local recurrence in this group yielded 100% local control and larynx preservation rate. Although local recurrence was noted in almost a third of patients with complete clinical response, it did not seem to be detrimental, given that none of these patients ultimately died of the disease or lost their larynx.

Early supraglottic cancer

In contrast to patients with glottic cancers, patients with early supraglottic cancer (with a clinically negative neck) are at a relatively high risk ($\geq 20\%$) of having subclinical cervical lymph node metastasis [12]. In early supraglottic cancer, the clinically negative neck is treated electively, and the same treatment modality is often used for both the neck and the primary site [34]. Historically, early supraglottic cancer has been treated either by definitive radiotherapy or by open horizontal supraglottic laryngectomy, usually combined with staged elective selective neck dissection. Since the early 1990s the treatment of early supraglottic cancer with transoral laser surgery has been growing in popularity in Europe [35].

Radiotherapy

Radiotherapy has proved to be an effective treatment in early supraglottic cancer. Success is generally correlated with the volume of the tumor, and the best results are obtained with superficial and small-volume tumors [35]. Radiotherapy can also be offered to patients who are not medically suitable for a supraglottic laryngectomy because of cardiac or pulmonary disease [12].

Orus *et al.* [35] reviewed eight large series (including their own series of 90 patients) of radiotherapy treatment of early supraglottic cancer and recorded local control rates of 88 to 100% for T1 tumors and 73 to 83% for T2 tumors. Partial laryngectomy offered a slightly better initial local control rate of 84%, which increased to 88% with salvage surgery. The larynx preservation rate was 80%.

Hinerman *et al.* [36] reported actuarial 5-year local control rates for 147 patients with T1N0 or T2N0 cancers treated with radiotherapy of 100% and 86%, respectively. They stated that there was a trend toward improved local control for tumors with normal vocal cord mobility, tumors whose vol-

ume was calculated to be less than 6 cm³, and tumors treated with twice-daily rather than once-daily fractionation.

Open partial laryngectomy

The horizontal supraglottic laryngectomy is a well-established means of controlling T1 and T2 supraglottic cancers, and the oncologic results have been extensively reported. Orus *et al.* [35] reviewed eight large series (worldwide) of supraglottic laryngectomy in early supraglottic cancer and recorded local control rates of 94 to 100% for T1 tumors and 82 to 100% for T2 tumors. The main oncologic contraindications to standard supraglottic laryngectomy are involvement at the glottic level, invasion of the cricoid or thyroid cartilage, involvement of the tongue base to within 1 cm of the circumvallate papillae, and involvement of deep muscles of the tongue base [37]. Although surgery may offer better local control for early supraglottic cancer, not all patients are medically suitable because there is a risk of postoperative swallowing problems and aspiration [38].

Transoral excision

Ambrosch *et al.* [39] reported 48 untreated patients with early supraglottic cancer (12 T1N0 and 36 T2N0) who underwent primary transoral CO₂ laser microsurgery with a median follow-up time of 55 months. The 5-year local control rate was 100% for pT1 cases and 89% for pT2 cases. The ultimate local control rate with voice preservation, including patients who underwent successful salvage procedures after local recurrence, was 97% for pT2 tumors. Only 5 patients died of tumor-related deaths. The 5-year recurrence-free rate and 5-year overall survival rate were 83% and 76%, respectively. No patients had symptomatic aspiration.

Davis *et al.* [40] reported their results of endoscopic supraglottic laryngectomy with postoperative radiation in 46 T2 supraglottic cancers (38 patients underwent planned postoperative irradiation). They developed the concept of performing endoscopic supraglottic laryngectomy to remove all known cancer at the primary site as an adjuvant to irradiation in T2N0 supraglottic cancer. The aim was to improve 70 to 80% control rates to 90% or greater, given that definitive radiotherapy would be treating only microscopic residual disease not apparent at endoscopic laser resection. In addition, the N0 neck would be treated with irradiation to both sides of the neck. Primary site control was maintained in 97% of combined-therapy patients and in all the surgery-only patients without any salvage procedures. Regional control was attained in 96% of N0 patients treated with irradiation alone. The combined-therapy group had a 3% gastrostomy dependency rate, no tracheostomies, a 5% aspiration pneumonia rate, and an average onset of swallowing without assisted nutrition by

nasogastric tube or percutaneous endoscopic gastrostomy (PEG) at less than 2 weeks.

Early subglottic cancer

True primary subglottic cancer is rare and is uncommon in all published series, forming 5% or less of the total. Subglottic extension of glottic cancer is as common as, if not more common than, true subglottic cancer, and the two are mostly indistinguishable [34]. Radiotherapy may be suitable for early tumors, but most patients present at a late stage, often with stridor, and treatment with total laryngectomy and postoperative radiotherapy is then indicated [34]. Santoro *et al.* [41] reported that the 5-year disease-free survival rate for subglottic cancer was 0% with radiotherapy alone and 47% with surgery.

Voice quality

Post-treatment voice quality is an important parameter in choosing between treatment modalities that have similar control rates for early laryngeal cancer. In many institutions, radiotherapy has been the preferred treatment because it has traditionally been considered to result in a superior voice quality compared with surgery (open and endoscopic). It is generally accepted that open partial laryngectomy usually results in poor voice quality, compared with radiotherapy. Some studies have shown voice quality after transoral laser surgery to be comparable to that after radiotherapy [23,42].

Leeper *et al.* [43], in their small prospective study, objectively assessed voice quality using a multidimensional voice analysis computer program in 18 T1aN0 cancers with no anterior commissure involvement. The results indicated deterioration of vocal function immediately after radiotherapy, with gradual and significant improvement in acoustic and perceptual features over 9 to 12 months after the completion of radiotherapy. Stoeckli *et al.* [42] compared the voice quality in long-term survivors after endoscopic laser surgery (n = 40) and radiotherapy (n = 16) for early laryngeal cancer, using two validated questionnaires. They found that in contrast to most objective measurements, long-term survivors after laser surgery did not rate their voice poorer than irradiated patients.

Brandenburg [23] compared voice quality after radiotherapy (n = 20) and endoscopic laser surgery (n = 11) for T1N0 glottic cancer, using two objective voice assessment studies, with a median follow-up time of 63 months. He found that all patients experienced some degree of dysphonia after treatment, which varied from near-normal voice to significant breathiness and hoarseness, depending on the size and site of the tumor. Breathiness was the predominant vocal feature after tumor resection, whereas harshness and raspiness (glottic fry) was the predominant feature after radiotherapy. He concluded that voice quality

obtained after laser cordotomy was comparable to that obtained after irradiation.

Several studies that assessed voice quality using subjective and objective measures after transoral laser surgery for T1 glottic cancers showed no marked deterioration in the postsurgery voice quality [18,21,24,44,45]. Jepsen *et al.* [46] assessed voice quality after laser surgery with and without adjuvant radiotherapy. They found good correlation between subjective and objective voice assessments and concluded that adjuvant radiotherapy is associated with poorer outcomes for voice and swallowing and may be associated with more impairment than surgery alone. Also, the outcomes were worse for voice quality in glottic cancers and for swallowing in supraglottic cancers. McGuirt *et al.* [47] compared laser treatment and radiotherapy in highly selected patients by videostroboscopy and acoustic analysis and concluded that laser treatment and irradiation might offer similar results in voice quality when the tumor volume is small. They also concluded that voice after laser surgery depends on the amount and type of tissue lost and the depth of vocal cord resection.

Quality of life

When different therapists recommend different treatment modalities for the same disease, as is the case for early laryngeal cancer, health-related quality of life issues become particularly relevant. Smith *et al.* [48] assessed this in patients with T1N0 glottic cancer treated with radiotherapy (n = 11) or surgery (n = 44; 86% endoscopic excision, 12% hemilaryngectomy, 1% total laryngectomy), using the University of Washington Quality of Life Questionnaire-Revised (UW-QOL-R) and the Performance Status Scale for Head and Neck Cancer Patients (PSS-HN). Patient-reported problems showed no difference between endoscopic excision and radiotherapy. Patients treated with endoscopic excision without additional treatment modalities scored best on the UW-QOL-R. If additional treatment modalities were required, the score decreased in all domains except pain and shoulder dysfunction. In conclusion, almost all patients, whether treated with surgery or radiotherapy, reported good quality of life outcomes and functional results.

Stoeckli *et al.* [43] compared the quality of life of long-term survivors after radiotherapy (n = 16) and endoscopic laser surgery (n = 40) for T1-T2N0 laryngeal cancer using validated EORTC global and specific head and neck questionnaires. All 56 patients showed good global quality of life, with no significant difference between the two treatment modalities. The head and neck specific evaluation showed significantly better scores for surgically treated patients in questions about swallowing solids, xerostomia, and tooth problems, but no difference with regard to voice quality.

Patient choice

Given that there is no clear advantage of a particular modality in treating early laryngeal cancer, the final decision about choice of treatment should be made by the patient after detailed counseling by a multidisciplinary head and neck cancer team. Stoeckli *et al.* [15] reported patient preference in their unit in Zurich, Switzerland, where the decision between radiotherapy or transoral laser surgery is based mainly on the patients' preference after multidisciplinary counseling. In their study group of 140 patients, 65 decided on surgery, and 75 decided on radiotherapy. Dinardo *et al.* [49] found that when patients were given treatment options without bias by an independent person, they were less likely to choose surgery than if it were suggested by the surgeon. The study also showed that more recently trained head and neck surgeons were more likely to support patient choice.

Cost

Health care costs have risen dramatically in recent years [23]. As a result, cost-saving strategies have become necessary to ensure that medical care is accessible to all at an affordable price. These strategies include choosing the least costly of competing treatments when both the success rate and the quality of life are essentially the same. Obviously, costs will vary from one health care system to another. Brandenburg [23] calculated the total charges in 1999 in the United States for a single patient to be treated for early glottic cancer to be \$6774 for endoscopic laser surgery and \$29 353 for radiotherapy. Gregoire *et al.* [50] performed a cost-minimization analysis in 1999 comparing transoral laser resection, open partial laryngectomy, and radiotherapy for T1N0 glottic cancer in Belgium. They found laser resection and radiotherapy to have roughly the same average cost, whereas open partial laryngectomy was approximately twice as expensive.

With regard to costs for the patient, Smith *et al.* [48] showed that patients undergoing radiotherapy had much higher hidden costs in terms of total number of hours of work missed, total travel distance, and total travel time than did patients undergoing endoscopic excision because of the many treatments necessary with radiotherapy. The average amount of work missed by family or friends traveling with the patient was low: only 6 hours missed by the endoscopic excision cohort and no hours missed by the radiotherapy cohort.

Conclusion

The rates of local control, survival, and laryngeal voice preservation are comparable between radiotherapy, endoscopic transoral excision, and open partial laryngectomy. Hyperfractionation and acceleration may improve radiotherapy outcomes. Anterior commissure involvement is an important factor that may or may not affect radiother-

apy and transoral resection outcomes. Unfortunately, there are no high-quality definitive prospective comparative studies that clarify the effect of anterior commissure involvement on outcomes. Endoscopic vertical partial laryngectomy may overcome the difficulties encountered in exposure with transoral laser resection of anterior commissure tumors. Partial laryngectomy may offer better initial local control rates than radiotherapy for early supraglottic cancer, but it is usually associated with more morbidity and poorer voice quality.

Voice quality is probably comparable between radiotherapy and transoral resection, but only if the tumor is small. Transoral resection of larger, more deeply invasive tumors results in poorer voice quality. Quality of life is comparable between transoral resection and radiotherapy and is generally good for both. It is likely that the cost of transoral laser resection and radiotherapy are similar and that open partial laryngectomy is more expensive.

Most of the literature on the management of early laryngeal cancer consists of retrospective nonrandomized case series of one treatment modality. The Cochrane Collaboration performed a systematic review of the management of early glottic laryngeal cancer (last updated May 2002), searching for randomized controlled trials comparing open surgery, endolaryngeal resection, and radiotherapy [51^{*}]. Only one randomized controlled trial was identified that compared open surgery and radiotherapy among a substantial number of patients. At present, there is insufficient evidence to guide management decisions on the most effective treatment for early laryngeal cancer, and well-designed multicenter randomized controlled trials are needed.

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- of outstanding interest

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This systematic review documents the lack of prospective evidence in the management of early glottic cancer.