Transoral resection of laryngeal and hypopharyngeal cancers

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Abstract

The advent of transoral microlaryngoscopic laser surgery is making a significant impact on treatment decisions in the management of early squamous cancers of the larynx and the hypopharynx. It has, to a great extent replaced the conventional open partial laryngectomy procedures. Moreover many cancers of the larynx or the hypopharynx that were earlier being treated with radiation therapy are now resected transorally with the CO₂ laser. This article focuses on the progress of transoral laser microsurgery in the management of early laryngopharyngeal cancers.

Keywords Transoral CO₂ laser microsurgery · glottic carcinoma · supraglottic carcinoma · carcinoma hypopharynx

Introduction

The advent of transoral microlaryngoscopic laser surgery is making a significant impact on treatment decisions in the management of early squamous cancers of the larynx and the hypopharynx.¹ It has, to a great extent replaced the conventional open partial laryngectomy procedures. Moreover many cancers of the larynx or the hypopharynx that were earlier being treated with radiation therapy are now resected transorally with the CO₂ laser². The following discussion focuses on the reasons for this transition.

Supraglottic cancer

Until recently, horizontal partial laryngectomy was the standard voice conservation surgical procedure for resection of early supraglottic cancer where both vocal cords are freely mobile. A major problem with this procedure has been aspiration on swallowing which is encountered in almost every patient post operatively.^{3,4} It is therefore mandatory to have a temporary tracheostomy and nasogastric tube feeding for several days and sometimes

weeks. Most patients need hospitalization for about 7 to 10 days. The strenuous and often stormy post-operative course precluded the use of horizontal partial laryngectomy in patients with chronic lung disease and in the very frail or elderly patients⁵. Instead, radiotherapy was offered to these patients, even when surgery was oncologically the preferred option, for e.g. in the presence of a large metastatic lymph node unlikely to respond to radiotherapy, or in a young patient where one wants to avoid radiation.

Microlaryngoscopic laser surgery has completely changed the scenario because of the very smooth post operative course following transoral resection of early supraglottic cancer.⁶ Most patients need only an overnight stay in the hospital resulting in major cost saving. In case a concurrent neck dissection is performed, the hospital stay is extended to 4–5 days.^{7–9} Tracheostomy is completely avoided, an advantage much appreciated by the patient. Most importantly, aspiration is not at all a significant problem with transoral resection. Most patients start swallowing on day one following surgery. In only a few patients where large resections are done, tube feeding is required for a few days, and this is more for dysphagia

rather than for aspiration. The other complications of open surgery viz wound dehiscence and salivary fistula are completely avoided with the transoral route.¹⁰

Physiologically therefore, transoral microlaryngoscopic resection of supraglottic cancer using the carbon dioxide laser, is a much more safe procedure as compared to the conventional open horizontal supraglottic partial laryngectomy and can therefore be offered even to the elderly and frail, as also to those with chronic lung disease.^{6,10}

The reason for such a huge difference in the physiological stress post operatively, is that in the transoral procedure the laryngeal framework remains intact, whereas in the open supraglottic partial laryngectomy procedure, the supraglottic portion of the thyroid cartilage and often the body of the hyoid bone are resected.¹¹ This brings the obvious question to mind, viz. is the transoral resection oncologically as sound as the open partial laryngectomy? The following discussion will try to answer this question.

To begin with, it must be emphasized that the laryngeal framework is not involved or infiltrated in early supraglottic cancer and therefore does not need to be resected for oncological reasons.¹¹ In the open procedure it is resected in order to get an approach to the interior of the larynx where the tumour is located. In doing that usually one internal laryngeal nerve and sometimes both get divided, rendering the residual supraglottis insensate and therefore more prone to aspiration. All this is avoided in the transoral procedure.

Secondly, operating under the magnification of the operating microscope and precise cutting with the carbon dioxide laser helps to achieve tumour free cut margins with greater confidence without unnecessarily sacrificing normal tissues.^{12,13} In the open procedure, once the larynx is entered into, if the lesion involves the mucosa overlying the arytenoid cartilage, the latter is resected with the specimen. As against this, in the transoral procedure, the mucosal tumour overlying the mobile arytenoid cartilage is excised adequately along with supple submucous soft tissues, under the magnification of the operating microscope, preserving the uninvolved arytenoid cartilage. This provides bulk to the posterior glottis without compromising on oncological safety and further helps in the prevention of aspiration, besides retaining the quality of voice.

Glottic cancer

Unlike the supraglottic partial laryngectomy, open partial laryngectomy procedures for early glottic cancers are fairly well tolerated even by the elderly. And yet, to a considerable extent, transoral vocal cordectomy with the CO₂ laser has taken over from the open procedures (a) because in properly selected cases it is equally effective (b) it avoids tracheotomy and tube feeding and (c) hospitalization is not required in majority of cases.

Great caution however needs to be exercised in two situations:

- (i) When the anterior commissure is involved¹⁴ and
- (ii) When there is gross infiltration of the paraglottis and some impairment in the mobility of the vocal cord.

In these situations, the open vertical partial laryngectomy procedures are oncologically safer than the transoral resection and should therefore be the preferred surgical option. Needless to say that the open surgical procedures are also resorted to, when on suspension microlaryngoscopy, the exposure of the lesion is unsatisfactory.¹⁵

It is worthwhile mentioning that involvement of the anterior commissure is not an absolute contraindication to transoral resection. If the lesion is superficial, not impacted at the anterior commissure and if the microlaryngoscopic exposure is satisfactory transoral resection may be undertaken quite safely.^{16–18} In order to prevent a web formation, a silicone keel is placed endoscopically using the Lichtenberger needle.^{19–20} This is then removed endoscopically after about 4 weeks once the healing is complete.

The short treatment time with transoral laser cordectomy, is another big advantage in those who have to travel distances to come to a treatment centre. It is therefore often preferred over radiotherapy provided some compromise in the quality of voice is acceptable.^{21–23}

Hypopharyngeal cancer

In the case of hypopharyngeal cancer the scope of voice conservation surgical procedure was even more limited as compared to that in supraglottic cancer. The supracricoid hemilaryngopharyngectomy is a procedure described for resecting an early lesion on the medial wall of the pyriform. However, due to the prohibitively high rate of post operative complications, the procedure never gained universal acceptance like the other partial laryngectomy procedures for glottic and supraglottic cancers. Occasionally, small and pedunculated tumours in the hypopharynx can be excised through a pharyngotomy but such lesions are very rarely encountered. Hence, early hypopharyngeal cancer was almost entirely in the domain of the radiation oncologist²⁴. If for any reason radiotherapy was not an option and surgery was the preferred treatment, it almost always entailed a total or a near-total laryngectomy with a permanent tracheostomy.²⁵ Such situations include:

- (i) Prior radiotherapy to the head& neck region for an earlier primary.
- (ii) Early primary with an associated large, mobile metastatic lymph node.

With the advent of transoral microlaryngoscopic resection with the carbon dioxide laser, we now have an

acceptable surgical alternative to deal with early hypopharyngeal cancer. Superficially infiltrative lesions in the pyriform or the posterior pharyngeal wall with freely mobile vocal cords are best suited for endoscopic resection.²⁶ Even a post-cricoid cancer is amenable to transoral resection, if it is exophytic and has a narrow base. Lesions that extend upto the cricopharyngeal sphincter, or deeply infiltrative lesions causing an excavating ulcer are not suitable for endoscopic resection.²⁷

Trans-regional cancers

A glottic cancer may extend to the supraglottis. A supraglottic cancer may extend to the oropharynx involving the vallecula or extend to the hypopharynx across the marginal zone to involve the pyriform.^{28–30} A pyriform cancer may extend to the oropharynx involving the pharyngo-epiglottic fold.³⁰ These are termed as trans-regional cancers.

Such extensions, either rule out a conventional open partial laryngectomy, or if an extended procedure is performed, the incidence and severity of postoperative complications increases significantly.^{30,31}

These trans-regional cancers are amenable to microlaryngoscopic laser resection, as long as they are superficially infiltrating, exophytic growths with the vocal cords freely mobile. As in the case of transoral resection of supraglottic cancer or hypopharyngeal cancer, the postoperative course is smooth and aspiration is not a significant problem.

Case Selection for transoral resection

Superficially infiltrative squamous cancers of the supraglottis, glottis or the hypopharynx are the ones best suited for transoral resection with the CO₂ laser. These are cases where the vocal cords are freely mobile, there is no gross invasion of the pre epiglottic space or the paraglottic space and no laryngeal widening or pharyngeal bulge. Hence T₁ and T₂ lesions form the bulk of cases resected transorally, though a few hypopharyngeal cases that are T₃ by virtue of size and surface extent may also be amenable to transoral resection provided they are only superficially infiltrative.^{32–34} Bulky, impacted anterior commissure glottic lesion are best treated with open surgery rather than transoral resection.

Trans-regional cancers are also amenable to transoral resection if they are not deeply infiltrating. Hence glotto-supraglottic cancer, epiglottic tumours involving the vallecula, pyriform cancer extending to involve the pharyngo-epiglottic fold and marginal zone cancer involving the supraglottis as well as the pyriform can be resected transorally.^{35,36}

Supraglottic and hypopharyngeal cancers have a propensity for cervical lymph node metastases. Presence of

metastatic cervical nodes does not preclude endoscopic resection of the primary. As a matter of fact, an early primary with a large cervical lymph node metastasis is a strong case for endoscopic laser resection of the primary followed by an appropriate neck dissection. This may either be performed concurrently or preferably after an interval of 4–5 days, particularly if the endoscopic procedure involves resection of the lateral pharyngeal wall.

While selection criteria on the basis of age, general health and pulmonary status are very stringent for open partial laryngectomy, they are quite liberal when it comes to transoral resection of the supraglottis or the hypopharynx. A number of elderly and frail individuals or those with moderate degree of COPD who will not qualify for the open surgical procedure for voice conservation, can be taken up for the transoral resection.

The most important prerequisite for transoral resection with the CO₂ laser is adequate exposure of the entire tumour.³⁸ While small tumours may be visualized in one field of microlaryngoscopy and resected completely as one block, larger tumours may not be visualized in their entirety in one field and will need to be resected segment by segment, readjusting the suspension laryngoscope until the entire tumour is resected with clear margins.³⁹ Complete tumour resection should be the objective the surgeon must set for himself when resecting endoscopically with CO₂ laser. Debulking the tumour and leaving the residual tumour to be treated with radiotherapy should never be the objective as one starts the resection. The raw area resulting from the laser resection will delay the starting of radiotherapy, nullifying the benefit, if any, of debulking.⁴⁰

Technical considerations

The supraglottis and the hypopharynx are very vascular regions. The area is large and there is a considerable vertical height unlike the glottis which is in one plane, occupies a small area and is much less vascular. Resection of tumours in the supraglottis and the hypopharynx may therefore be technically quite demanding. Proper instrumentation is very important, besides having the operating microscope, the CO₂ laser and the plume sucker. Some of these essential instruments are the distending laryngopharyngoscopes, insulated monopolar cautery with suction channel, and tissue holding forceps with suction channel.

Author's experience

Between January 1990 and August 2008, 393 patients with laryngeal and hypopharyngeal cancer were resected transorally with the CO₂ laser. There were 284 glottic

cancers, 70 supraglottic cancers and 39 hypopharyngeal cancers.

Functional results

Almost all cases of glottic cancer were treated on a day care basis, unless an associated medical condition demanded an admission to the hospital. None of the patients required tracheostome. Feeding was resumed on the first post operative day for all cases.

Most patients with supraglottic and hypopharyngeal cancers were hospitalized overnight unless the lesion was very small. Hospitalisation was longer for those undergoing concurrent neck dissection. None of them required tracheostomy. 107/109 patients (98.2%) achieved oral intake on the first postoperative day. Only two patients where the arytenoid was resected had significant aspiration for a prolonged period necessitating a feeding gastrostomy.

Oncological results

Glottic cancer: Of the 284 cases of glottic cancer 253 patients were controlled whereas 31(11%) developed recurrence. Out of the 31 patients developing recurrence, 27 could be salvaged. Re-laser resection was possible in five cases, open partial laryngectomy was done in six patients, nine patients underwent total laryngectomy, near total laryngectomy in one patient and six were treated

with radiation therapy. Four patients died of locoregional disease and, two patients died of unrelated causes. Four patients died of distant metastasis.

Supraglottic cancer: Of the 70 cases of supraglottic cancer 53 patients were controlled whereas, 17(24.9%) developed recurrence. Out of the 17 patients developing recurrence, nine were salvaged. Salvage procedures included four cases of near-total laryngectomy, one case of Supracricoid partial laryngectomy, one case of total laryngectomy, four cases with radiation therapy and, two cases of modified neck dissection followed by radiotherapy. Eight patients died of locoregional disease. Two patients died of distant metastasis.

Hypopharyngeal cancer: Of the thirty-nine patients undergoing CO₂ laser resection for hypopharyngeal cancer, 33 patients were controlled whereas, 6(15.4%) developed recurrence. Out of the 6 patients developing recurrence, 5 were salvaged. Salvage procedures included two near total laryngectomy with partial pharyngectomy followed by postoperative radiation therapy, one total laryngectomy with partial pharyngectomy with postoperative radiation therapy. One patient underwent neck dissection with postoperative radiation therapy and, one patient underwent re-laser resection with neck dissection followed by postoperative radiation therapy. One patient who was unresectable, died of disease. Two patients died of distant metastasis.

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