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Use of Transoral Laser Microsurgery for Treatment of Hypopharyngeal Cancer

Squamous cell carcinoma of the hypopharynx is relatively rare compared to other major sites of the head and neck, and accounts for approximately 3% to 5% of all head and neck squamous cell carcinomas. Despite this low incidence, hypopharyngeal carcinomas show the worst survival rates within the head and neck region. Advanced stage of disease at the time of diagnosis seems to be mainly responsible for the poor prognosis. Interestingly, oncologic results for hypopharyngeal carcinomas have not significantly improved during recent decades regardless of the chosen management scheme [1].

Traditionally, total laryngopharyngectomy followed by postoperative radiation has been the preferred treatment in many centres. In the last decade, with the emergence of organ preservation protocols, a tendency towards chemo-radiotherapy has reduced the percentage of primary surgery in head and neck carcinomas. However, the success of organ preservation protocols relies not only on favourable survival and preservation rates, but also on adequate function of the remaining organ, together with the feasibility of adequate salvage surgery for cases with local and regional failure. Long-term toxicity in patients treated with concurrent chemo-radiotherapy, with the subsequent loss of function of many preserved organs and inability to benefit from radiation in the future has made chemo-radiotherapy a suboptimal choice of treatment [2].

This is especially relevant in piriform fossa because the dose administered to the pharyngeal constrictor muscles cannot be reduced due to these structures being the primary target and the feasibility of salvage surgery is low in comparison to laryngeal carcinoma. Takes et al analyses the current trends in the initial management of hypopharyngeal carcinoma and concludes that, in early stages, both surgery and radiotherapy are considered good organ-preserving treatment options. For advanced disease, most patients are treated with total laryngopharyngectomy followed by chemo-radiotherapy or up-front chemo-radiotherapy. However, the authors

propose that the TNM classification may be a better tool to guide physicians in treatment decisions involving organ preservation strategies than overall stage classification [3].

In a further review, Gourin and Johnson reveal that despite the increasing popularity of organ preservation protocols, primary surgical therapies continue to play an important role. The authors suggest that primary surgery is indicated in selected hypopharyngeal carcinomas when the surgical approach offers an alternative to radiation or the possibility to reduce the intensity of adjuvant therapy or when the extent of the primary tumour mandates a surgical approach to optimise survival and function [4].

Transoral Laser Microsurgery (TLM) for hypopharyngeal carcinoma

Use of CO₂ laser for oncological purposes in the upper aerodigestive tract was first introduced by Steiner in the late 1980s; His initial results were given no credit by many head and neck surgeons, but encouraged by others [5]. In the early 1990s, Zeitels et al reported a case series of supraglottic and hypopharyngeal carcinomas treated with laser only or with laser plus radiotherapy. The lesions were highly selected for small volume and endoscopic accessibility. The authors concluded that endoscopic resections were less morbid and more cost-effective than open surgery or radiotherapy [6]. While use of TLM in early laryngeal carcinoma has become increasingly used, its use in treatment of hypopharyngeal carcinomas remains to be the less established (Figure 1).

In 2010, Karatzanis et al evaluated 119 patients with T1 and T2 hypopharyngeal carcinomas primarily managed with laser surgery. Local control and 5-year disease-specific survival were 90 and 77.8% for T1, and 83.1 and 70% for T2. 2.5% of Patients received permanent tracheostomies due to chronic post operative aspirations and 2.5 % were reported to require permanent gastrostomy tubes due to impaired swallowing. More recently, A retrospective comparison at the same institution, comparing the outcomes of TLM

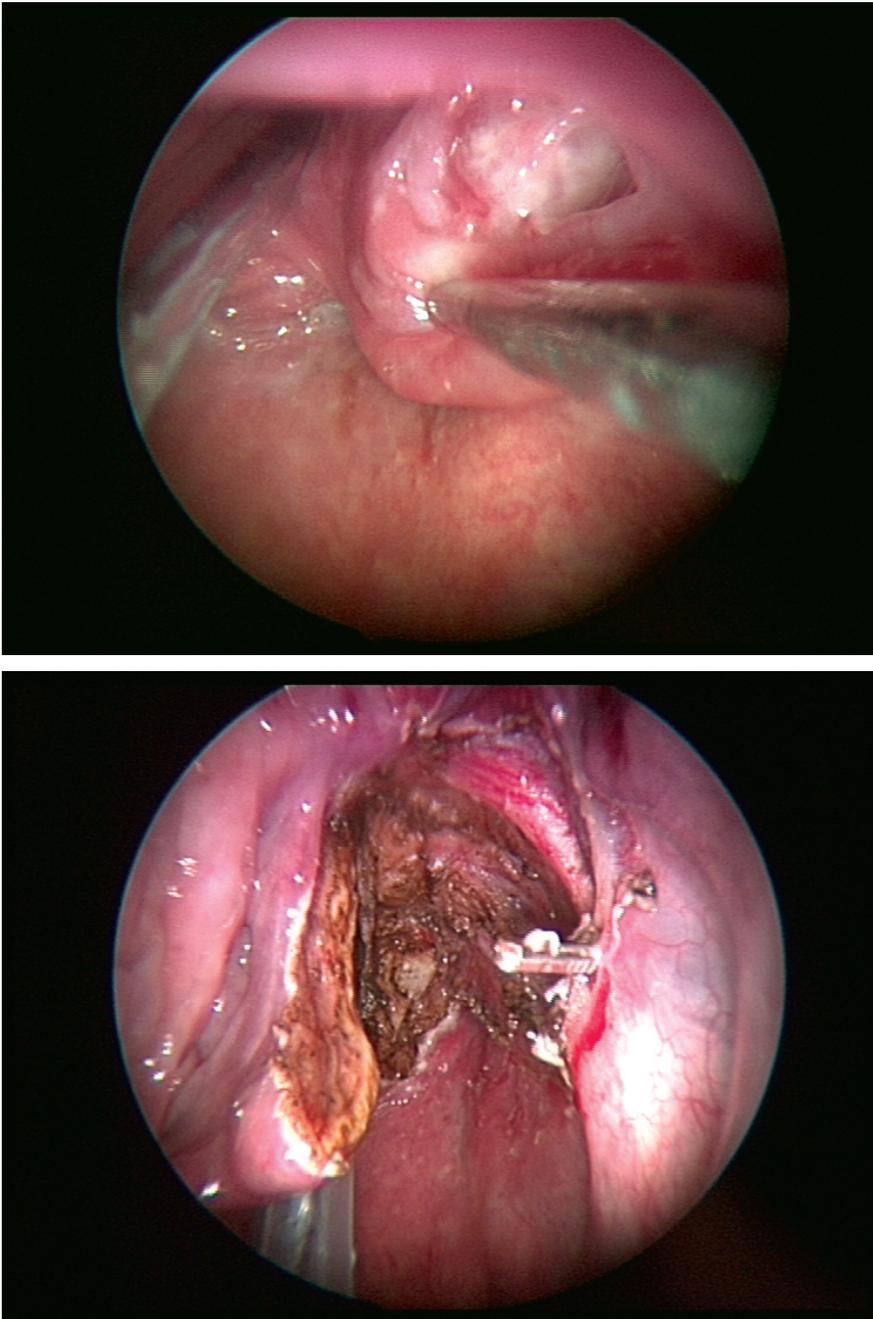


Figure 1 showing a TLM on a hypopharyngeal tumour arising from the right piriform fossa a) before b) after surgery.

with other treatment modalities for similarly staged tumours, showed that the local control and disease specific survival were totally comparable with open surgical techniques ($P > 0.05$) and better than those of radiation-based protocols ($P < 0.001$) [7].

Previous to that in 2001, Eckel et al reported a 92% organ preservation rate in a sample of 46 patients with T1 and T2 hypopharyngeal tumours treated by organ-sparing surgery with or without postoperative radiotherapy. Twenty-

three of those patients were treated with TLM. The 5-year overall and disease-specific survival rates for the 46 patients were 61.1 and 75.9%, respectively [8]. Rudert and Hoft confirmed these initial results with their series of 29 T1–T2 hypopharyngeal tumours treated with TLM, with a 5-year overall and disease-specific survival of 58 and 48%, respectively, and 100% larynx preservation. Almost all patients underwent neck dissection and adjuvant radiotherapy [9].

Later, Kutter et al reported the outcomes of 55 patients, mostly T1–T2, with a local control of 90% after a median follow-up of 2 years and a local and regional control and overall survival rate of 72% and 78%, respectively. The authors highlighted the early recovery of swallowing compared with open approaches, with only 67% of the patients needing a gastrostomy tube and a significant reduction in the period of time [10].

For more advanced tumours, experience with TLM is still limited. The first series of patients with early and locally advanced hypopharyngeal carcinomas treated with TLM was published by Steiner et al, with a 5-year overall survival rate of 71% in early stages and 47% for stage III and IV disease [11]. In 2004, Vilaseca et al published their preliminary results in a group of 28 consecutive early and advanced tumours (stages II–IV) with a 4-year overall survival of 43% and 79% larynx preservation. Only 14% of the patients received adjuvant radiotherapy to the tumour site, whereas 57% underwent adjuvant radiation to the neck because of positive nodes. The local control was 100% for T1, 91.6% for T2, 56.2% for T3, and 100% for T4 [12].

Technical requirements and patient selection

Careful selection of the cases suitable for laser surgery is paramount in order to obtain satisfactory results. For TLM to work, optimal access to the complete tumour is essential making the tumours arising from the lateral pharyngeal wall, which are, in general, easily accessed more suitable. In post cricoid tumours, laser surgery is only suitable for superficial lesions without cartilage involvement and without involvement of the arytenoid joints. At least one mobile arytenoid should be preserved to avoid aspiration. In tumours of the medial wall and the fornix of the piriform fossa, the absence of anatomical barriers to the supraglottic larynx and the paraglottic space allows rapid invasion of these areas. Therefore, the ipsilateral supraglottis and the paraglottic space lateral to the vestibular fold are usually included in the resection specimen. The invasion of the paraglottic

space lateral to the true vocal cord usually precludes the indication of TLM. These limitations reduce the percentage of patients with hypopharyngeal carcinoma that are suitable for TLM at presentation [2].

Advantages of transoral laser microsurgery

In contrast to radical surgical procedures, TLM allows minimisation of the loss of healthy tissue and thus avoiding extensive reconstruction procedures. In most cases, tracheotomies are not required and the need for postoperative gastrostomy tubes is lower when compared to other conservation regimen or to open surgery. The preservation of pharyngeal sensory nerve function results in better postoperative swallowing and further reduces postoperative morbidity such as aspiration pneumonia. TLM can be seamlessly integrated into any therapeutic regimen while maintaining all salvage treatment options.

Furthermore, the minimally invasive nature of TLM increases indications in the elderly whenever the general

performance status is adequate to allow surgery. Compared with organ preservation protocols, one of the advantages of TLM is the possibility to obtain prognostic information from the surgical specimen. Precise data on tumour characteristics, nodal status, or the presence of perineural or vascular invasion will allow rational administration of adjuvant treatment preventing overtreatment.

Disadvantages of transoral laser microsurgery

One of the limitations of TLM is the reduced percentage of patients suitable for this technique at presentation. Although few authors have published good results in moderately advanced cases, the best functional and oncologic results are obtained in T1–T2 which make only 20% of hypopharyngeal carcinomas.

An advanced learning curve in the field of TLM is required to approach and treat moderately advanced hypopharyngeal carcinomas with a favourable success rate. According to the low percentage of early cases at initial presentation, it could be

difficult for most of the surgeons to achieve such a learning curve, but, with the increasing use of the laser and the emerging field of transoral robotic surgery, an increase in experience is to be expected in the future.

Conclusion

In experienced hands, TLM is a real alternative to any other surgical or nonsurgical therapeutic regimen in the treatment of early hypopharyngeal carcinoma. High rates of organ and function preservation can be achieved without compromising the oncologic outcome and with relatively low morbidity. A careful selection of suitable patients is mandatory for this kind of surgery. Randomised studies comparing primary surgical approaches and organ-preservation protocols are necessary to clarify the role of primary surgery in the treatment of hypopharyngeal carcinomas. The inclusion of outcomes such as survival rates, organ and function preservation rates, cost of the procedures and quality of life should be mandatory. ●

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