

Short Communication

Supraglottic laryngectomy for endoscopic resection: proposal of a new classification

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ABSTRACT

Proposal of a new classification, which includes six types of resections, for supraglottic laser surgical treatment. Our classification defines precisely Type Ia excision as an en bloc procedure. Aside, the lateral supraglottic resections are described in detail, with type Ib, II and III modalities, which encompass excision of lateral supraglottic structures and partial paraglottic space excision, due to the potential for extension to this space present on laterally located tumors. Type IV resection refers to a complete supraglottic laryngectomy, which addresses the preepiglottic spread potential of midline supraglottic lesions. Type Va resection or arytenoidectomy is introduced, leaving types Vb and Vc as previously described cordectomies. A new concept of palliative procedures types VIa and VIb is presented, according to invasion to supraglottic structures and/or tongue base extension in T3-T4 lesions. A classification should be understandable, reproducible and easy to interpret, so that it facilitates comparison of results and potentially translates into better oncologic outcomes. Laser resection of the supraglottis must not be considered curative for all patients, objective are different according to the stage, so the present classification include: Partial, Extended and Palliative Debulking Resection.

Keywords: Supraglottis, Laser resection, Robotic laser resection. Cancer, Classification

INTRODUCTION

After the first description of a partial supraglottic laryngectomy performed by Alonso, this technique was considered the gold standard procedure for conservative surgical treatment of supraglottic carcinoma.¹ Thirty years later laser surgery emerged, described by Vaughan and later popularized in Italy by Motta, and in Germany later on by Rudert and Steiner; the latter author's reports were quite controversial for years because of his piecemeal technique which contrasts with the current concepts of en bloc resection and wide margins, which were considered at that time the major objectives to obtain successful oncologic outcomes in terms of

recurrence and survival.²⁻⁵ When incomplete surgical specimens were obtained, an inadequate treatment was considered because of the impossibility to obtain an integrated analysis by pathologists used to dissect whole block specimens. Under these circumstances, these techniques took long time to be adopted, specially by American surgeons, and initially with the addition of adjuvant radiation therapy.⁶

At the present time, a new technique has emerged: robotic surgery. One of the main indications of it in the head and neck area is oropharynx and supraglottic tumor location. So far, glottic tumors are not yet amenable to robotic surgery.⁷ The benefits of both techniques are

undeniable, with laser being a more affordable alternative to endoscopic management, with excellent results in terms of cost-effectiveness and expeditiousness of treatment. The expenses associated with robotic surgery today, make this technology unavailable for most patients in developing countries. Fusion of both technologies is what will probably occur in the future, as has been reported in selected cases in Europe.⁸ Nevertheless, results should be measured by now considering the type of resection performed, and to this aim several classifications exist, like the one by Remacle et al.^{9,10}

Our objective is to propose a classification based in the experience of our institution, which can be easily adopted, reproduced, and validated to obtain uniform results regarding this new surgical techniques.

METHODS

Classification proposal

We point out that no mention will be given of the anesthetic technique, instruments, grasps, valves, forceps, or micromanipulators used in our institution, since they are all widely known and standard at present time.

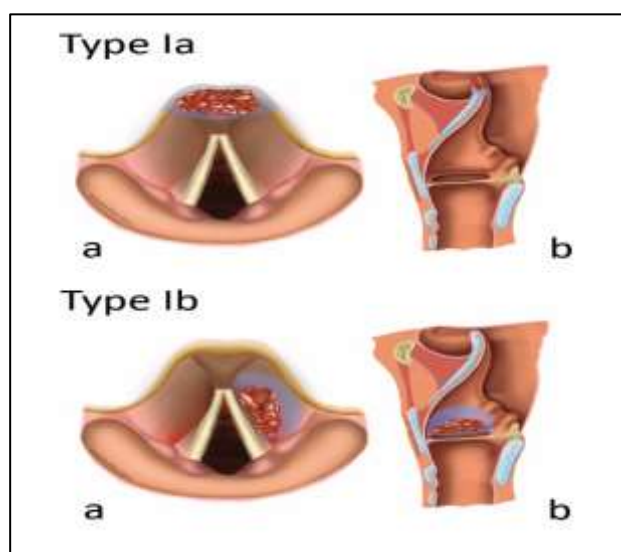


Figure 1: Suprahyoid epiglottectomy. (a) Axial and (b) Sagittal view of resection for free edge tumors. (Type Ia) and Figure 1b. Ventriculectomy. (a) Axial and (b) Sagittal view of tumors located at the ventricular fold, its includes partial resection of paraglottic space and the inferior limit is the ventricle (Type Ib)

Type I. Suprahyoid epiglottectomy/ventriculectomy

Type Ia resection (Figure 1a). This type of resection is indicated for free edge tumors of the epiglottis (T1), located in the suprahyoid region. Resection should be performed in a tridimensional fashion, since even superficial lesions have potential to invade the channels of the cartilaginous portion of epiglottis, with an increase

in recurrence frequency and consequently lowering the oncologic control. This type of resection has no impact on function (voice, swallowing or breathing capability).

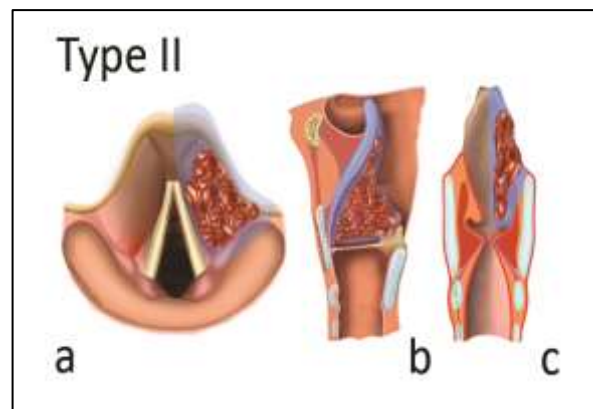


Figure 2: Vertical hemiepiglotectomy. (a) Axial, (b) sagittal and (c) coronal view for a Vertical Hemiepiglotectomy. (Type II)

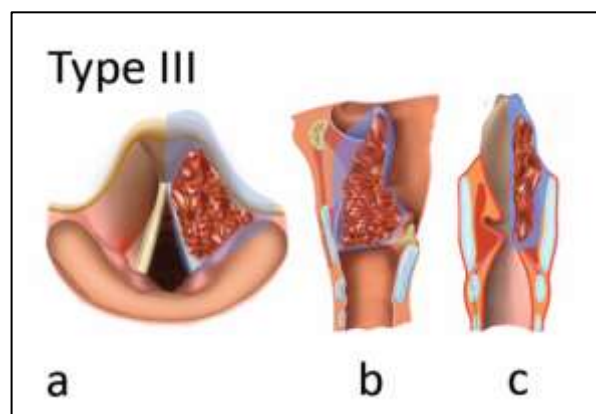


Figure 3: Vertical Hemilaryngectomy. (a) Axial, (b) sagittal and (c) coronal view for a Vertical Hemilaryngectomy. (Type III)

Type IIb resection (Figure 1b). Indicated for T1 tumors limited to the ventricular fold, with no involvement of the aryepiglottic fold. Includes partial resection of paraglottic space and the inferior limit is the ventricle.

Type II. Vertical Hemiepiglotectomy

Type II resection (Figure 2). Resection of the upper lateral half of supraglottis, including the ventricular band and the aryepiglottic fold.

This type of resection is indicated for T1, T2 epiglottic tumors with no midline invasion, which involve the ventricular fold, the aryepiglottic fold and the infrahyoid region of epiglottis with no extension to the preepiglottic space. Resection limits include: the midline, including the petiole, the thyroepiglottic ligament and, inferiorly, the ventricle.

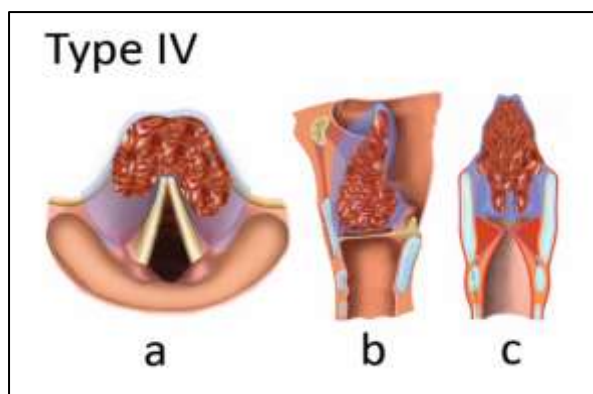


Figure 4: Transoral Supraglottic Laryngectomy. (a) Axial, (b) sagittal and (c) coronal view for a transoral supraglottic laryngectomy. (Type IV)

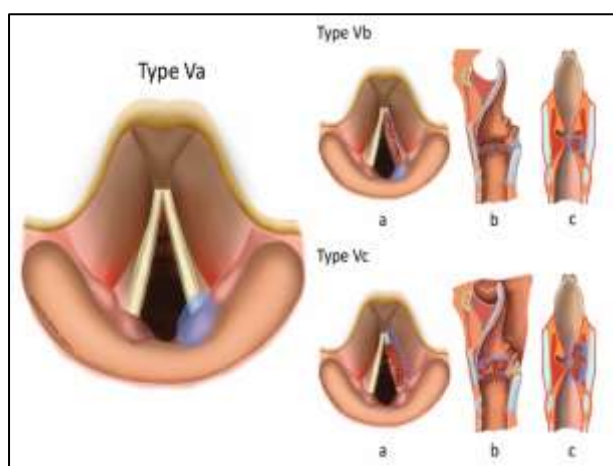


Figure 5: Arytenoidectomy / Extended cordectomy. Type Va. Arytenoidectomy. Type Vb. (a) Axial, (b) sagittal and (c) coronal view for an extended cordectomy encompassing the arytenoid. Type Vc. (a) Axial, (b) sagittal and (c) coronal view for an extended cordectomy encompassing the ventricular fold.

Type III. Vertical Hemilaryngectomy

Type III resection (Figure 3) of lateral hemilarynx, (including hemiepiglottis, aryepiglottic fold, ventricular band, the ventricle and the ipsilateral vocal cord). The ipsilateral arytenoid is not included. This type of resection is indicated for T3 lesions which invade the hemilarynx with no extension to arytenoid cartilage. Includes partial resection of the pre-epiglottic and paraglottic spaces since the lesion involves the ventricle. Major changes in voice quality and swallowing capability occur, which can be addressed with phoniatric rehabilitation since the ipsilateral arytenoid cartilage is preserved.

Type IV. Transoral Supraglottic Laryngectomy

Type IV resection (Figure 4). This resection modality is indicated for midline epiglottic tumors which do not

invade the anterior commissure, whether or not they spare the preepiglottic space. In cases where the preepiglottic space is involved, the procedure can be extended up to the thyrohyoid membrane, including the thyroid perichondrium and the insertion of the petiole. It includes completely the ventricular bands, aryepiglottic folds sparing the arytenoids. Its caudal margin is the ventricle. This type of resection is basically the one described by Alonso but performed endoscopically.

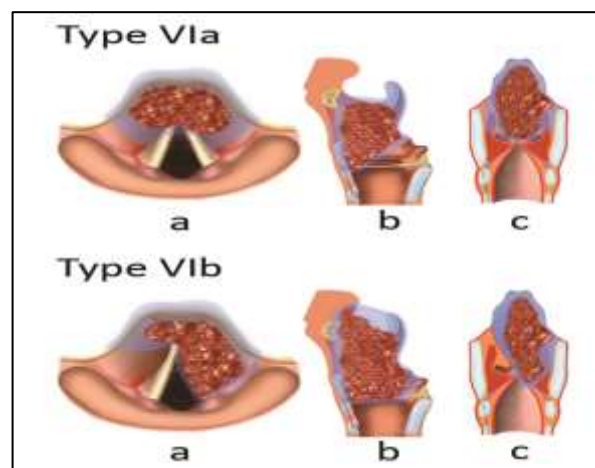


Figure 6: Debulking procedure. Type VIa. (a) Axial, (b) sagittal and (c) coronal view for a resection that includes supraglottis and hemiglottis. Type VIb. (a) Axial, (b) sagittal and (c) coronal view for a resection that includes supraglottis and hemiglottis, but vallecula is involved.

Type V. Arytenoidectomy / Extended cordectomy

This modality is divided in a,b,c subtypes according to the extent of resection. It is important to point out that resections Vb and Vc remain the same as the ones described by the Working Committee, European Laryngological Society, since it includes glottic and supraglottic resections, to maintain a common language and facilitate communication regarding laryngeal resections.⁹

Type Va resection (Figure 5a). Arytenoidectomy. A complete arytenoid resection is performed.

Type Vb resection (Figure 5b). Extended cordectomy encompassing the arytenoid⁷. This technique is indicated for cases of vocal fold carcinoma involving posteriorly the vocal process but sparing the arytenoid. The arytenoid is mobile. The cartilage is partially or totally resected and the posterior arytenoid mucosa is preserved. According to certain laryngologists, the vocal fold must be completely mobile. Other clinicians have indicated that the mobility of the vocal fold may be impaired as long as the arytenoid itself remains mobile and the fixation only involves the muscular vocal fold. According to some others, the vocal fold may even be totally fixed.

Resection Type Vc, (Figure 5c) Extended cordectomy encompassing the ventricular fold¹⁰. According to certain schools, total cordectomy can be extended to the ventricular fold (Figure 7).⁹ This procedure is indicated for ventricular cancers or for transglottic cancers that spread from the vocal fold to the ventricle. The specimen encompasses the ventricular fold and Morgagni's ventricle. This procedure is indicated for T3 lesions involving the supraglottis' ventricular fold, including the Morgagni's ventricle and glottis (cord). It includes a complete resection of the true vocal cord including the paraglottic space and preservation of the ipsilateral arytenoid. This procedure could be considered curative when free margins are obtained, palliative when margins are involved and requires a complementary treatment either radiation therapy or chemoradiation therapy according to the experience of the oncologic group.

Type VI. Debulking procedure

This type is a palliative debulking procedure to alleviate symptoms secondary to large tumor burden. After this treatment modality, patients can receive adjuvant radiation or chemoradiation. This procedure is indicated for patients that do not accept a total laryngectomy or who are not candidates for surgery because of comorbidities.

Type VIa resection (Figure 6a). Indicated when the lesion affects the whole supraglottis including the preepiglottic space, and descends to the glottis unilaterally. This resection includes supraglottis and hemiglottis.

Type VIb resection (Figure 6b) Is same as the previous modality, but vallecula is involved and the tongue base is included in the surgical specimen.

DISCUSSION

Partial supraglottic laryngectomy, as described by Alonso, has been regarded as the gold standard in the treatment of supraglottic tumors.¹ However, nowadays there is a risk for open surgery to become obsolete because of major advances in endoscopic surgical techniques that allow for decreased hospital length of stay, faster recovery periods, and decreased costs, compared with open surgery, specially for T1-T2 tumors. This type of surgery will be also advantageous in the management of advanced lesions, avoiding tracheostomy which allowed airway patency, but at the cost of increased risk of transoperative hypoxia, surgical morbidity, and peristomal recurrence with decreased survival periods. Laser resection of the supraglottis must not be considered curative for all patients, objective are different according to the stage, so the present classification include: partial resection, extended resection and palliative debulking resection. Combination of endoscopic surgery in these settings and chemoradiotherapy would offer a chance for organ preservation within some selected subgroups of patients.

Remacle et al have already described a classification of endoscopic surgery for the larynx; however, we believe that several possible modalities of resection are missing in it, and in our new classification we consider Types Vb and Vc supraglottic resections same as Remacle's glottic resections trying to avoid as much as possible two classifications by subsites and consequent duplication of concepts when these modalities can be included together.^{9,10}

Remacle et al. proposed a type I resection in any supraglottic site for superficial lesions, which we have reserved only for resections which involve the suprahoid epiglottis or located in the ventricular fold, but adding a tridimensional concept; we believe that superficial resections should only be described with no special classification, with only a description of the specific site of excision.¹⁰

Type II resections are described by us as lateral hemiepiglottectomies as shown in figure 2, and indicated for tumors which involve only the lateral upper half of epiglottis with preservation of the other half. This type of resection has not been considered in Remacle's description as a limited procedure, since they consider it as a type IV procedure, which could include a segment of piriform sinus mucosa or even the arytenoid cartilage.

Type III resections is an extension of type II, indicated for tumors, which involve the Morgagni's ventricle and the vocal cord either deep or superficial; consequently the resection should encompass the ipsilateral glottis with the lower margin being the subglottis.

Type IV resections as above mentioned constitutes a supraglottic laryngectomy as the one described by Alonso¹, but with an endoscopic approach, and we classified it as a supraglottic major resection, since we consider that for an integrated classification of this kind of procedures a tridimensional concept of surgical margins should be introduced.

To illustrate this: in the central infrahyoid carcinomas, the epiglottis has a wide upper base and a narrow vertex towards the petiole where surgical margins could be compromised. As opposed to Remacle's et al. classification, where IIb resection (total epiglottectomy) is advised, we perform a more extended procedure, which is the type IV resection (transoral supraglottic laryngectomy), and in more advanced lesions inclusion of the thyrohyoid membrane or partial resection of the thyroid cartilage is feasible.¹⁰

Remacle classifies these procedures as type III. Besides, he establishes a non-practical subdivision since it does not seem more advantageous but technically more difficult to leave the bands instead of performing a total transoral supraglottic laryngectomy (Type IV). Resections type V.

Type Va resections could be considered by some as a limited excision. Nevertheless, its complexity depends not only on the amount of tissue resected, but also on its potential complications or functional sequelae, like aspiration and a limited phonatory capability, because of the vocal cord paralysis secondary to this procedure.

Regarding resections type Vb and c, they have been extrapolated from the glottic resections already described to avoid a different classification which includes supraglottic and glottic subsites.⁹

We have described resections type VIa and b, despite the fact that a better oncologic option would be a total laryngectomy with some kind of phonatory rehabilitation. However, on our daily practice, we continuously treat patients that persist in their intention to preserve their larynx. For tumors where a VIb resection is indicated the scenario is more complicated, since a total laryngectomy with involvement of the tongue base could result in close or positive margins that require complex microvascular reconstructive procedures. Having said this, even though the endoscopic procedure could mean compromised margins, adjuvant chemoradiotherapy has the chance to obtain similar or better results since the tumor load is smaller. At same time, airway obstruction is alleviated avoiding performance of a tracheostomy and its impact on quality of life of these patients with better oncologic outcomes.¹¹

Remacle states that his position is that of being against surgical margins determined only by the surgeon in the endoscopic sparing procedures.¹⁰ On the other hand, his article does not explain how the margin assessment takes place, or the time taken by the pathologist for this evaluation. It is clear that not all endoscopic surgeries are piecemeal and that some cases are resected en bloc, tridimensionally, but specially in the supraglottic area the feasibility to perform a single-piece resection is higher with TORS (Transoral Robotic Surgery), since this is performed with electrosurgery. As mentioned before, this technology is more costly, and consequently less widely available in developing countries, where endoscopic laser surgery is the procedure of choice.

CONCLUSION

A classification should be understandable, reproducible and easy to interpret. Laser resection of the supraglottis must not be considered curative for all patients, objective are different according to the stage, so the present classification include: Partial, Extended and Palliative Delbulking Resection. We consider that our classification has the advantage that resections are progressively staged which makes it easy to understand. Additionally, to consider different classifications for the same procedure could cause an important difference in future reports from different centers and produce an inadequate interpretation of results.

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Ethical approval: Not required

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