

Supracricoid partial laryngectomy for non-squamous cell carcinoma of the larynx

DAVID VEIVERS, M.D., ANDRÉA DE VITO, KUAUHYAMA LUNA-ORTIZ, M.D., DANIEL BRASNU, M.D.,
OLLIVIER LACCOURREYE, M.D.

Abstract

The objective of this paper was to evaluate the potential utility of supracricoid partial laryngectomies (SCPLS) for non-squamous cell carcinoma of the larynx. To illustrate our management of such tumours we present a case series based on six patients. Local control was achieved in five patients, with the sixth being salvaged by total laryngectomy and post-operative radiation therapy. Three of the six patients died of distant metastases. We concluded that supracricoid partial laryngectomies should become part of the armamentarium of the otolaryngologist – head and neck surgeon for non-squamous cell carcinoma of the larynx.

Key words: Larynx; Carcinoma; Surgical Procedures, Operative

Introduction

In the medical literature, supracricoid partial laryngectomies (SCPLS) have been advocated for selected 'early' and 'advanced' squamous cell carcinoma of the larynx.^{1–5} However, to our knowledge, no report has yet specifically analysed the results achieved with SCPLS for non-squamous cell carcinoma of the larynx. The current retrospective study was undertaken to evaluate the possibility of using SCPLS to resect non-squamous cell carcinoma of the larynx. The cases documented represent six out of a series of 390 SCPLS performed consecutively at this institution.

Case reports

Case 1

A 59-year-old patient presented at our clinic with odynophagia of five months duration and dysphonia of one month's duration and dysphonia of one month's duration. Clinical examination and endoscopy noted a right-sided transglottic tumour. The arytenoid cartilage and true vocal fold on the tumour side were fixed. The biopsy revealed an adenocarcinoma. The tumour was staged as T₃N₀M₀ according to the 1987 American Joint Committee Cancer staging classification system.⁶ After induction chemotherapy (cisplatin-fluorouracil), a partial clinical response with more than a 50 per cent decrease in the overall size of the tumour was noted. The arytenoid cartilage and true vocal fold on the tumour

side were once again mobile. A SCPL with cricothyroidopexy (CHP)¹ was performed during which there was partial resection of the arytenoid cartilage on the tumour-bearing side. A percutaneous endoscopic gastrostomy was performed at the time of the surgery. The final histology was adenocarcinoma. The margins of resection were free of tumour. Post-operative radiation therapy was not used. Post-operatively, the tracheostomy tube was removed on day 3. The patient was discharged from hospital on post-operative day 13. Normal oral feeding was progressively re-established but he patient needed the gastrostomy for 12 months following surgery. The patient is now 39 months from surgery and is well without evidence of disease and/or aspiration.

Case 2

A 64-year-old male presented with a two-week history of a hoarse voice. Clinical examination and endoscopy noted a tumour originating from the true vocal fold and involving the laryngeal ventricle. The motion of the true vocal fold was impaired. The biopsy was diagnosed as pseudosarcomatous squamous cell carcinoma. The tumour was staged as T₂N₀M₀.⁶ Tumour progression with invasion of the false vocal fold was noted after induction chemotherapy (cisplatin-fluorouracil). The patient had a SCPL with CHP¹ sparing both arytenoid cartilages together with bilateral level II, III and IV selective neck dissection sparing the internal jugular vein and XIth

cranial nerve. The diagnosis was changed to adenocarcinoma when the whole specimen was reviewed. The margins of resection were free of tumour. The removed lymph nodes were free of tumour invasion. The post-operative course was unremarkable. The tracheostomy tube was removed on post-operative day 5. The nasogastric feeding tube was removed on post-operative day 16. The patient was discharged from hospital on post-operative day 27 being able to swallow normally.

Post-operative radiation was not used. The patient developed lung and then non-cervical subcutaneous metastases 17 months after initial presentation. He died at 28 months from distant metastasis with no evidence of loco-regional recurrence.

Case 3

A 39-year-old female was referred to our clinic with a hoarse voice of one month's duration. Clinical examination and endoscopy noted a tumour involving the left true vocal fold and ventricle. The motion of the true vocal fold was impaired. The initial biopsy suggested a squamous cell carcinoma. The tumour was staged as T₂N₀M₀.⁶ Induction chemotherapy (cisplatin-fluorouracil) resulted in a partial response with a more than 50 per cent decrease in the overall size of the tumour. The patient then had a SCPL with cricothyroidoepiglottomy (CHEP)² sparing both arytenoid cartilages. The margins of resection were free of tumour. Pathological analysis of the specimen was again a squamous cell carcinoma. The post-operative course was unremarkable. Post-operatively, the patient was decannulated on day 5, resumed oral feeding with removal of the nasogastric feeding tube by day 15 and left hospital on day 22. Thirty-three months after the initial surgery she developed a local recurrence. This was treated with total laryngectomy, voice prosthesis insertion and post-operative radiation therapy. Histological review of this lesion and those of the first procedure together with immunohistochemistry changed the diagnosis to adenocarcinoma. She is alive with no evidence of disease at 70 months after initial surgery.

Case 4

This case involved a 39-year-old male who had suffered six months of throat pain radiating to his ear. Clinical examination and endoscopy noted a tumour located at the anterior commissure and subglottis. The laryngeal computed tomography (CT) scan noted that the lesion breached the anterior arch of the cricoid cartilage. The biopsy revealed an adenoid cystic carcinoma. The tumour was staged as T₄N₀M₀.⁶ He underwent a SCPL with tracheocricothyroidoepiglottomy (TCHEP).³ Resection of the anterior part of the first two tracheal rings was required to achieve free margins of resection. The pathological analysis of the specimen was a low grade adenoid cystic carcinoma. The post-operative course was unremarkable. The tracheostomy tube was removed on post-operative day 5. The patient resumed oral feeding with removal of the nasogastric

feeding tube by post-operative day 17 and was discharged from hospital on day 21. The patient developed lung metastases 41 months post-operatively that were managed with radiation therapy and chemotherapy. The patient died 81 months from the initial disease from distant metastasis without evidence of local or regional disease.

Case 5

This 69-year-old male had a history of right carotid surgery and a resultant vagal and hypoglossal palsy. He presented with increasing hoarseness of two months duration. Clinical examination and endoscopy noted an exophytic supraglottic tumour arising from the right ventricular band and involving the ipsilateral arytenoid cartilage and ventricle. The biopsy revealed a moderately differentiated neuroendocrine carcinoma (atypical carcinoid). The tumour was staged as T₂N₀M₀.⁶ The patient underwent a SCPL-CHEP² with removal of the arytenoid cartilage on the tumour-bearing side. Margins of resection were free of tumour. Pathological analysis of the specimen showed an atypical carcinoid. The tracheostomy tube was removed by post-operative day 11. The nasogastric feeding tube was removed by post-operative day 16. The patient was discharged from hospital by post-operative day 22. The post-operative course was complicated by poor swallowing with aspiration pneumonia that occurred three months from initial surgery. The management of aspiration relied on a percutaneous endoscopic gastrostomy for nine months together with chest therapy. Post-operative radiation therapy was not used. He developed neck, lung and then liver metastases at six, seven and 10 months respectively. The patient died 16 months from the initial disease from distant metastasis without evidence of local recurrence.

Case 6

A 64-year-old male presented with four months' history of dysphonia. Clinical examination and endoscopy noted a lesion of the left vocal fold involving the anterior commissure and floor of the ventricle. The motion of the true vocal fold was not impaired. A biopsy revealed a leiomyosarcoma histologically. The tumour was staged as T₂N₀M₀.⁶ The patient underwent an SCPL-CHEP² sparing both arytenoid cartilages. Margins of resection were free of tumour. Pathological analysis of the specimen with immunohistological staining was a low-grade leiomyosarcoma. Post-operative radiation therapy was not used. The post-operative course was unremarkable. The tracheostomy tube was removed by day 4, the nasogastric feeding tube by day 14 and the patient was discharged on day 18. An ipsilateral digastric node was noted six months from the initial diagnosis. This was treated with selective lymph node dissection taking level II, III and IV sparing the jugular vein and the XIth cranial nerve. Pathological analysis revealed a well-differentiated squamous cell carcinoma without extracapsular spread. As there was no primary lesion, this was considered to be a

TABLE I
ALL PATIENTS INITIALLY STAGED AS M₀

Age	TNM	SCPL	Pathology	Oncological outcome	Ultimate outcome
59	T ₃ N ₀ M ₀	CHP	Adenocarcinoma	–	ANED 39 Months
64	T ₂ N ₀ M ₀	CHP	Adenocarcinoma	DM 17 months	DOD 28 months
39	T ₂ N ₀ M ₀	CHEP	Adenocarcinoma	LR 33 months	ANED 70 months
39	T ₄ N ₀ M ₀	TCHEP	Adenoid cystic carcinoma	DM 41 months	DOD 81 months
69	T ₂ N ₀ M ₀	CHEP	Atypical carcinoid	NR 6 months DM 7 months	DOD 16 months
64	T ₂ N ₀ M ₀	CHEP	Leiomyosarcoma	MSP 6 months	ANED 80 months

LR = local recurrence; DM = distant metastasis; MSP metachronous second primary tumour; ANED = alive with no evidence of disease, DOD: died of disease.

metastasis from an unknown metachronous second primary tumour. The patient is alive and well with no signs of disease 80 months from initial surgery.

Discussion

Over the past 10 years, various reports suggested that the use of SCPLs for selected squamous cell carcinoma of the endolarynx resulted in an increase in the local control rate for 'early' cases and a decrease in the need for total laryngectomy in 'advanced' cases.^{1–5} However, to our knowledge, no report has yet documented the results achieved with SCPLs for non-squamous cell carcinoma of the larynx. This lack of data was the initial impetus for the current report designed to analyse the outcome following SCPLs in patients with selected non-squamous cell carcinoma of the endolarynx.

When compared to squamous cell carcinoma, non-squamous cell carcinomas of the endolarynx are noted to occur in relatively specific locations and rarely at the level of the true vocal folds^{7–9} Adenocarcinomas are predominantly supraglottic in origin and particularly affect the aryepiglottic fold or the false fold.⁷ Adenoid cystic carcinomas are infraglottic in 2/3 of cases and their tendency to perineural invasion is just as marked in laryngeal cases as in cases elsewhere.⁸ Moderately differentiated neuroendocrine carcinomas (atypical carcinoid) are also much commoner in the supraglottis, have a predilection for the false vocal fold, and may exhibit 'skip lesions' along the affected nerves.⁹ All of these lesions, arising from glandular elements, often present as swelling under normal mucosa and have specific methods of spread. Adenocarcinomas are reported to have a prolific extension submucosally.^{10,11} Adenoid cystic carcinomas as well as atypical carcinoid are well known to spread along nerve sheaths.^{8,10,11} Non-squamous cell carcinomas of the larynx also have a large propensity for wide metastatic spread which tends to have a greater bearing on patient's survival.^{12,13} Finally these tumours are also not very radiosensitive.¹⁴

All of the above mentioned pathways of spread as well as the lack of large numbers reported at any single institution together with the retrospective nature of the reported data make the definition of the best treatment difficult and lead to conflicting opinions on the degree of aggressiveness needed for treating these neoplasms (total versus partial surgery) and the role of complementary treatment

(post-operative radiation therapy). However, when analysing the reported large series documenting the results achieved for non-squamous cell carcinoma of the larynx it appears that most authors advocated the completion of total laryngectomy with vertical partial laryngectomy or supraglottic laryngectomy being used rarely while supracricoid partial laryngectomies (SCPLs) are never mentioned as a useful tool in such tumours.^{10,14–16} According to Whicker *et al.*¹⁴ justifications for the use of total laryngectomy in the face of adenoid cystic carcinoma of the larynx were the frequent infraglottic extent of the tumour and the tumour spread along nerve sheaths. Similarly Alavi *et al.*¹⁰ as well as Cohen *et al.*¹¹ advocated total laryngectomy for laryngeal adenocarcinoma because of the prolific extension noted submucosally. On the other hand Sessions *et al.*¹² noted that the form of local treatment used did not impact on the length of survival and therefore 'cautiously advocated the use of the most conservative surgery feasible'. Similarly, Whicker *et al.*¹⁴ considered the use of supraglottic laryngectomy for laryngeal adenocarcinomas since they were generally supraglottic in origin. In our series, safe margins of resection were achieved in all cases and only one local recurrence occurred that was salvaged by total laryngectomy. The explanation for the high rate of local control after partial laryngectomy in our series might be that wider mucosal and muscular margins of resection are achieved with SCPLs when compared to the conventional vertical partial and supraglottic laryngectomy. In addition the conventional oncologic contra-indications for SCPLs^{1–3} (fixation of the arytenoid cartilage, invasion of the posterior commissure, infraglottic extent of tumour reaching the upper border of the cricoid cartilage, cricoid cartilage invasion and/or extralaryngeal spread of tumour) should be taken into account.

As with the degree of resection required (total vs partial) in treating these neoplasms the medical literature contains conflicting opinions on the role of complementary treatment. The use of post-operative radiation therapy following partial laryngectomy in patients with non-squamous cell carcinoma of the larynx is still under debate. These tumours are not very radiosensitive.¹⁴ However, Alavi *et al.*¹⁰ suggested that the use of post-operative radiation therapy improved local control. In our series, safe margins of resection were achieved in all cases and post-operative radiation therapy to the remaining larynx was not used. With this approach, only one

local recurrence occurred that was salvaged by total laryngectomy and post-operative radiation therapy. A platinum-based induction chemotherapy regimen was used in the three patients with adenocarcinomas in our series as a result of an institutional protocol. Although two of these patients had a partial response (more than 50 per cent decrease in the tumour volume) it was not possible to demonstrate a benefit in terms of survival, local control, and laryngeal preservation when using this treatment modality. Therefore, at the present time the use of a platinum-based induction chemotherapy regimen in patients with adenocarcinoma of the larynx should still be considered as experimental.

With regard to the neck disease, most authors recommended the use of neck dissections for clinically evident disease and in cases of adenocarcinoma and high grade mucoepidermoid carcinoma.^{10,11,15,17} Spiro *et al.*¹³ felt that 'uncontrolled cervical lymph node involvement or distant metastasis was more often the reason for treatment failure' and therefore recommended aggressive treatment of regional nodes. Adenocarcinomas have a high rate of lymphatic metastasis either at presentation or during the course of the disease and elective neck dissection in patients initially classified as N₀ is advocated by most authors.^{10,11,15} In our series, we performed an elective neck dissection in the two cases of adenocarcinoma classified as N₀ that were diagnosed prior to surgery. They were both histologically negative and nodal failure was not encountered. On the other hand it is also recommended that patients with adenoid cystic carcinoma classified as N₀ do not have elective neck dissection because of the rarity of lymphatic metastases.^{18,19} However, in our series nodal failure was noted in only one case – neuroendocrine carcinoma – in whom the neck was not managed at the time of SCPLs. Such conflicting data makes it hard to define the best treatment option regarding the N₀ neck. With regards to the low morbidity related to selective neck dissection and the benefit in terms of precise staging that allows the completion of an associated neck dissection our current policy is to advocate the systematic completion of a selective neck dissection at the time of initial treatment in patients with non-squamous cell carcinoma of the larynx initially classified as N₀.

Sessions *et al.*¹² as well as Spiro *et al.*¹³ noted that non-squamous cell carcinomas of the larynx have a propensity for wide metastatic spread that tends to have a greater bearing on the patient's survival. In the medical literature it is also recommended that because of the frequency of blood-borne metastases, all patients with glandular carcinomas of the larynx be screened for these. In our series, three patients ultimately developed a distant metastases. Therefore, we actually recommend the use of CT scanning of the chest and abdomen as well as radionuclide bone scanning to search for metastases.

The heterogeneity of the reported series and the lack of uniform treatment modalities makes the analysis in terms of survival extremely difficult to

compare. Alavi *et al.*¹⁰ reporting the UCLA experience with glandular carcinoma in a series of 12 patients (five adenoid cystic carcinoma, five mucoepidermoid carcinoma and two adenocarcinomas), in whom partial laryngectomy was performed only in three patients, reported a 50 per cent five year survival. Cohen *et al.*¹¹ reporting the MD Anderson experience in a series of 18 patients (10 adenocarcinomas and eight adenoid cystic carcinomas) noted that nine patients died of the tumour while three were alive with disease. Gadoski *et al.*¹⁶ reported a series of 19 non-epidermoid cancers (six mucoepidermoid, four adenocarcinoma, two adenoid cystic, seven mesenchymal). Of the 12 glandular tumours, five out of 12 died from the tumour. In our series three of the six patients died of the disease suffering from distant metastases. However total laryngectomy was performed only in one of our six patients. Functionally, all of our patients were decannulated and returned to full oral alimentation, albeit a lengthy process in two of them. Such data confirms the previously reported good functional outcome after SCPLs.^{20,21}

In conclusion, the current case series presented herein does not allow for a definitive conclusion regarding the overall management of non-squamous cell carcinoma of the endolarynx. The data reported, however, strongly suggest that the use of SCPLs might be a valuable adjunct and should be further investigated in an attempt to increase the percentage of patients with non-squamous cell carcinoma of the endolarynx that could avoid total laryngectomy.

References

- Laccourreye H, Laccourreye O, Weinstein G, Menard M, Brasnu D. Supracricoid laryngectomy with cricothyroidopexy: a partial laryngeal procedure for selected supraglottic and transglottic carcinomas. *Laryngoscope* 1990;**100**:765–71
- Laccourreye H, Laccourreye O, Weinstein G, Menard M, Brasnu D. Supracricoid laryngectomy with cricothyroidopexy a partial laryngeal procedure for selected glottic carcinomas. *Ann Otol Rhinol Laryngol* 1990;**99**:421–6
- Laccourreye O, Ross J, Bourguignat E, Kelly JH, Brasnu D, Laccourreye H. Extended supracricoid partial laryngectomy with tracheocricothyroidopexy. *Acta Otolaryngol* 1994;**114**:669–74
- Piquet J, Chevalier D. Subtotal laryngectomy with cricothyroid-epiglottopexy for the treatment of extended glottic carcinomas. *Am J Surg* 1991;**162**:357–61
- Chevalier D, Piquet JJ. Subtotal laryngectomy with cricothyroidopexy for supraglottic carcinoma: review of 61 cases. *Am J Surg* 1991;**168**:472–3
- Beahrs O, Henson D, Hutter R, Myers M, eds. *AJCC: Manual for Staging of Cancer*, 3rd edn. Philadelphia, PA: JB Lippincott, 1987; 33–44
- Batsakis JG. *Tumours of the Head and Neck: Clinical and Pathological Considerations*. 2nd edn. Baltimore, MD: Williams & Wilkins, 1979
- Sasaki CT, Carlson RD. Malignant neoplasms of the larynx. In: *Otolaryngology Head and Neck Surgery* St Louis MO: Mosby-Year Book Inc. 1992;1925–54
- Watters GWR, Molyneux AJ. Atypical carcinoid tumour of the larynx. *J Laryngol Otol* 1995;**109**:455–8
- Alavi S, Calcaterra TC, Namazie A, Blackwell KE. Glandular carcinoma of the larynx: The UCLA experience. *Ann Otol Rhinol Laryngol* 1999;**108**:485–9

- 11 Cohen J, Guillaumondegiu OM, Batsakis JG, Medina JE. Cancer of the minor salivary glands of the larynx. *Am J Surg* 1985;**150**:513–8
- 12 Sessions DG, Murray JP, Bauer WC, Ogura JH. Adenocarcinoma of the larynx. *Can J Otolaryngol* 1975;**4**:293–6
- 13 Spiro RH, Lewis JS, Hajdu SJ, Strong EW. Mucus gland tumours of the larynx and laryngopharynx. *Ann Otol Rhinol Laryngol* 1976;**85**:498–503
- 14 Whicker JH, Neel HB III, Weiland LH, Devine KD. Adenocarcinoma of the larynx. *Ann Otol Rhinol Laryngol* 1974;**83**:487–90
- 15 Cady B, Rippey JH, Frazell EL. Non-epidermoid carcinoma of the larynx. *Ann Surg* 1968;**167**:116–20
- 16 Gadowski SP, Zwillenberg D, Choi H. Non-epidermoid carcinoma of the larynx: The Thomas Jefferson University experience. *Otolaryngol Head Neck Surg* 1986;**95**:558–65
- 17 Browne DJ. Management of nonepidermoid cancer of the larynx. *Otolaryngol Clin North Am* 1997;**30**:215–29
- 18 Ferlito A, Barnes L, Myers E. Neck dissection for laryngeal adenoid cystic carcinoma: Is it indicated? *Ann Otol Rhinol Laryngol* 1990;**99**:277–80
- 19 Ferlito A, Rinaldo A, Devaney K, Devaney S, Milroy C. Impact of phenotype on treatment and prognosis of laryngeal malignancies. *J Laryngol Otol* 1998;**112**:710–4
- 20 Naudo P, Laccourreye O, Weinstein G, Hans S, Laccourreye H, Brasnu D. Functional outcome and prognosis factors after supracricoid partial laryngectomy with cricothyroidopexy. *Ann Otol Rhinol Laryngol* 1997;**106**:291–6
- 21 Naudo P, Laccourreye O, Weinstein G, Jouffre V, Laccourreye H, Brasnu D. Complications and functional outcome after supracricoid partial laryngectomy with cricothyroidopexy. *Otolaryngol Head Neck Surg* 1998;**118**:124–9

Address for correspondence:

O. Laccourreye M.D.,
Department of Otorhinolaryngology Head and Neck Surgery,
Laënnec Hospital,
42 rue de Sèvres,
75007 Paris,
France.

Fax: 33 1 44 39 66 46

E-mail: ollivier.laccourreye@inc.ap-hop-paris.fr

D Veivers, M.D., takes responsibility for the integrity of the content of the paper.

Competing interests: None declared
