

## Frontolateral Laryngectomy with Imbrication Laryngoplasty for Stage I Glottic Carcinoma

Anne Margaux V. Artates, MD

Department of Otorhinolaryngology  
Philippine General Hospital  
University of the Philippines Manila

**Good prognosis** has been associated with early detection of Squamous Cell Carcinoma of the larynx. The patient's choice for any treatment modality depends highly on the cure rate, larynx preservation rate, post-treatment voice quality, morbidity, and treatment cost.<sup>1</sup> Regardless of which stage of disease, the choice of treatment centers mainly on the maintenance of quality of life and minimal adverse effects.

### CASE REPORT

A 56-year-old male presented with a 9-month history of intermittent hoarseness with occasional low-grade fever. A local private physician diagnosed pulmonary tuberculosis and treated him with anti-tuberculosis medications for six months. Persistence of hoarseness after treatment prompted consult in our institution where laryngeal videostroboscopy revealed a fleshy, fungating mass occupying the anterior 1/3 of the right true vocal cord extending towards the midline with probable involvement of the contralateral anterior 1/4 of the left true vocal cord and full, symmetric mobility of both arytenoids. (*Figure 1*)

Direct laryngoscopy, tracheoscopy, esophagoscopy and biopsy yielded histopathologic findings consistent with well-differentiated squamous cell carcinoma. Computed tomography revealed an isolated right glottic mass with no radiologic extension to the cricoid, contralateral vocal cord and ipsilateral arytenoid. American Joint Committee on Cancer (AJCC) staging of the patient at this time was Stage I (T1bN0M0). Options for radiotherapy or conservation laryngectomy (via frontolateral laryngectomy with imbrication laryngoplasty) were presented to the patient, as well as prognosis, and expected outcomes. Having opted for conservation laryngectomy, the patient underwent frontolateral laryngectomy with imbrication laryngoplasty.

At the beginning of the procedure, the larynx was exposed via a 5 cm horizontal skin incision and strap muscle retraction. A perichondrial flap was elevated over the right thyroid lamina. (*Figure 2*) A midline laryngotomy allowed direct visualization of the tumor and its location. In this case, an extension of 3 mm beyond the midline afforded better exposure. Cartilage and mucosal cuts were mapped and the superior cut was performed at the level of the ventricle. The inferior cut was 1 cm from the superior margin, providing an ample margin of resection.

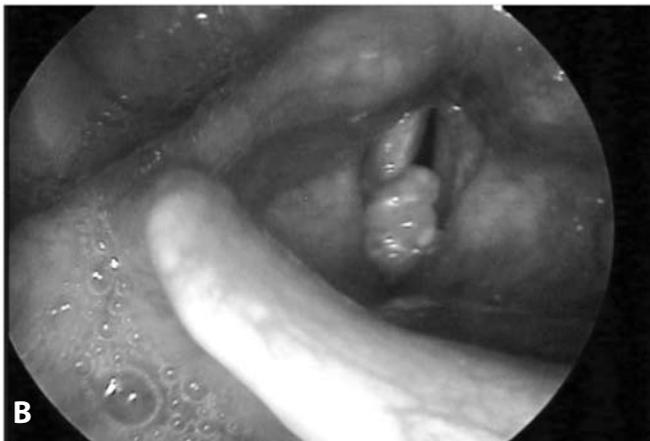
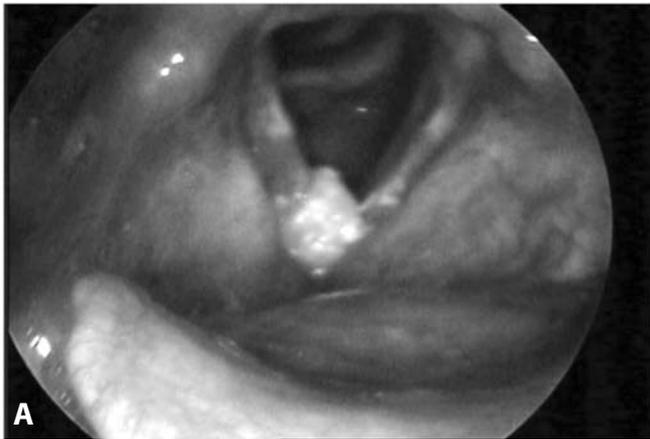
Prior to making the cartilage cuts, a fine cutting burr was used to drill two pairs of holes on each cartilage strip of the involved side. The superior cut was made through the ventricle and paraglottic tissues, leaving behind the posterior 1/3 of the right true vocal cord together with the right arytenoid. The specimen included the anterior 2/3 of the right true vocal cord, inferior and superior surfaces, vocalis muscle, and ipsilateral thyroid cartilage strip. Hemostasis was achieved using bipolar cautery. (*Figure 3*) Specimens from the posterior, anterior and inferior margins were sent for final histopathology.

Correspondence: Dr. Anne Margaux V. Artates  
Department of Otorhinolaryngology Ward 10  
Philippine General Hospital  
University of the Philippines Manila  
Taft Avenue, Ermita, Manila 1000  
Philippines  
Phone: (632) 554 8400 local 2151 or 2152  
Email: a\_artates@yahoo.com  
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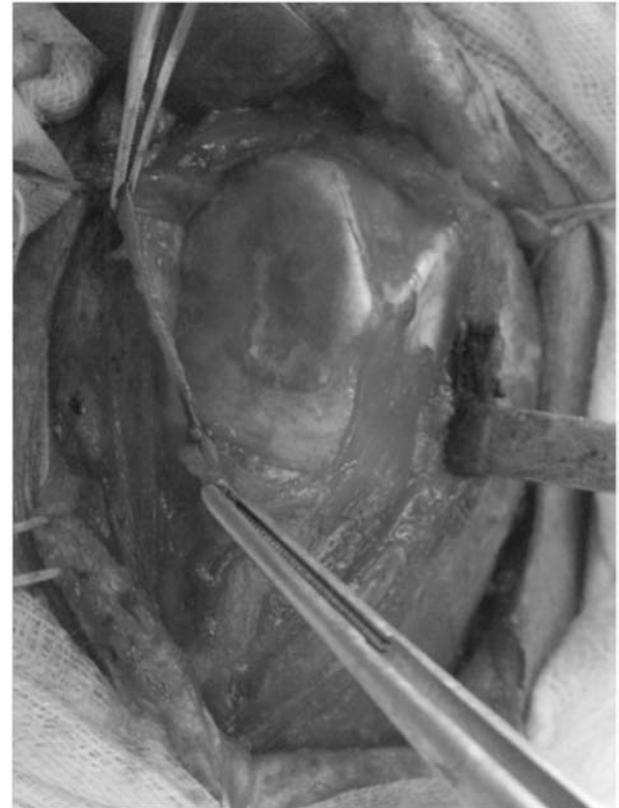
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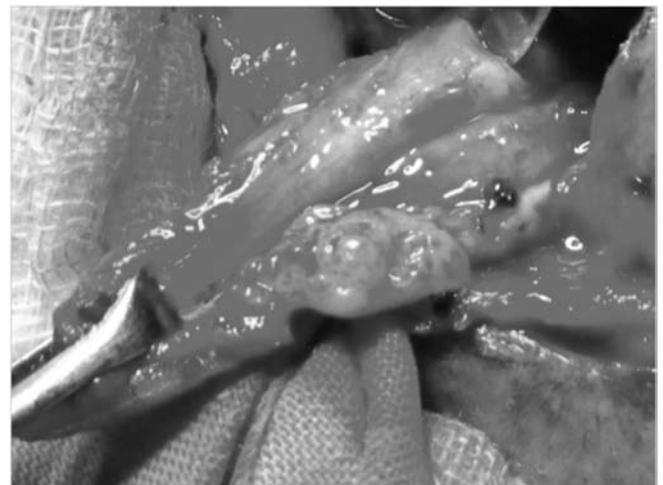
**Figure 1.** A. Right true vocal cord mass on videolaryngoscopy with both vocal cords in abduction; and B. In adduction.

Reconstruction of the remaining hemilarynx comprised two steps: first, imbrication of the remaining thyroid cartilage for the cartilaginous framework; and second, development of the superiorly-based vocal fold mucosal flap.

The vocal fold mucosal flap was developed by undermining the mucosa of the remaining false vocal fold from the inner aspect of the superior thyroid cartilage strip. The superior and inferior cartilage strips were then imbricated—whereby both strips were overlapped by placing the superior strip medial to the inferior strip—a technique also known as internal imbrication laryngoplasty. (Figure 4) Two Prolene 2-0 sutures were placed through the predrilled holes to secure the cartilage strips together and the knots were placed externally. (Figure 5) Complete closure of the anterior and posterior commissure was accomplished using absorbable Vicryl 5-0 sutures. A tracheotomy was performed in this patient and a nasogastric tube inserted. Estimated blood loss was 100 cc, and the procedure lasted 4 hours and 20 minutes. The nasogastric tube was removed 10 days after the operation and decannulation was



**Figure 2.** Exposure of the right thyroid lamina.



**Figure 3.** Specimen showing the involved anterior 2/3 of the right glottis

achieved three weeks after surgery with no complaints of aspiration. (Figure 6) Monthly follow-up for 10 months with indirect laryngoscopy and videostroboscopy has shown no evidence of recurrence in this patient.

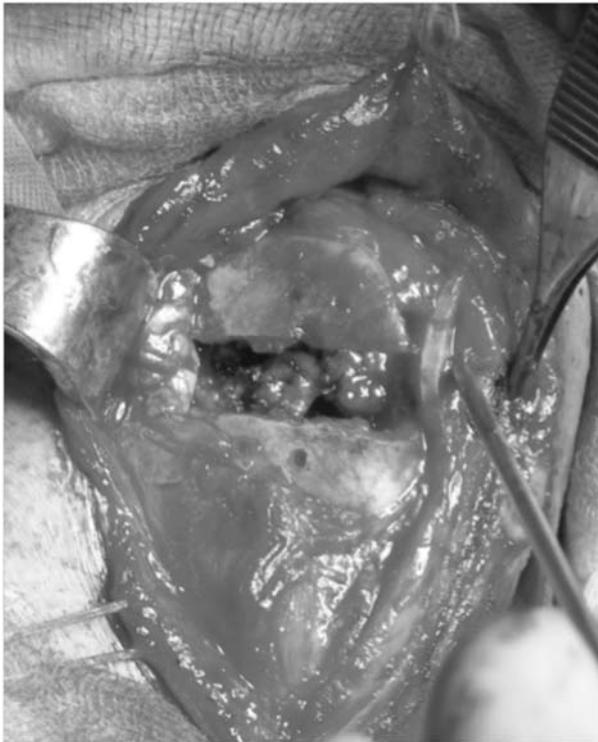


Figure 4. Superior and Inferior cartilage strips after tumor resection



Figure 6. Videolaryngoscopy 6 months after the procedure

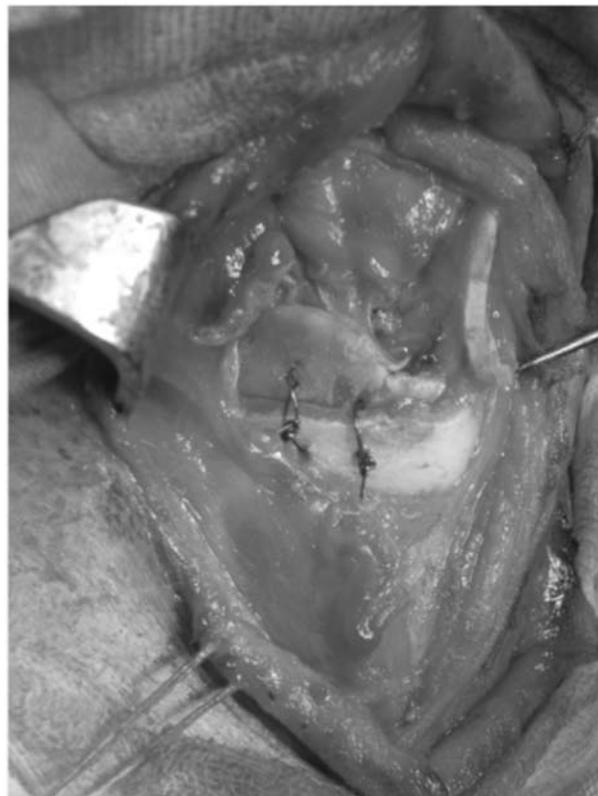
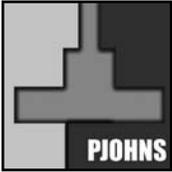


Figure 5. Internal Imbrication Laryngoplasty

**DISCUSSION**

Laryngeal squamous cell carcinoma involving one subsite as defined by the TNM staging of the AJCC is managed with a single treatment modality – the choice of treatment is influenced by the associated morbidities.<sup>2</sup> Historically, Gordon Buck performed the first reported laryngofissure and local excision of laryngeal cancer in 1851. It was in 1878 that Bilroth introduced transcervical vertical partial laryngectomy and achieved long-term cure for glottic carcinoma.<sup>1</sup> Publications by Chawla *et al.*, Ferlito *et al.* and Har-El *et al.* enumerate the treatment strategies for stage I and II glottic carcinoma, namely radiation therapy, endoscopic surgery, transoral laser surgery, laryngofissure with cordectomy, and partial laryngectomy, including its modifications and reconstructive options.<sup>1,3,4</sup> Silver *et al.* have claimed that results of laser surgery are equivalent to those obtained with conservation surgery.<sup>6</sup>

The International Federation of Head and Neck Oncologic Societies (IFHNOS) Dr. Randall Webber enumerated four factors promoting renewed interest in organ preservation surgery: cost, functional outcome, lack of demonstrated survival benefit for non-surgical therapy, and improvement of surgical precision and limited access approaches driven by technological advances.<sup>5</sup> While complete eradication of disease has remained the principal goal in oncologic management, the said factors should be taken into consideration prior to initiation of treatment. Depending on the availability of treatment choices, T1/T2 glottic lesions can be managed effectively by a single treatment protocol – via transoral endoscopic surgery or radiotherapy or open-approach conservation laryngectomy. Isolated cases have reported



failure of disease control in transoral endoscopic surgery when the anterior commissure is involved. It is in the same light that frontolateral laryngectomy was given as an option in the case presented.

The phonatory and protective functions of the laryngeal complex are achieved by normal or otherwise acceptable apposition of the vocal cords. In the case of a neo-glottis, this is achieved by imbrication laryngoplasty. This technique, as described by Gady and Paniello,<sup>3</sup> includes endolaryngeal mucosal reconstruction with a false vocal fold flap that is combined with the medialization of the thyroid cartilaginous framework. The result is an improved voice quality owing to the vocal fold flap that forms a smaller glottic gap. Furthermore, Paniello *et al.*<sup>3</sup> were able to measure outcomes in their retrospective study of patients who underwent partial frontolateral laryngectomy with imbrication laryngoplasty (PLIL) by means of monitoring local control rate of the

disease, postoperative course, length of treatment, postoperative voice quality, swallowing function and patient satisfaction. Their results revealed that the said technique compare favorably with those treated with radiation therapy and endoscopic surgery. Local control rates reported by Dedivitis *et al.*<sup>7</sup> in 2005 involved a retrospective analysis of 30 patients with the AJCC staging of T1bN0M0 and T2N0M0 from 1995-2002. Twenty five of the said patients showed no evidence of disease during follow-up while five experienced local recurrence and were subsequently treated with salvage surgery.

Individual discussions on indications and outcomes of each modality for T1/T2 glottic lesions are beyond the scope of this report. However, we encourage that partial frontolateral laryngectomy with imbrication laryngoplasty also be presented as a treatment option for selected early glottic carcinoma cases.

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