

## CASE REPORT

# Ultrasound as a Useful Diagnostic Tool in the Follow-up of Laryngeal Carcinoma

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## ABSTRACT

**Background:** Using neck ultrasound to evaluate the status of the lymph nodes of a patient with a head and neck cancer is common practice but laryngeal ultrasound could help to receive more information of the tumor.

**Methods and results:** We report a case of an initially T1a N0 M0 G2 R0 squamous-cell carcinoma of the right vocal cord. Despite regular follow-up, the relapse of the tumor remained undetected. The hypopharyngoscopy and laryngoscopy were performed. The tumor was evaluated with laryngeal ultrasound and to confirm the relapse of the tumor a MRI scan was performed. Endoscopically there was no obvious presence of the tumor. Laryngeal ultrasound facilitated the visualization of the tumor in good quality.

Unfortunately, a total laryngectomy was necessary to treat the relapse of the squamous-cell carcinoma (T4a N0 (0/16) M0 G2 R0).

**Conclusion:** Despite careful follow-up via laryngoscopy a relapse of the laryngeal tumor was not visible. Using laryngeal ultrasound, the relapse might have been detected sooner.

**Keywords:** Laryngeal ultrasound, Laryngeal carcinoma, Neck, Sonography, Follow-up.

**Source of support:** Nil

**Conflict of interest:** None declared

## INTRODUCTION

Ultrasound, as a diagnostic tool, has become very popular because it is easy to use, noninvasive and radiation-free. In relation to laryngeal tumors the ultrasound is mainly used to examine the status of the lymph nodes. However, in general it is not always used by the otolaryngologist as a diagnostic tool for tumors of the head and neck. The primary tumor is mostly assessed by laryngoscopy.

The case presented herein of a relapse of a laryngeal carcinoma not detected via laryngoscopy, but visible upon ultrasound and magnetic resonance imaging (MRI) of the neck convinced us of the usefulness of laryngeal ultrasound. The use of laryngeal ultrasound as a diagnostic tool in laryngeal carcinoma has been documented more frequently in the literature. Hu et al<sup>1,2</sup> recommend sonography as a noninvasive complementary modality for detection and initial staging of glottic carcinoma.

## CASE REPORT

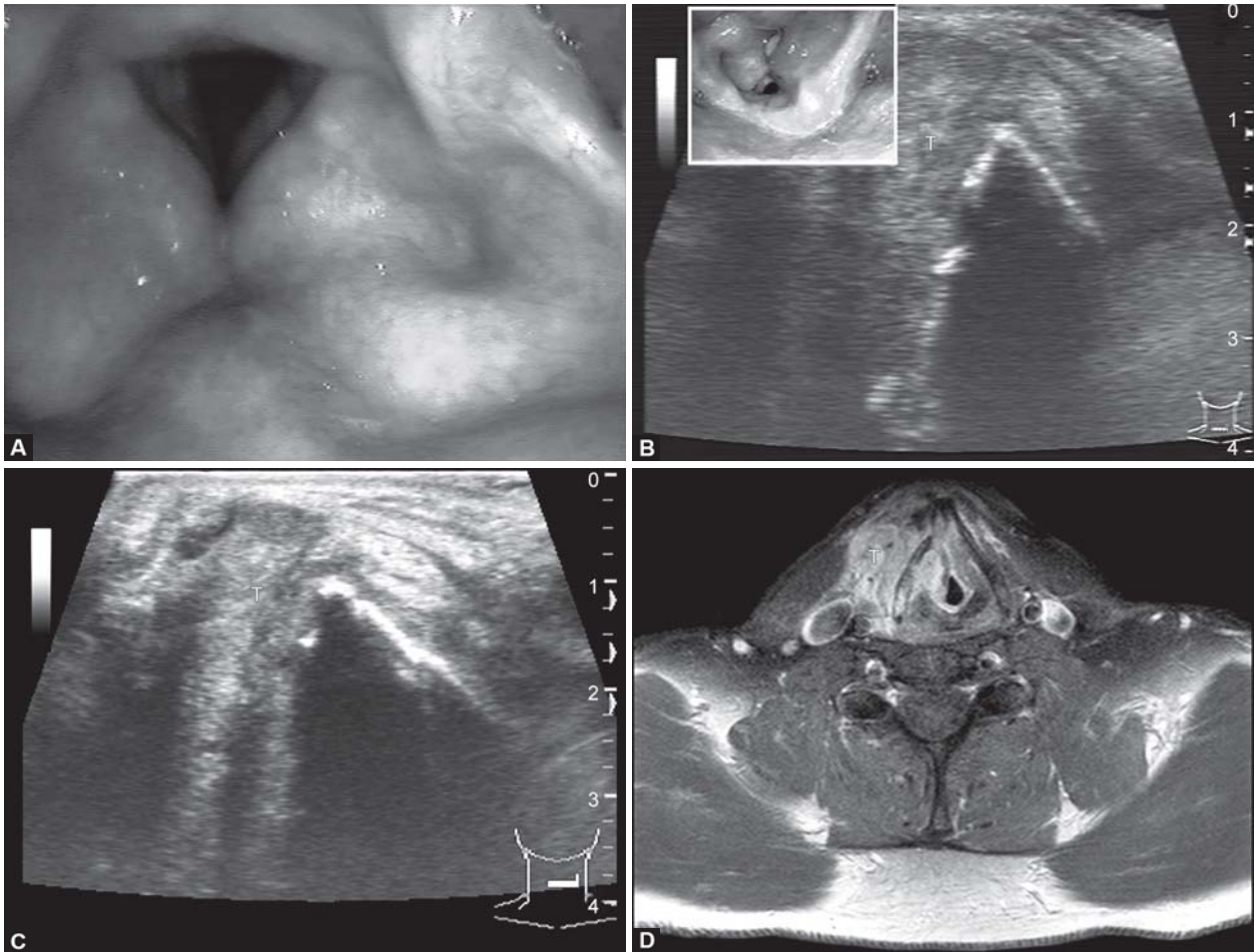
In February 2011, a 56-year-old man presented to our clinic with a history of several years of hoarseness. At the time of admission there was no noticeable relevant medical history and the patient was not taking any medication. He had already quit smoking but he had smoked 10 pack years.

A squamous-cell intermediate grade carcinoma of the anterior part of the right vocal cord was confirmed outside the clinic and the patient presented for tumor excision. The anterior commissure of the vocal cord was free of tumor and both of the vocal cords were equally mobile. A laser cordectomy of the right vocal cord was performed. Intraoperatively the cancer showed no paraglottic extension. Fresh frozen sections of the anterior, middle and posterior part of the right vocal cord were performed and were free of tumor. The histopathological result confirmed the preoperative diagnosis of a squamous cell carcinoma of the right vocal cord (T1a N0 M0 G2 R0) with a maximum diameter of the tumor of 5 mm. No pathological lymph nodes were found upon ultrasound of the neck. A sonography of the abdomen and computer tomography (CT) scan of the thorax showed no distant metastases.

The patient attended for follow-up at our clinic in March 2011 and April 2011. In May 2011 the patient was sent for a microlaryngoscopy to biopsy a suspected leukoplakia at the area of the scar tissue on the right vocal cord. The histopathological findings revealed inflammation only, no carcinoma. The motility of the right vocal cord was normal at this time.

The patient attended our clinic regularly for examination of the region of the excised tumor (June 2011, August 2011, November 2011, February 2012, May 2012, August 2012). During all these appointments no pathological findings were observed except at the area of the scar tissue on the right vocal cord from the laser surgery. Regularly performed ultrasound of the neck which included the usual status of the lymph nodes showed no signs of any pathology.

In November 2012 the patient presented with pain on the right side of the neck and headaches, which had persisted over the last 2 months. The laryngoscopy showed no visual signs of a relapse of the tumor and normal motility of the right vocal cord was normal (Fig. 1A). In the ultrasound examination including the status of the lymph nodes, we



**Figs 1A to D:** (A) Laryngoscopy from the last outpatient visit prior to the diagnosis of the relapse of the tumor (November 2012), (B) Simultaneous laryngoscopy and ultrasound at the time of histopathological diagnosis of tumor relapse (January 2013); the tumor (T) is visible in the ultrasound; the laryngoscopy image shows the patients larynx after external biopsy, (C) The ultrasound picture prior to laryngectomy; showing the tumor (T) and the destruction of the thyroid cartilage (January 2013), (D) MRI scan showing the extension of the tumor (T), as the sonography had also shown (January 2013)

could see an enlarged lymph node (1.5 cm) at the submandibular region on the right side of the neck.

As a study of laryngeal ultrasound in children was taking place at the same time in our clinic, we focused on this diagnostic approach and were interested in evaluating if any pathology was visible by ultrasound of the larynx (Figs 1B and C). The ultrasound image revealed a tumor as a clearly defined inhomogeneous hypoechoic mass with hyperechoic sections, which was destroying the thyroid cartilage.

We performed an MRI scan to confirm the clinical suspicion of the relapse of the tumor seen in the ultrasound. An MRI scan, performed in January 2013, revealed a submucosal spread, centrally necrotic tumor on the right side of the larynx, infiltrating the paraglottic space, the thyroid lamina, the cricoid ring and the strap muscles on the right side (Fig. 1D). Furthermore, a suspected pathological lymph node was found in the right submandibular region.

At that time, of inpatient presentation, one could see a thickening of the right vestibular fold only, with normal movement of the vocal cord via flexible laryngoscopy.

In January 2013, staging of the tumor, using sonography of the abdomen, found it was normal and a CT scan of the chest showed no signs of metastases.

However, because of the ongoing headaches we presented the patient to the neurologist who performed a cerebrospinal fluid puncture. The histopathological exam showed no tumor cells. A MRI scan of the head was also performed and showed no pathological findings.

A direct hypopharyngoscopy, laryngoscopy and external exploration of the larynx, to obtain samples for histopathological examination, were performed under general anesthesia. The histopathological findings confirmed relapse of squamous cell carcinoma of the larynx. Biopsies of the right paraglottic space, the left vallecula and from outside of the neck showed invasion of the tumor.

The therapeutic options were discussed between a board of interdisciplinary experts, 'the Tumorboard' and the patient and his relatives. The patient and his family voted against primary radiotherapy and decided for the operative removal of the tumor.

A total laryngectomy was performed, including a resection in the area at the left base of the tongue, a resection of the right thyroid gland, and a partial resection of the left thyroid gland. Histopathological investigation revealed a relapse of the squamous cell carcinoma had occurred. The maximum diameter of the tumor was 5 cm and it had infiltrated the thyroid cartilage and the strap muscles. All 16 resected lymph nodes and the resection lines were free of cancer [T4a N0 (0/16) M0 G2 R0].

Postoperatively, the patient recovered well and went home. Unfortunately, he needed readmission shortly after surgery due to a bilateral pulmonary embolism with pneumonia and pleuritis within a deep vein thrombosis on the right leg. Therefore, the start of adjuvant radio-chemotherapy was delayed, but is presently ongoing.

## DISCUSSION

Laryngeal ultrasound has become more interesting in the examination of the larynx; with a focus on identifying the laryngeal structures, the movement of the vocal cords and evaluating laryngeal pathologies. The idea of using laryngeal ultrasound as a diagnostic tool is not new. In 1993, Erkan et al<sup>3</sup> indicated that high-resolution real-time ultrasound is a sensitive, simple and inexpensive method for evaluating laryngeal cancers and subclinical cervical lymph node metastases. Sonography can be used as the primary imaging modality in advanced laryngeal cancer.<sup>4</sup> Nowadays, new ultrasound techniques can provide a high-resolution image of the larynx. Improved image contrast allows a more detailed description of the laryngeal structures.

The gold standard in examining laryngeal pathologies is to perform a laryngoscopy using a flexible or rigid endoscope. The CT and MRI scans can provide the missing information of the 'endoscopically-blind' submucosal areas. The disadvantages of these methods are the exposure of the patient to radiation via the CT scan, the presence of movement artifacts in the MRI scan, and that they are not as easy available as ultrasound. In a comparison by Hu et al<sup>1,2</sup> of ultrasound of the larynx, with CT scan and MRI of the larynx, they found that ultrasonography had a reliable pretherapeutic staging accuracy of laryngeal carcinoma. It can therefore, be used as a noninvasive complementary

technique for the pretherapeutic staging of laryngeal carcinoma.<sup>2</sup>

Initial staging of the cancer and evaluation of the prognostic impact of tumor features determined by sonography, as described by Kuribayashi et al,<sup>5</sup> indicate that thyroid cartilage invasion may be an independent negative predictor of the outcome. However, to our knowledge the data presented herein is the first to use laryngeal ultrasound, performed by the head and neck surgeon, as a diagnostic tool in the follow-up of patients with laryngeal cancer.

## CONCLUSION

Laryngeal ultrasound is easily applied, free of radiation and tolerated well by patients. It should be considered, in addition to routine ultrasound of the neck, to explore the larynx itself and as a valuable diagnostic tool in the follow-up of patients with laryngeal cancer.

Using ultrasound, in the case of the present patient, the tumor might have been detected earlier and less invasive surgery would have been required. Further studies, with more patients are needed to evaluate the diagnostic power of laryngeal ultrasound in comparison to laryngoscopy, CT and MRI scan, in the follow-up of laryngeal cancer.

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