A Case of Laryngeal Amyloidosis: Role of US and US-CNB for Preoperative Diagnosis

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Amyloidosis is a rare benign disease characterized by the extracellular deposition of nonsoluble fibrillar proteins (amyloids) within organs. Laryngeal amyloidosis (LA) accounts for only 9%–15% of all cases of amyloidosis. Since clinical manifestations and laryngoscopic findings often overlap with those of laryngeal cancer, it is challenging to differentiate LA from laryngeal cancer prior to surgical biopsy. We report a case of LA mimicking laryngeal cancer, in which the diagnosis was facilitated by preoperative ultrasonography (US) and US-guided core-needle biopsy (US-CNB) prior to surgical biopsy. The US findings of this case were distinguishable from those of laryngeal cancer, which enabled us to consider a diagnosis other than laryngeal cancer. Amyloidosis was diagnosed preoperatively using office-based percutaneous US-CNB, avoiding general anesthesia needed for suspension laryngoscopic examination. This case suggests that US and US-CNB could be used as supplementary diagnostic modalities to evaluate suspicious laryngeal masses mimicking laryngeal cancer.

Keywords
Amyloidosis; Image-guided biopsy; Laryngeal neoplasm; Larynx; Ultrasonography.
pears as a well-defined, homogenous, and low-attenuating mass with occasional punctuated calcifications.\(^6\) MRI is regarded as an ideal modality, which demonstrates the characteristic intermediate signal on T1 comparable with that of skeletal muscle, enhancement with contrast, and a low T2 signal reflecting the low water content.\(^5\) However, these CT and MRI findings are inconsistent in cases of LA and are not specific for LA.\(^2,4,6\)

Although ultrasonography (US) is the most popular imaging modality for the head and neck region, few studies have literatures addressed its utility for the evaluation of laryngeal pathologies because of critical limitations resulting from the soft tissue–air interface and laryngeal framework structures.\(^8\) Moreover, there are no reports addressing US findings of LA.

Here, we report a case of LA mimicking laryngeal cancer, in which the diagnosis was facilitated by preoperative US and US-guided core-needle biopsy (US-CNB) prior to surgical biopsy. In addition, we introduce the US characteristic of LA, suggesting a possible role of US in preoperative evaluation.

**Case**

A 69-year-old female visited our clinic complaining of hoarseness for the past 4 months. She had no other signs or symptoms, such as cough, sore throat, dyspnea, dysphagia, or history of smoking or alcohol consumption. However, she had multiple comorbidities, including hypertension, diabetes, hyperthyroidism, stage 3 chronic kidney disease, heart failure, and arterial fibrillation. Additionally, she had a recent history of myocardial infarction and had undergone coronary angiography with stent placement; she has been on anticoagulant medication since then.

Laryngoscopy revealed a protrusion of the right false vocal cord with an irregular mucosal surface (Fig. 1). The ipsilateral vocal cords were edematous and immobilized. Due to impaired renal function, CT and MRI were performed without contrast enhancement. On the CT scan, a well-defined, homogenous, and low-attenuating mass without calcification was identified at the supraglottic region, and the mass extended to the glottic level through the paraglottic space (PGS) (Fig. 2). No suspicious lymph node enlargement was observed. The CT results suggested transglottic cancer involving PGS and with possible T3 stage. On MRI, the mass showed an intermediate signal on T1 and a high signal on T2, suggesting laryngeal malignancy on CT (Fig. 3). Based on the findings of laryngoscopy and cross-sectional images, we planned a suspension laryngoscopic biopsy under general anesthesia to confirm the pathological diagnosis of laryngeal cancer. However, because the patient was at a very high risk for general anes-
thesia owing to multiple comorbidities, laryngoscopic biopsy under general anesthesia was not possible. Hence, we attempted to use laryngeal US and subsequent US-CNB to evaluate her laryngeal mass, because her thyroid cartilage was not ossified. We used an HS70A US device (Samsung Medison, Seoul, Korea) with a high-frequency, linear, 3–12-MHz transducer with a setting of penetration mode. US clearly depicted the mass through the levels of the right supraglottis and glottis; it presented an ill-defined, homogenous, and isoechoic mass with an absence of internal vascularity (Fig. 4A), which was different from the US characteristics of laryngeal malignancy, usually presenting as a heterogeneous hypoechoic mass with increased vascularity. US-CNB was performed immediately via the transcartiilage approach, and the specimen was harvested successfully (Fig. 4B). Pathological examination with hematoxylin-eosin staining revealed deposition of bright pink amorphous material in the extracellular space. Immunohistochemistry showed negative results for cytokeratin and positive results for Congo red staining and lambda light chain, ultimately leading to the diagnosis of amyloidosis. There was no evidence of systemic disease in additional laboratory and imaging studies. Approximately four months after diagnosis, laryngeal microsurgery using a CO2 laser was performed after maintaining multiple comorbidities, as the lesion gradually increased and hoarseness was aggravated accordingly. The lesion was completely removed by excision of the involved false cord and PGS, preserving the true vocal cord. Final pathological diagnosis was consistent with amyloidosis, concur-

Fig. 3. MR image shows right supraglottic mass (asterisks) with intermediate signal on T1 (A) and high signal on T2 (B).

Fig. 4. US depicts ill-defined, homogenous, and isoechoic mass (asterisk) with no internal vascularity at the right glottic level (A). Subsequent core-needle (arrows) biopsy is performed via transcartiilage approach under real-time US monitoring (B). TC, thyroid cartilage; US, ultrasonography.
Sufficient volume and thyroid cartilage. However, the operator should note that there is still a lack of established indications or guidelines of US-CNB for laryngeal mass. In addition, careful consideration should be paid to major bleeding/hematoma at the larynx which can lead to serious medical situations even though it is extremely rare. We always use Doppler US to identify vascular structures along the CNB path prior to the procedure to avoid major bleeding/hematoma and check the patient’s larynx 30 min after the procedure for early detection of any laryngeal swelling.

The primary treatment for LA is surgical removal or debulking, predominantly using microlaryngoscopy techniques. However, given the organ involved it is often not possible to remove all the deposit. Hence, long-term follow-up is essential in all cases and recurrence is very common, usually observed in more than half of patients.

In conclusion, this case suggests a possible role of US in the evaluation of LA by facilitating the differential diagnosis from laryngeal cancer prior to pathological diagnosis. Furthermore, subsequent US-CNB could provide a conclusive pathological diagnosis in patients with a suspicious laryngeal mass mimicking laryngeal cancer, avoiding general anesthesia for laryngoscopic biopsy. However, to demonstrate the usefulness and benefits of US for the evaluation of LA, more studies using US for this disease entity should be performed in the future, and we hope that this case would be the trigger for such exploration.

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