Laryngeal deviation: Condition mimicking submucosal tumor

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A 71-year-old male had visited our hospital complaining of laryngeal discomfort and hoarseness for 3 months. Physical examination revealed marked laryngeal deviation, with the tip of the "Adam's apple" pointed toward the right side (Figure 1). On a fiberscope inspection, protrusion of the left false cord was seen. There was no apparent mucosal change. Mobility of the left vocal cord seemed slightly limited. A CT scan was performed to exclude submucosal tumor, and neither laryngeal mass nor abnormal enhancement was seen. Thyroid cartilage pointed toward the right side, inclining in the same direction (Figure 2). After a 10-month follow-up, fiberscope inspection revealed no significant changes. Based on these findings, protrusion of the false vocal cord was assumed to be caused by laryngeal deviation.

Discussion

Laryngeal deviation, without regard to degree, is a common condition, as it was seen in up to 94% of the patients who were examined by CT scan (computed tomography scan) for various otolaryngologic problems.[1] However, there are only a few reports describing this condition in the English literature of radiology.[1,2]

In most cases, larynges are twisted to the right side, shifted to the left side, and inclined to the right side. If the rotation and inclination of the larynx is as prominent as to cause protrusion of the false vocal cord, it becomes a clinical issue, as in our case. Possible predisposing factors for marked laryngeal deviation include old tuberculosis, cervical spondylosis, and surgery.[1,3] Yet, it is not infrequent that patients have no such underlying factors.

The etiology of the right predominance is unknown. Keenan *et al.* speculated that tethering effect of the aortic arch leads to the right predominance.[3] Shortening of the spine, owing to either advancing age or arthritis, compresses the trachea. Since the aortic arch exists on the left side to the trachea, the first curve tends to be concave to the left side and the second curve to the opposite side (Figure 3). However, an actual mechanism for axial rotation cannot be

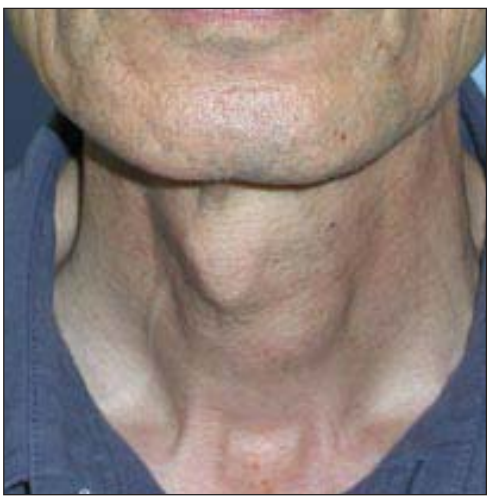

Figure 1: Photograph of the patient. Note twisted thyroid cartilage

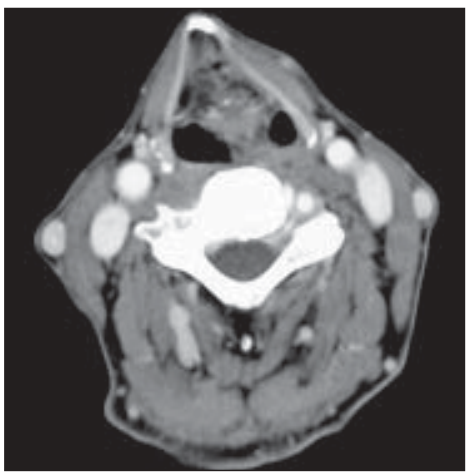

Figure 2: Contrast-enhanced CT of the neck at the level of the false vocal cord. The tip of the thyroid cartilage points toward the right side

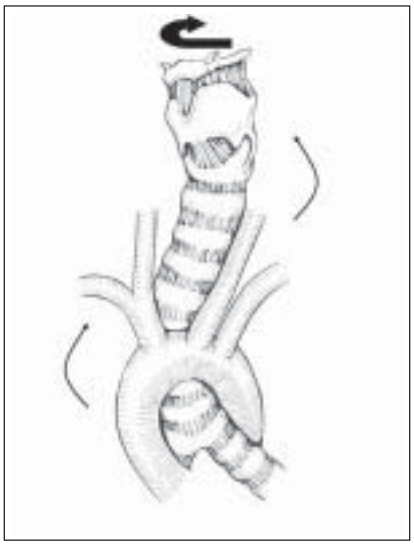

Figure 3: Relationship between the trachea and the larynx

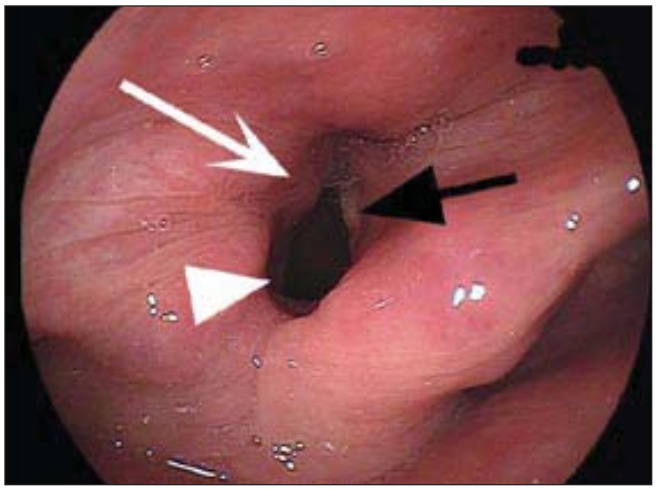

Figure 4: Fiberscopy of the companion case. White arrow: protrusion of the left false vocal cord. Arrowhead: most part of the left true vocal cord is hidden. Black arrow: right true vocal cord. (Courtesy of Dr. Kohzu.)

explained by their hypothesis. The mechanisms underlying right predominance have not been clearly elucidated.

Morinaka *et al.* reported a study of five cases using helical CT.[2] They demonstrated the relationship between right rotation/inclination of the thyroid cartilage and protrusion of the left false vocal cord in three-dimensional images. They argued that protrusion of the left false vocal cord was caused by its upper position. Inclination toward the right side forces the position of the false vocal cord toward the upper and more medial side, resulting in protrusion and hiding of the ipsilateral true vocal cord (Figure 4). Similar geometric changes of the thyroid cartilage and false vocal cord were seen in our case.

Examples of the clinical significance of laryngeal deviation are as follows:

1. Prominent false vocal cord can mimic submucosal tumor.
2. It may make a tracheal intubation difficult.
3. Poor visibility of the ipsilateral vocal cord may lead to underestimatation of the mobility. With regard to the first example, computed tomography is the modality of choice because laryngeal submucosal masses such as laryngocele, squamous cell carcinoma with submucosal extension, paraganglioma, and lymphoma can be readily depicted.[4] The third example is important especially in the staging of laryngeal carcinoma.[5] Underestimating the mobility of vocal cord can cause overstaging of local tumor status, resulting in overtreatment. Hence, it is mandatory to recognize this condition to avoid pitfalls in diagnosis.

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