Nonrecurrent inferior laryngeal nerve in patients with esophageal cancer: report of two cases

Abstract The preservation of the recurrent laryngeal nerve is a fundamental skill in cervical procedure such as thyroid, parathyroid or esophagus surgery. Any damage to this nerve could lead to permanent ipsilateral vocal cord paralysis. Therefore this iatrogenic complication must be absolutely avoided by surgeons. However, surgeons rarely encounter the nonrecurrent inferior laryngeal nerve. The aim of this report is to describe this nerve anomaly and its causes based on our recent experience obtained during two esophageal operations.

Key words Nonrecurrent inferior laryngeal nerve · Aberrant right subclavian artery · Preoperative CT · Esophageal cancer surgery

Introduction Damaging the recurrent laryngeal nerve (RLN) can cause serious complications during esophagus, thyroid, or parathyroid cancer surgery. Hence, the identification and preservation of the RLN are very important [1,2]. However, the absence of RLNs is also occasionally observed during such operations. Most of the time, two or three aberrant nerves that go directly into the larynx from the vagus nerve trunk are noticed. This anomaly could cause iatrogenic complications. Otorhinolaryngologists or upper gastrointestinal (GI) surgeons therefore need to be aware of this anomaly (non-recurrent inferior laryngeal nerve) before surgery [3–5].

A nonrecurrent inferior laryngeal nerve (NRILN) that heads directly into the larynx without going around the right subclavian artery in the thoracic cavity is a significant and rare anatomical variant [6]. This anomaly was first reported by Stedman in 1823 [1–7].

Case 1 A 70-year-old woman first noticed slight dysphasia in November 1998. On preoperative examination, esophagastroduodenoscopy showed a protruding tumor in the middle portion of the esophagus that was proven histopathologically to be a squamous cell carcinoma. A barium meal study also showed an elevated lesion that looked like a predominantly subepithelial type in the middle thoracic esophagus. Furthermore, a notch sign was detected on the posterior wall of the upper thoracic esophagus (Fig. 1). Preoperative diagnosis was as follows: Mt, 1 + IIb, T1b, N0, M0, IM0, stage II (Japanese classification). An esophagectomy and neck lymph node dissection were performed. During trans-thoracic excision of the esophagus, the aberrant artery, which arose from the descending thoracic aorta directly behind the esophagus, was recognized, and this artery went up to the top of the thoracic cavity. In addition, the right subclavian artery was not found in its usual form, and the recurrent nerve was also not identified in its normal position. During cervical lymph node dissection, the right recurrent laryngeal nerve was not recognized in the normal sulcus area. Therefore, the right carotid sheath was opened carefully. When the right vagus nerve trunk was observed, two aberrant nerves that went directly into the larynx were noticed. We learned that these aberrant nerves were non-recurrent inferior laryngeal nerves (NRILN) intraoperatively (Fig. 2). Therefore, these nerves were carefully preserved. After surgery, her vocal cord was checked by a laryngoscope. Nothing abnormal was detected in her vocal function.
ing thoracic aorta was identified as the retroesophageal right subclavian artery (Figs. 3, 4). This case was our first patient with NRILN and a retroesophageal right subclavian artery. We usually evaluate such cases preoperatively with radiologists and endoscopists. However, no one was able to recognize the anomaly in this case.

**Case 2**

A 59-year-old man, whose chief complaints were swallowing pain and epigastric discomfort, was admitted to our hospital in March 2006. On preoperative examination, first, esophagogastroduodenoscopy showed a superficial slightly depressed lesion that was located in the middle portion of the esophagus. This tumor was proven histopathologically to be a poorly differentiated squamous cell carcinoma. Second, CT revealed the presence of an abnormal vascular structure posterior to the esophagus that was called a ret-

---

**Fig. 1.** Findings of a barium meal study (case 1). An esophagogastric barium X-ray showed the elevated lesion corresponding to the endoscopic findings and the compressed sign in the upper thoracic esophagus. This notch was considered to be the *bayonet sign*.

**Fig. 2.** Cervical anatomical findings (case 1). The two *nonrecurrent inferior laryngeal nerves* that went into the larynx were thus confirmed to have formed the vagus nerve.

**Fig. 3.** Computed tomography (CT) findings (case 1). CT examination revealed the presence of an aberrant vascular structure behind the *esophagus* that is called the retroesophageal subclavian artery.

**Fig. 4.** Three-dimensional (3D) CT findings (case 1). The 3D-CT could show the steric images from the common CT findings. In case 1, the retroesophageal right subclavian artery arose directly from the distal portion of the aortic arch, which was separated from the left subclavian artery. Furthermore, the right and left carotid arteries had a common trunk (bicarotid trunk).