New Variation of Right Recurrent Laryngeal Nerve: Cases Report

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Received: 8 January 2014 / Accepted: 27 April 2014 / Published online: 1 June 2014
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Abstract The recognition of variation in recurrent laryngeal nerves is important for both surgeons and the prognosis of patients undergoing surgery of the neck. Here, we reported a new variation of the right recurrent laryngeal nerves in five patients with thyroid surgery. The new variation is characterized by the additional ascending intracranial branches after division of laryngeal branches.

Keywords Recurrent laryngeal nerves · Variation · Ascending intracranial branches

The anatomy of recurrent laryngeal nerves makes surgery of this region potentially dangerous for both surgeons and patients. Therefore, the clarification and recognition of the variation and passage of recurrent laryngeal nerves are very important for preventing postoperative complications. To date, multiple variations of the recurrent laryngeal nerve have been reported [1–5]. Here, we reported a new variation of the right recurrent laryngeal nerve that should be carefully considered during neck surgery.

Case Report

From 2,094 patients undergoing bilateral total or near-total thyroidectomy, central neck lymphadenectomy, or thyroid surgery, we assessed 2,710 recurrent laryngeal nerves and detected three types of variation in 274

patients (Table 1). The first type was the division of the laryngeal nerve into an extralaryngeal branch before entering the larynx. The second type was a right non-recurrent laryngeal nerve. The third type was detected in right recurrent laryngeal nerves of five females and has not been previously reported (Fig. 1). The new variation consisted of an ascending intracranial branch, except for the tracheal, esophageal, and laryngeal branches. These five patients included four patients undergoing a total thyroidectomy plus central lymph node dissection for papillary thyroid cancer and one patient undergoing bilateral total thyroidectomy for bilateral nodular goiter.

Postoperative hypocalcemia occurred in 77 patients, including eight patients with permanent hypocalcemia. The percentage of patients experiencing paralysis of the recurrent laryngeal nerve is listed in Table 1.

Discussion

With continuous improvements in surgical techniques and anatomic knowledge, intraoperative damage of the recurrent laryngeal nerves is increasingly rare. However, recurrent laryngeal nerves with abnormal anatomy are still susceptible to injury. Based on the literature, several variations of recurrent laryngeal nerves have been

Table 1 Postoperative paralysis of recurrent laryngeal nerves in patients with variation

Variations	Extralaryngeal branch	Nonrecurrent laryngeal nerve	Intracranial branch (new variation)
Patients (n)	255	14	5
Nerve paralysis	5 (1.96 %)	1 (7.14 %)	0

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Fig. 1 Images of the new variation of recurrent laryngeal nerve identified in five patients

Abbreviation: CCA, common carotid artery; RLN, recurrent laryngeal nerve;

reported [1–5]. Similar to the non-recurrent laryngeal nerve, the variants identified in this study were all located on the right side, but not directly divided from the vagus, and divided into intracranial branches except for the tracheal, esophageal, and laryngeal branches. Therefore, they should not be considered as a variation of non-recurrent laryngeal nerves.

The major functions of recurrent laryngeal nerves are to innervate the larynx through laryngeal branches. The distinction of the new variation described in this study is the ascending intracranial branches, except for other branches from laryngeal nerves. Due to the exposure restriction of the incision and the concern of damage to the variants, no further tracking of the final innervations of these variants was made. However, we hypothesize that the intracranial branches may have some unknown functions, which challenge the current concept of complete nerve exposure during thyroid surgery in order to avoid accidental injury to the recurrent laryngeal nerve [6]. Our experience is that intraoperative exposure of the recurrent laryngeal nerve has no effect on postoperative phonation if complete isolation of the recurrent laryngeal nerve or excessive dissection of the laryngeal entry of the recurrent larynx nerve does not occur [7].

In summary and to the best of our knowledge, we have described a novel variation of the recurrent laryngeal nerve that should be given close attention during surgery.

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