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Postoperative laryngeal granuloma in mediastinal goitre with gastro-oesophageal reflux disease

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SUMMARY

Reported postoperative complications of mediastinal goitre include recurrent laryngeal nerve palsy, hypoparathyroidism and tracheomalacia. Voice and swallowing symptoms after thyroid surgery have been associated with laryngopharyngeal reflux, but it is unclear whether the retrograde flow of gastric contents into the oesophagus, larynx and pharynx worsens after thyroid surgery. We present the case of a man in his 40s with gastro-oesophageal reflux disease (GERD) who developed heartburn and laryngeal granuloma after total thyroidectomy for mediastinal goitre. Vonoprazan therapy effectively controlled these symptoms. Although the exact cause remains unclear, we suggest that changes in pressure dynamics after thyroidectomy may worsen the retrograde flow of gastric contents into the oesophagus, larynx and pharynx, contributing to GERD symptoms and laryngeal granuloma. This case highlights the need to consider the management of retrograde flow of gastric contents into the oesophagus, larynx and pharynx in the postoperative care of mediastinal goitre resections.

BACKGROUND

Reported postoperative complications of mediastinal goitre include recurrent laryngeal nerve palsy, hypoparathyroidism and tracheomalacia.[1 2] Patients often report voice and swallowing symptoms after thyroid surgery, and laryngopharyngeal reflux (LPR) has been implicated. However, it is unclear whether the retrograde flow of gastric contents into the oesophagus, larynx and pharynx worsens after thyroid surgery.[3 4] In this case report, we present a patient with gastro-oesophageal reflux disease (GERD) who underwent total thyroidectomy for mediastinal goitre, resulting in the development of GERD symptoms (heartburn) and laryngeal granuloma.

CASE PRESENTATION

A man in his 40s with no medical history was found to have an incidental mediastinal goitre during a physical examination 9 years ago and was followed up as asymptomatic. A subsequent physical examination revealed an enlarged goitre and tracheal stenosis. The patient was asymptomatic. This included gastrointestinal, voice and swallowing symptoms such as heartburn, hoarseness and dysphagia, but he was referred to our department for tracheal stenosis.

INVESTIGATIONS

The patient was 171 cm tall and weighed 85 kg (body mass index 29.0 kg/m^2). CT showed an enlarged mediastinal goitre causing tracheal stenosis and oesophageal compression (figure 1). Laryngoscopy revealed no mass lesions in the vocal cords and normal vocal cord mobility. The reflex findings score (RFS) was 11, suggesting coexisting LPR (figure 2A).[5]

TREATMENT

Due to the expected progression of tracheal stenosis caused by the mediastinal goitre, total thyroidectomy was performed under general anaesthesia. Total operative time was 251 min and blood loss was 50 mL. The patient demonstrated good bilateral vocal cord mobility without hoarseness or laryngeal oedema after surgery and was discharged on postoperative day 6. Pathological examination of the excised thyroid gland revealed multinodular thyroid hyperplasia with mild follicular epithelial atypia, consistent with nodular goitre.

OUTCOME AND FOLLOW-UP

Three months after surgery, the patient had hoarseness and heartburn. Laryngoscopy revealed bilateral masses beyond the vocal process (figure 2B). Oesophagogastroduodenoscopy revealed GERD (Los Angeles classification grade B). We diagnosed laryngeal granuloma based on laryngoscopy findings and started therapy with 20 mg of vonoprazan (VPZ). Hoarseness and heartburn improved after 1 month. Hence, we switched to 10 mg VPZ as maintenance therapy. The size of the laryngeal granuloma decreased after 3 months of VPZ therapy. After 6 months of VPZ therapy, the laryngeal granuloma disappeared and RFS was 10 (figure 2C). After 15 months of VPZ therapy, RFS remained at 10.

DISCUSSION

The primary findings were as follows: GERD symptoms and laryngeal granuloma developed after total thyroidectomy for mediastinal goitre with GERD. VPZ therapy was effective. Aggravation of retrograde flow of gastric contents into the oesophagus, larynx and pharynx was thought to be the primary cause of GERD symptoms and laryngeal granuloma.

Rodrigues *et al* reported that mediastinal goitre is more likely to be associated with LPR than cervical goitre.[6] Antireflux defence mechanism and swallowing symptoms may also be worsened after thyroid surgery, including that for mediastinal goitre, although the cause and pathogenesis of this phenomenon remain unclear.[3 4] Regarding the effect on the oesophagus after thyroid surgery, Sorensen *et al* reported that in patients with benign nodular

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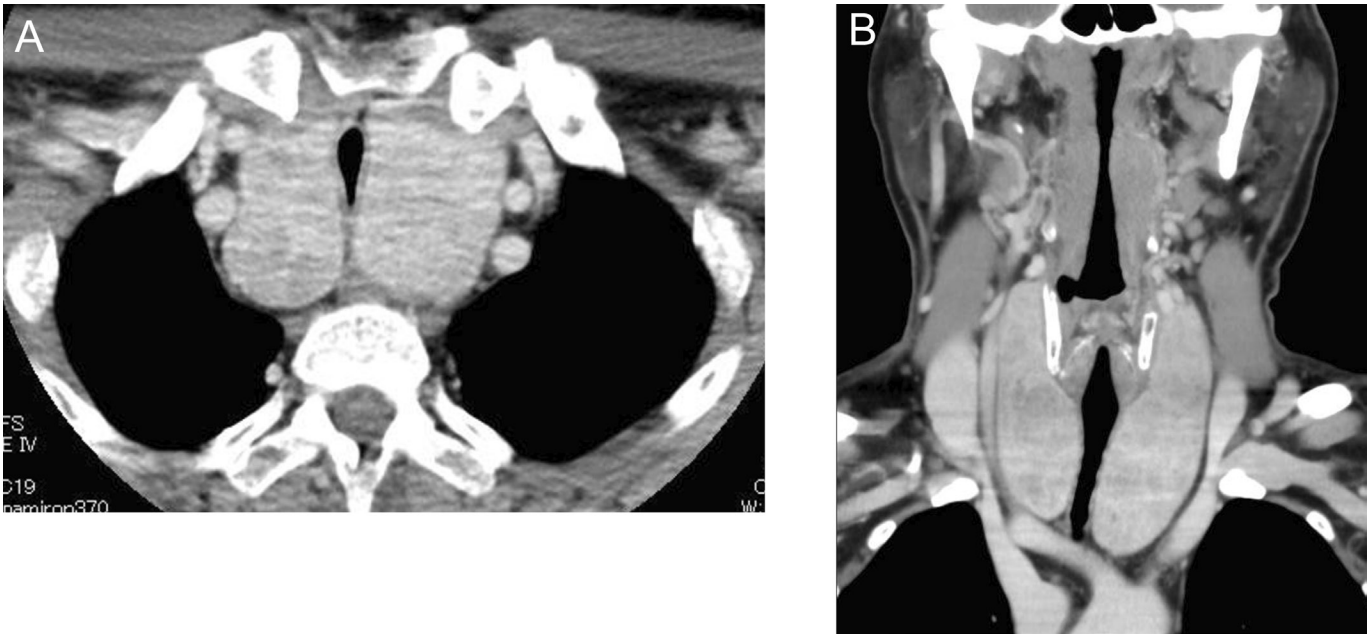

Figure 1 CT findings. (A) Axial view. (B) Coronal view.

goitre who underwent thyroidectomy, the motility parameters were within the limits of normal swallowing physiology, both before and 6 months after surgery.[7] The patients who underwent total thyroidectomy experienced a greater reduction in pressure in the area of the upper oesophageal sphincter and the former thyroid gland after surgery in comparison with patients who underwent less extensive surgery. Brinch *et al* reported that in patients with goitre who underwent thyroidectomy, the smallest cross-sectional area of the oesophagus and median oesophagus width increased, and median oesophageal deviation decreased on MRI at 6 months after surgery.[8] From these reports, we can assume that in the presence of gastro-oesophageal reflux, retrograde flow of gastric contents into the oesophagus, larynx and pharynx is likely to worsen due to the release of physical pressure after thyroidectomy for mediastinal goitre. However, there are no reports of objective measurement of retrograde flow of gastric contents into the oesophagus and pharynx using hypopharyngeal-oesophageal multichannel intraluminal impedance-pH monitoring (HEMII-pH) both before and after surgery, and it is unclear whether retrograde flow of gastric contents into the oesophagus, larynx and pharynx worsens in actuality after thyroidectomy for mediastinal goitre. In this case, although HEMII-pH was not performed before and after surgery, we can diagnose that the retrograde flow of gastric contents into the oesophagus, larynx and pharynx worsened after surgery because the patient had GERD, GERD symptoms and postsurgical laryngeal granuloma development, and VPZ therapy was successful.

In this case, the aggravation of the retrograde flow of gastric contents into the oesophagus, larynx and pharynx was thought to be the primary cause of laryngeal granuloma formation, but the effect of tracheal intubation should also be considered. In an animal study using GERD model rats, Shimazu *et al* reported that laryngeal granuloma formation did not occur even after 20 weeks, but mechanical stimulation of the vocal cords led to laryngeal granuloma formation 2 weeks later in a GERD model rat.[9 10] Although humans and rats are different, laryngeal granuloma formation, in this case, may be related to tracheal intubation in addition to the worsening retrograde flow of gastric contents into the oesophagus, larynx and pharynx.

The laryngeal mucosa is more sensitive than the oesophageal mucosa and a small amount of retrograde flow of gastric contents can cause LPR disease (LPRD) but not enough to cause

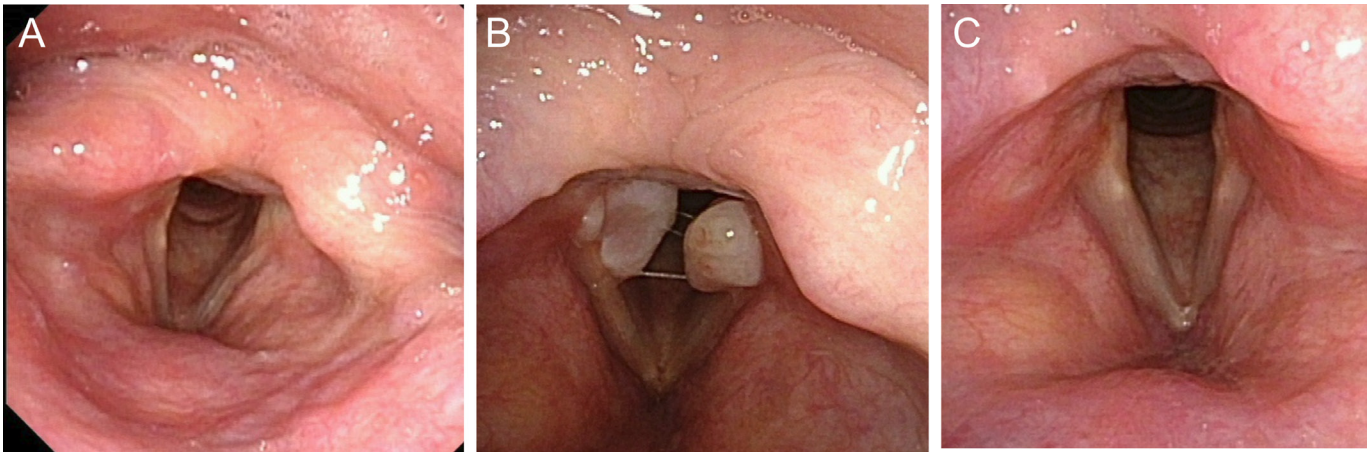

Figure 2 Laryngeal findings. (A) Before surgery. (B) Three months after surgery. (C) Six months after VPZ therapy. VPZ, vonoprazan.

GERD symptoms.[11] Yoon *et al* reported that while RFS of LPRD increased significantly after thyroidectomy, it returned to preoperative levels at 12 months after thyroidectomy, and the RFS improved with additional proton pump inhibitor (PPI) therapy at 12 months.[3] In this case with GERD, RFS remained with no significant change compared with the preoperative scores 15 months after VPZ therapy. We believe that VPZ therapy suppressed retrograde flow of gastric contents into the oesophagus, larynx and pharynx, leading to improvement of subjective symptoms and laryngeal granuloma but did not suppress retrograde flow of gastric contents into the larynx and pharynx causing laryngitis of LPR.

The Japanese GERD guidelines 2021 suggest VPZ or PPI therapy depending on the severity of endoscopic oesophageal mucosal damage and the use of alginate and antacids as adjunctive treatment.[12] The guidelines recommend 20 mg of VPZ therapy for 4 weeks or a standard dose of PPI for 8 weeks as initial treatment for mild reflux oesophagitis (Los Angeles classification grade A or B). We chose VPZ therapy and did not add alginate or antacid because VPZ therapy improved both GERD symptoms and laryngeal granuloma. If no improvement is seen with medical therapy, evaluation of the condition with oesophageal impedance-pH monitoring and oesophageal manometry is recommended.

The Japanese GERD guidelines 2021 recommend maintenance therapy with a minimum dose of VPZ or PPI when symptoms improve, but there is no clear limit to the duration of long-term maintenance therapy with VPZ or PPI.[12] We switched to maintenance therapy with VPZ based on the Japanese guidelines and continued VPZ therapy for 15 months because there was no change in RFS score.

The prevalence of GERD in the Japanese population has been reported to be approximately 10%, and it is not uncommon for GERD to be found in association with mediastinal goitre.[13] Although mediastinal goitre resection is associated with various complications, including recurrent laryngeal nerve palsy, hypoparathyroidism and tracheomalacia, it is important to consider the potential worsening of GERD symptoms and development of laryngeal granuloma in postoperative management. Further research is needed to investigate the mechanisms underlying these complications.

Learning points

- Mediastinal goitre probably inhibits the retrograde flow of gastric contents into the oesophagus, larynx and pharynx.
- Gastro-oesophageal reflux disease symptoms and laryngeal granuloma may develop after thyroidectomy for mediastinal goitre because the retrograde flow of gastric contents into the oesophagus, larynx and pharynx is worsened.
- Vonoprazan therapy is effective.

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Case reports provide a valuable learning resource for the scientific community and can indicate areas of interest for future research. They should not be used in isolation to guide treatment choices or public health policy.

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