

Delayed tracheal perforation after thyroid surgery in patient with neck radiotherapy

Perforación traqueal diferida tras cirugía tiroidea en un paciente con radioterapia cervical

Pedro López-Morales*, M. Fe Candel-Arenas, Nuria Martínez-Sanz, Esther Medina-Manuel, Clara Giménez-Francés, and Antonio Albarracín-Marín-Blázquez

Servicio de Cirugía General y Aparato Digestivo, Hospital General Universitario Reina Sofía, Murcia, España

Abstract

Tracheal perforation is a rare complication of thyroid surgery. A 36-year-old man with previous neck radiotherapy due to a nasopharyngeal cancer. After right hemithyroidectomy and isthmusectomy, the patient presented a tracheal perforation. The diagnosis was confirmed with computed tomography and bronchoscopy. A conservative management was performed with drainage and antibiotic therapy, and the evolution was satisfactory. If recognized at the time of the surgery, perforations should be closed primarily. Delayed perforations will be treated with an emergency surgery or conservatively depending on the clinical situation of the patient.

Keywords: Tracheal perforation. Radiotherapy. Hemithyroidectomy.

Resumen

La perforación traqueal es una rara complicación de la cirugía tiroidea. Varón de 36 años con antecedente de radioterapia cervical por una neoplasia de cavum sometido a hemitiroidectomía derecha e istmectomía que durante el posoperatorio presentó una perforación traqueal confirmada por tomografía computarizada y broncoscopia. Se realizó manejo conservador con drenaje y antibioticoterapia, evolucionando de forma favorable. Las perforaciones identificadas durante la cirugía deben ser reparadas intraoperatoriamente, mientras que las diferidas se tratarán de forma quirúrgica urgente o de manera conservadora en función de la situación clínica del paciente.

Palabras clave: Perforación traqueal. Radioterapia. Hemitiroidectomía.

*Correspondence:

Pedro López-Morales

E-mail: pedro.lopez6@hotmail.com

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Introduction

Thyroid surgery is a safe procedure with a low rate of complications, including paralysis of the vocal cords due to injury to the recurrent laryngeal nerve, hypoparathyroidism, hypocalcemia, asphyctic hematoma, and surgical wound infection¹. However, tracheal injury of intraoperative or delayed perforation origin due to necrosis is extremely rare².

Case report

This is the case of a 36-year-old man with a past medical history of stage III undifferentiated nasopharyngeal carcinoma (T1 N2 M0) 2 years ago, treated with chemotherapy (bleomycin, epirubicin, and cisplatin) and radiation therapy on the nasopharynx and cervical area, resulting in a complete response. At follow-up, a computed tomography (CT) scan revealed a 12 mm nodule in the thyroid isthmus that had increased its size compared to a previous study (7 mm). The fine-needle aspiration biopsy of the lesion turned out suspicious for follicular neoplasm (Bethesda IV).

The patient underwent uneventful surgery (right hemithyroidectomy and isthmectomy) with intermittent neuromonitoring of the right recurrent laryngeal nerve. The patient's recovery was favorable, and he was discharged from the hospital 24 hours after surgery. The definitive histological study of the specimen revealed the presence of thyroid multinodular hyperplasia, with the largest 10 mm nodule exhibiting solid, pseudoencapsulated characteristics, and no malignancy criteria being located in the isthmus.

Seven days after surgery, the patient presented to the ER following a 3-day history of odynophagia (painful swallowing) associated with fever. He remained hemodynamically stable, with a low-grade fever (37.7 °C). The examination revealed an increased cervical perimeter with crepitus at surgical wound site level, without flogotic signs. Lab test results showed elevated C-reactive protein levels (6.54 mg/dL) and a white blood cell count of 14,500/mm³ with neutrophilia (85%).

The CT revealed the presence of an air collection at the site of the hemithyroidectomy and 3 focal defects in the trachea, on its right lateral side and right paramedial region of 3 mm, 4 mm, and 7 mm, respectively (Fig. 1). No findings were made of pneumomediastinum or pneumothorax. A bronchoscopy confirmed the presence of these openings at

anterolateral right side level of the upper trachea, 2 cm above the vocal cords and 11 cm away from the main carina.

The surgical wound was reopened, and air was released that resulted in a reduced cervical perimeter. Two Penrose drains were placed inside the collection. The patient received conservative treatment with antibiotic therapy (piperacillin-tazobactam, 4/0.5 g every 8 hours), methylprednisolone (40 mg every 24 hours), and daily wound dressings. To avoid any episodes of bronchial aspiration with coughing, a nasogastric tube was inserted, through which enteral nutrition was administered.

The patient's recovery was favorable, and he was discharged from the hospital with the fistula closed 2 weeks after admission. The follow-up bronchoscopy performed 2 months after surgery confirmed the complete closure of the tracheal wall fistula, without any residual stenosis.

Discussion

Latrogenic tracheal rupture has been described as a complication of external radiation therapy, airway manipulation, or cervical and mediastinal surgery.³ However, tracheal perforation after thyroid surgery is a rare complication, especially in cases of hemithyroidectomy. As a matter of fact only the case of a patient treated with right hemithyroidectomy and isthmectomy due to a right thyroid nodule that presented with tracheal perforation 4 weeks after surgery has been reported⁴.

Gosnell et al.⁵ conducted a retrospective analysis of the incidence rate of tracheal perforation over 45 years in 2 Australian hospitals. A total of 7 perforations were described among the 11,917 thyroidectomies performed, all of which were identified and repaired intraoperatively, resulting in an incidence rate of 0.06%.

Risk factors for tracheal perforation include female sex, toxic goiter, prolonged intubation with high-pressure endotracheal balloon cuff, use of diathermy (in cases of bleeding), and persistent postoperative cough.²

Tracheal injuries during thyroid surgery can be identified intraoperatively. In such cases, primary closure of the defect is advised. Perforations that go unnoticed or develop postoperatively due to tracheal perforation may show as a surgical wound infection, subcutaneous emphysema, and dyspnea with respiratory involvement. The patient's medical history may reveal a significant coughing episode before symptom onset.

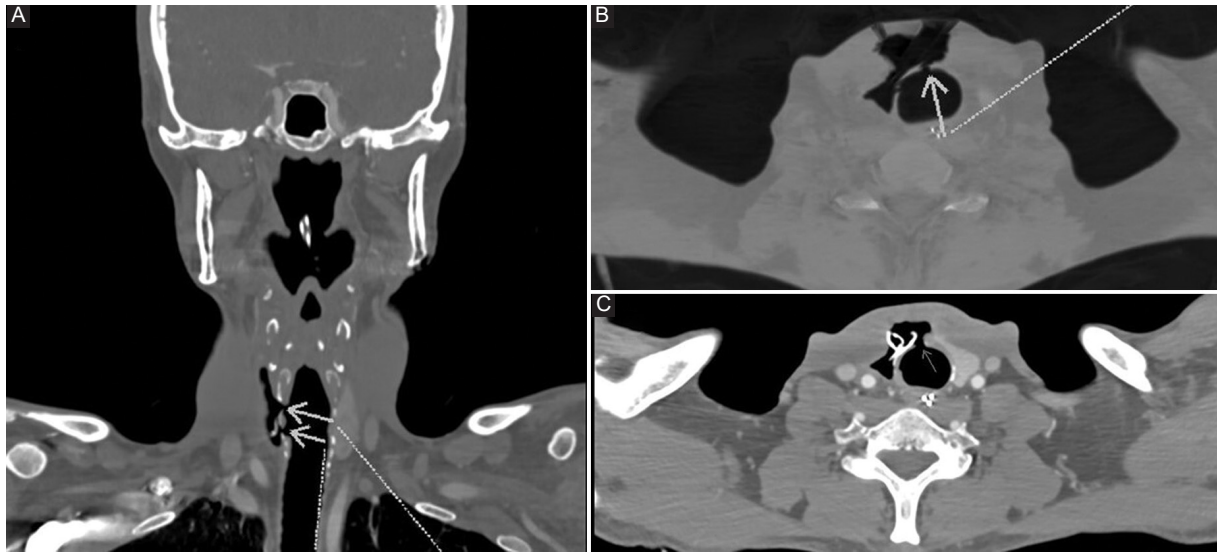


Figure 1. A: coronal section of computed tomography (CT) scan showing 2 defects in the tracheal wall communicating with an air collection. B: axial section of CT scan also showing 2 defects in the tracheal wall. C: axial section of CT scan showing a defect in the tracheal wall communicating with a collection after placing a Penrose drain inside.

Retrosternal pain suggests pneumomediastinum or pneumothorax. In some cases, hemoptysis, cervical or facial edema, and stridor may also be observed².

Delayed perforation is often due to tracheal wall necrosis following the use of diathermy to achieve hemostasis during surgery capable of damaging adjacent structures through lateral heat dispersion⁶. In this patient, we believe that the lesion occurred due to the combined effect of diathermy usage and the impact of radiation therapy on the tracheal wall.

The most common location for tracheal perforation is the posterolateral region of the trachea, in the Berry ligament area. However, perforations at anterior and lateral levels have also been reported as it was our case².

The diagnosis is clinical and based on the presence of cervical crepitus upon palpation due to subcutaneous emphysema. Bronchoscopy can identify the perforation in most cases, although its normal appearance does not rule out the diagnosis.³ The thoracic x-ray can assess the presence of pneumothorax or pneumomediastinum, and the CT can be useful to identify both the location and size of the perforation⁶, as in our case where 3 defects were seen in the right anterolateral area.

The management will depend on when the lesion is identified and the patient's condition. As mentioned before, perforations identified intraoperatively should be closed primarily with resorbable sutures².

Patients with delayed presentation due to tracheal necrosis following thermal injury without respiratory distress or signs of infection, can be treated conservatively with antibiotic therapy and wound care³, as was done in this case that met both requirements. Other patients need urgent procedures, prioritizing airway control. Emergency tracheostomy material should be available if necessary. However, a rapid sequence of anesthetic induction along with orotracheal intubation and placement of a pneumo-tamponade balloon distal to the lesion is often enough to achieve good airway control. Positive pressure in the airway should be avoided because it can worsen subcutaneous emphysema and cause respiratory distress, pneumothorax, and pneumomediastinum².

The procedure will involve closing the defect with resorbable sutures on viable tissue, with or without the use of a muscle flap. The use of a collagen adhesive matrix coated with human fibrinogen and thrombin has also been described⁷.

In conclusion, delayed tracheal perforation after hemithyroidectomy is an exceptionally rare complication often due to thermal injury. The treatment will vary depending on the patient's clinical status, with conservative management being possible in cases without respiratory distress or signs of infection.

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Conflicts of interest

None reported.

Ethical disclosures

Protection of human subjects and animals in research. The authors declare that no experiments were performed on humans or animals for this study.

Patients' data protection. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

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