

Bronchoscopic resection of an Endobronchial Carcinoid Tumor during Early IVF Twin Pregnancy: A Case Report

Suha Kaaki

King Saud University

Rasheed Alhabib

rasheed.a.alhabib@gmail.com

King Saud University

Faisal Albishri

King Saud University

Sultan Alanazi

King Saud University

Mohamed Delvi

King Saud University

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Abstract

Background

Bronchopulmonary carcinoid tumors are rare neuroendocrine neoplasms that can present with hemoptysis and airway obstruction. They are extremely rare in pregnancy and present major diagnostic and management difficulties due to concerns about maternal and fetal safety.

Case Presentation

A 33-year-old pregnant woman with a dichorionic-diamniotic twin pregnancy following in vitro fertilization presented at 13 weeks of gestation with a 4-year history of intermittent hemoptysis.

Conclusion

A multidisciplinary approach is essential in the management of pulmonary carcinoid tumors during pregnancy. Bronchoscopic intervention can be performed safely in selected cases and may avoid the need for extensive surgery in early pregnancy.

Background

Hemoptysis is a symptom characterized by coughing up blood that originates from the tracheo-bronchial tree (1). Typically, etiologies for contributing to hemoptysis encompass bronchiectasis, pulmonary tuberculosis, lung tumors, and a variety of fungal infections affecting the respiratory tract (2). While it's rare in the obstetric population, bronchial carcinoids manifest with hemoptysis. These neuroendocrine tumors account for a minor percentage of lung neoplasms and are characterized by a slow clinical course. Mostly remain clinically silent until they become locally advanced or metastatic, substantially complicating both prompt diagnosis and clinical management (3,4). Bronchial carcinoids are characterized by their high vascularity, appearing as reddish endobronchial masses that bleed easily on contact (5). Detecting these lesions requires high clinical suspicion and advanced imaging, which must be carefully balanced against maternal and fetal risks. Because these tumors are exceptionally rare in pregnancy, early detection is crucial to mitigate the severe therapeutic challenges and increased healthcare costs associated with late-stage disease (6).

Case presentation

A 33-year-old pregnant woman (gravida 2 para 1) at 13 weeks of gestation with a dichorionic–diamniotic twin pregnancy conceived via in vitro fertilization (IVF), presented with a four-year history of mild intermittent hemoptysis with small amounts of frank blood that did not exceed half a cup. Every episode lasted 1–2 days and recurred every 2–3 months, resolving on its own. The patient also reported a

continual sensation of fullness in the central chest and pharynx. Her past surgical history included frozen embryo transfer, gastroscopy, low-segment cesarean section, uterine myomectomy, egg retrieval, she had no significant family history and was a nonsmoker. The current pregnancy had been uncomplicated. Clinical examination revealed equal symmetrical air entry with vesicular breath sounds, and vital signs were stable (temperature 36.9°C, pulse rate 99 bpm, blood pressure 124/79 mmHg, mean arterial pressure 94 mmHg). **Computed tomography (CT)** of the chest, performed in April 2025, about five months prior to the current pregnancy, showed a homogeneous soft-tissue mass within the right main bronchus extending into the bronchus intermedius, findings highly suggestive of an endobronchial carcinoid tumor. An indeterminate 3-mm right lower-lobe pulmonary nodule, bronchoscopy was planned with caution, given the potential risk of procedure-related bleeding and sedation in early pregnancy.

(Fig. 1)

(Fig. 1)

Preoperative assessment was performed, and all vital signs were documented. The plan was general anesthesia with a modified rapid sequential endotracheal intubation, with 1–2 mics /kg Fentanyl, 2 mgs/ kg of Propofol, and 1.2 mgs/ kg of Rocuronium. Endotracheal intubation was achieved with an 8mm Oral Endotracheal tube (cuffed), allowing for the largest size of flexible bronchoscope available. Neuromuscular blockade was subsequently reversed with sugammadex (2 mg/kg). Intraoperative fetal monitoring was conducted using ultrasound in the operating room. **Flexible bronchoscopy** was performed under general anesthesia for 120 minutes with the patient in the supine position.

Bronchoscopic examination revealed a smooth-surfaced, oval endobronchial mass located in the right main bronchus near the junction of the right upper lobe bronchus and bronchus intermedius. The lesion was snared and removed in two pieces using the endobronchial basket, followed by cold saline lavage with evacuation of blood clots. A systematic re-inspection of both the right and left bronchial trees demonstrated no synchronous masses or residual tissue and no active bleeding. Bronchoscopy was undertaken to obtain a definitive diagnosis and therapeutic resection after CT identified an endobronchial lesion. Since the carcinoid was a suspected highly vascular tumor and the patient was pregnant, careful airway management under general anesthesia was performed. However, definitive oncologic resection was postponed until after delivery due to fetal risks in the early stages of pregnancy, especially since the pregnancy was the result of IVF following multiple failed conception attempts.

(Fig. 2)

Postoperatively, the patient was transferred to the post-anesthesia care unit (PACU) with no adverse events throughout the procedure. The patient was discharged to the floor after she was fully awake and with normal vital signs comparable to the preoperative period. Fetal heart activity for both fetuses was assessed before and after anesthesia by an obstetrician.

(Fig. 3)

Pathological Findings: The final diagnosis histopathologically was atypical pulmonary carcinoid tumor. Two well-circumscribed, tan-beige, soft tissue fragments measuring $2.0 \times 1.5 \times 1.0$ cm and $1.5 \times 1.5 \times 1.0$ cm were revealed during gross examination of the endobronchial mass. Under a microscope, a well-organized neuroendocrine neoplasm consisting of tumor cell sheets and lobulated nests separated by thin fibrous septa, with a prominent vascular network was seen. Neither infiltrative growth nor necrosis was found (Fig. 4). Immunohistochemical studies show that the tumor cells are positive for TTF-1, synaptophysin, and chromogranin, supporting neuroendocrine differentiation. The Ki-67 proliferation index is low. (Fig. 5).

(Fig. 4)

(Fig. 5)

Discussion

The diagnosis of bronchopulmonary carcinoids is often delayed because common symptoms are frequently dismissed as normal pregnancy physiology. Therefore, diagnostic interventions such as imaging and biopsy must be carefully balanced to address clinical needs while minimizing exposure to ionizing radiation and procedural risks (7).

Surgery remains a cornerstone of treatment for pulmonary carcinoid tumors confined to the lung or associated with regional spread (8). The options include lung-preserving surgical procedures such as lobectomy, segmentectomy, sleeve resection, and wedge resection. It also involves extensive interventions like pneumonectomy. The choice of a surgical approach depends on factors related to the tumour characteristics (9,10). Endobronchial therapy with laser ablation, cryotherapy, or electrocautery has been reported as an acceptable alternative to surgical treatment for selected patients with bronchial carcinoid tumors (11). A retrospective cohort study was conducted to assess predictors of successful endobronchial treatment found that purely intraluminal disease and a small tumor diameter on CT scan (< 20 mm) were independent predictors of successful EBT, while patient characteristics, bronchoscopic findings, and histopathological grade were not significant predictors. No tumors measuring ≥ 20 mm were successfully treated with EBT (12). On the other hand, a systematic review was done to evaluate both surgical and endobronchial treatment. Stated that, in selected patients, EBT provides survival, recurrence, and complication rates comparable to surgical resection. Suitable candidates for EBT include those with central airway involvement, intraluminal localization, absence of metastasis, and small tumor diameter on CT. Another important characteristic is histopathology, as atypical carcinoids are more commonly associated with large diameter, peripheral location, and high incidence of lymph node involvement compared to typical carcinoids. These factors should be considered when selecting the appropriate treatment strategy. Even when curative treatment can't be achieved, EBT can alleviate bronchial obstruction of the involved bronchus and reduce the extent of the subsequent surgical resection (13).

Several studies have connected general anesthesia during the first trimester to a 3.68-fold increased prevalence of microcephaly and other CNS issues in newborns, such as hydrocephalus, non-neural tube, and neural tube (spina bifida, anencephalus, and encephalocele) anomalies (14). However, some researchers connected it to congenital heart defects (15).

A warning that repeated or lengthy use (> 3 hours) of general anesthetic and sedation drugs during surgeries or procedures in children younger than 3 years or in pregnant women during their third trimester may affect the development of children's brains. The drugs involved belong to two main categories of anesthetics: N-methyl D-aspartate (NMDA) antagonists and gamma-aminobutyric acid (GABA) receptor agonists (16).

In the present case, due to surgical limitations related to pregnancy, endobronchial therapy (surgical resection) was initially performed as a bridging procedure before planned oncologic sleeve lobectomy resection after delivery.

In **conclusion**, the management of a pregnancy complicated by a pulmonary carcinoid tumor requires a carefully balanced, multidisciplinary approach to protect both maternal and fetal health. When diagnosed during the early stages of a highly precious pregnancy, such as an IVF twin gestation, minimizing major surgical trauma and prolonged general anesthesia exposure is critical to mitigate the risks of fetal loss or potential anomalies. The patient was successfully managed via flexible bronchoscopic snare resection, which served as an effective minimally invasive bridging therapy to achieve rapid airway clearance and complete symptom control. With a tailored anesthetic protocol and continuous intraoperative fetal ultrasound monitoring, the procedure was completed without adverse events, ensuring fetal well-being and allowing definitive lung-sparing sleeve resection to be safely deferred until the postpartum period.

Abbreviations

IVF

In Vitro Fertilization

CT

Computed Tomography

PACU

Post-Anesthesia Care Unit

TTF-1

Thyroid Transcription Factor-1

Ki-67

Marker of Proliferation Ki-67

EBT

Endobronchial Treatment

NMDA

N-methyl-D-aspartate
GABA
Gamma-Aminobutyric Acid.

Declarations

Ethics approval and consent to participate

institutional ethics approval was obtained from the Institutional Review Board of [King Saud University], approval number [R26-IRB-562].

Competing Interests

The authors declare that they have no competing interests.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Availability of data and materials

The datasets used and/or analyzed during the current case report are available from the corresponding author on reasonable request. The information in the data might compromise the patient's privacy, so it is not publicly accessible.

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Authors' contributions

S.K., M.D. and R.A. conceived and designed the case report. R.A. and F.A. collected the clinical data. M.D. provided anesthesia-related data and expertise. R.A. and F.A. drafted the manuscript. S.K. , F.A. , S.A. , and M.D. critically revised the manuscript for important intellectual content. All authors read and approved the final manuscript.

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Figures

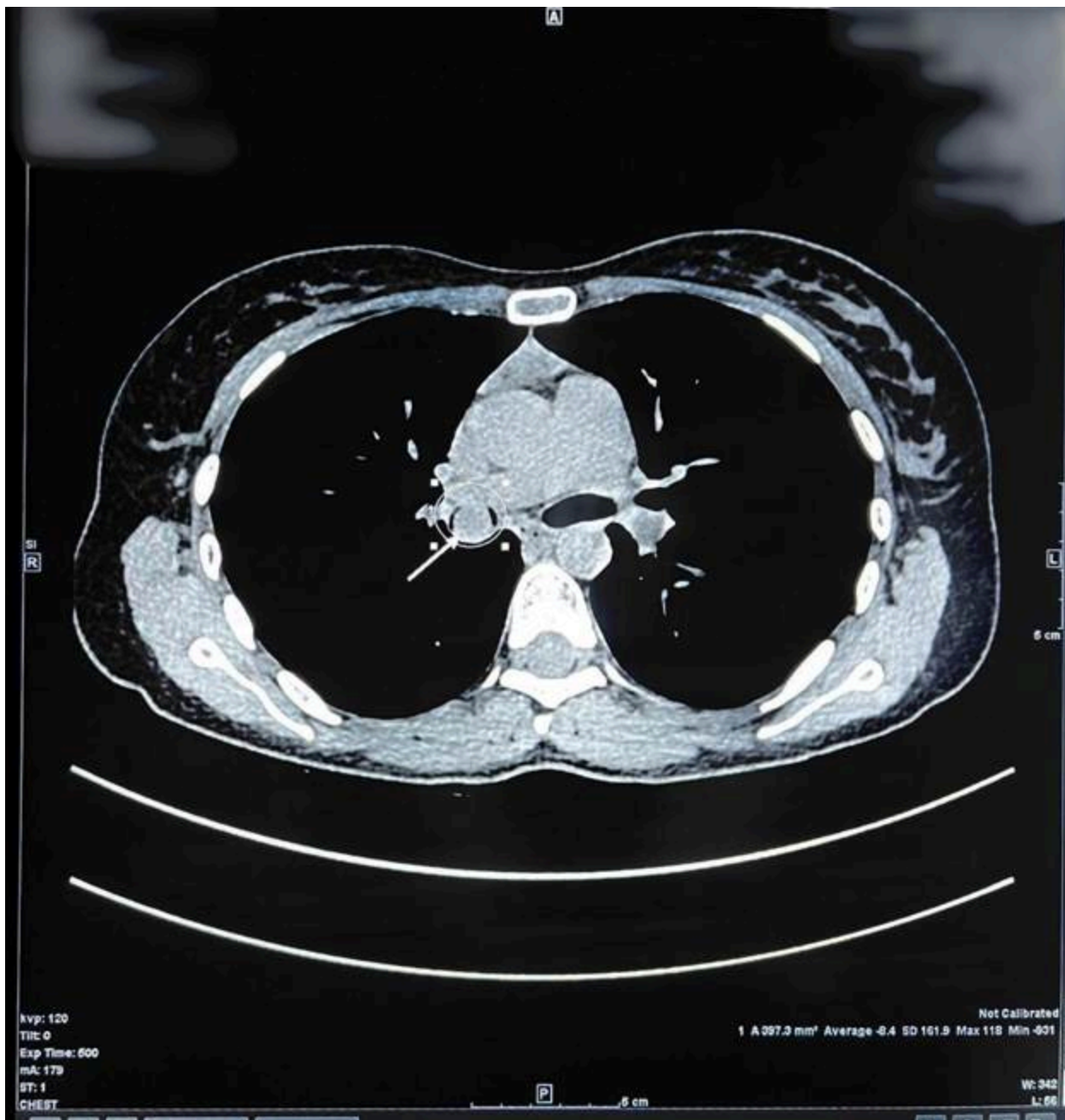


Figure 1

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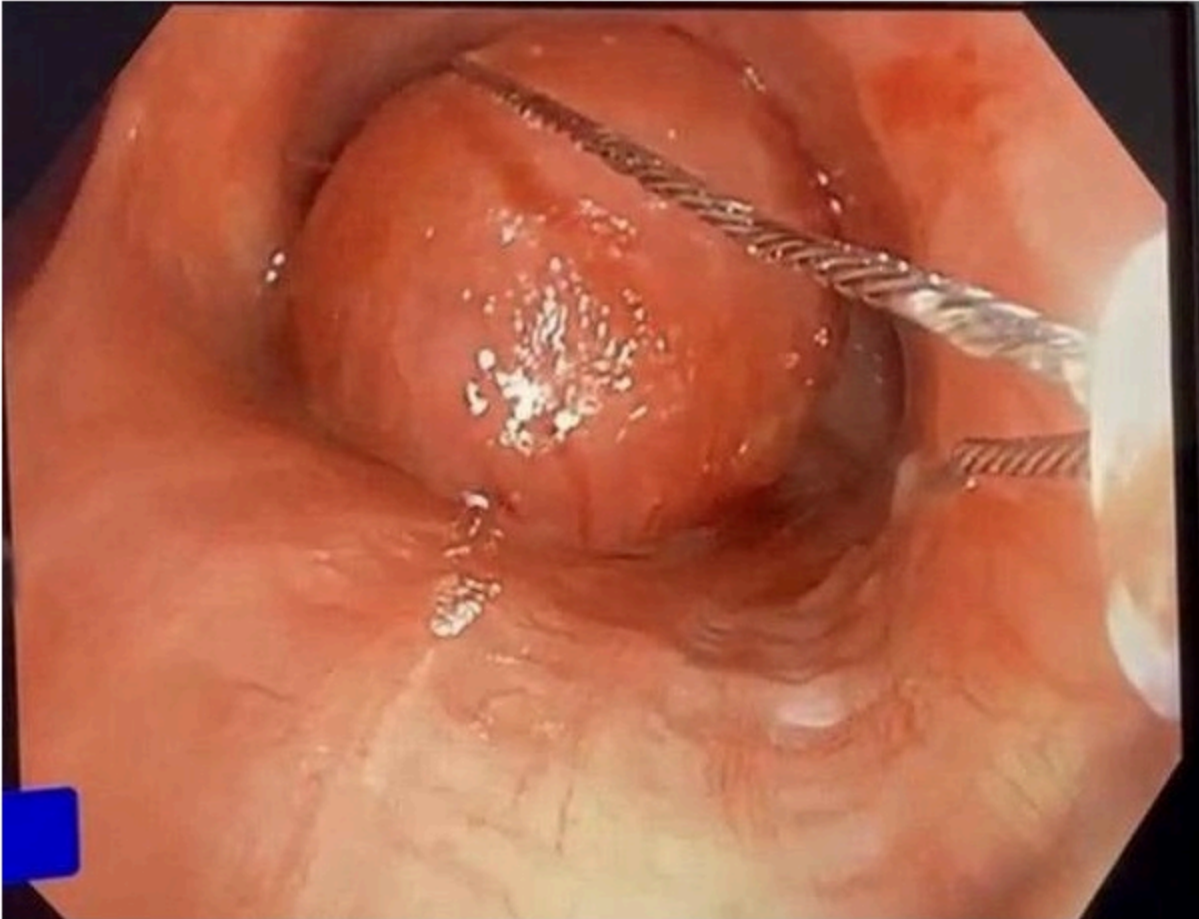


Figure 2

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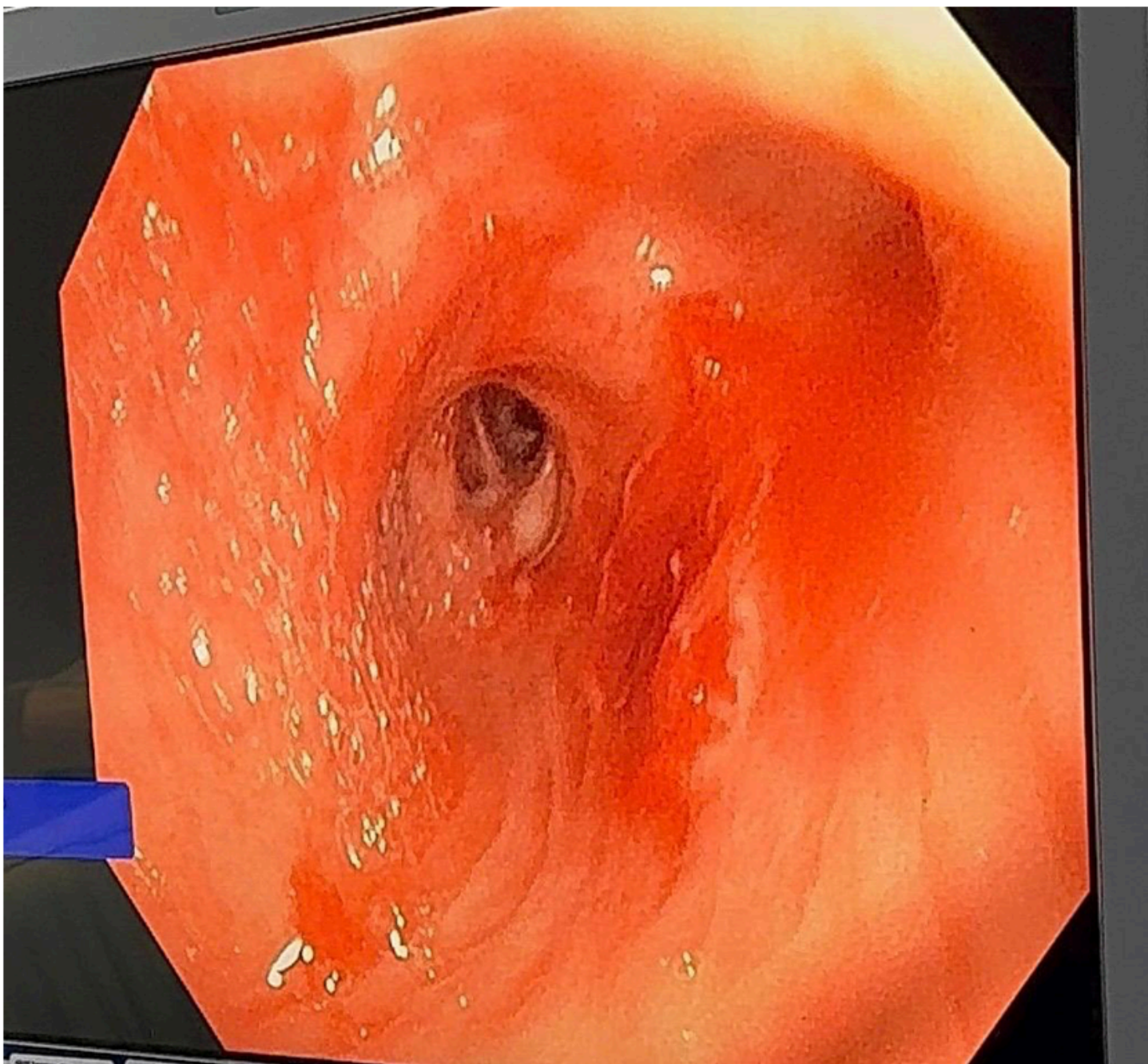


Figure 3

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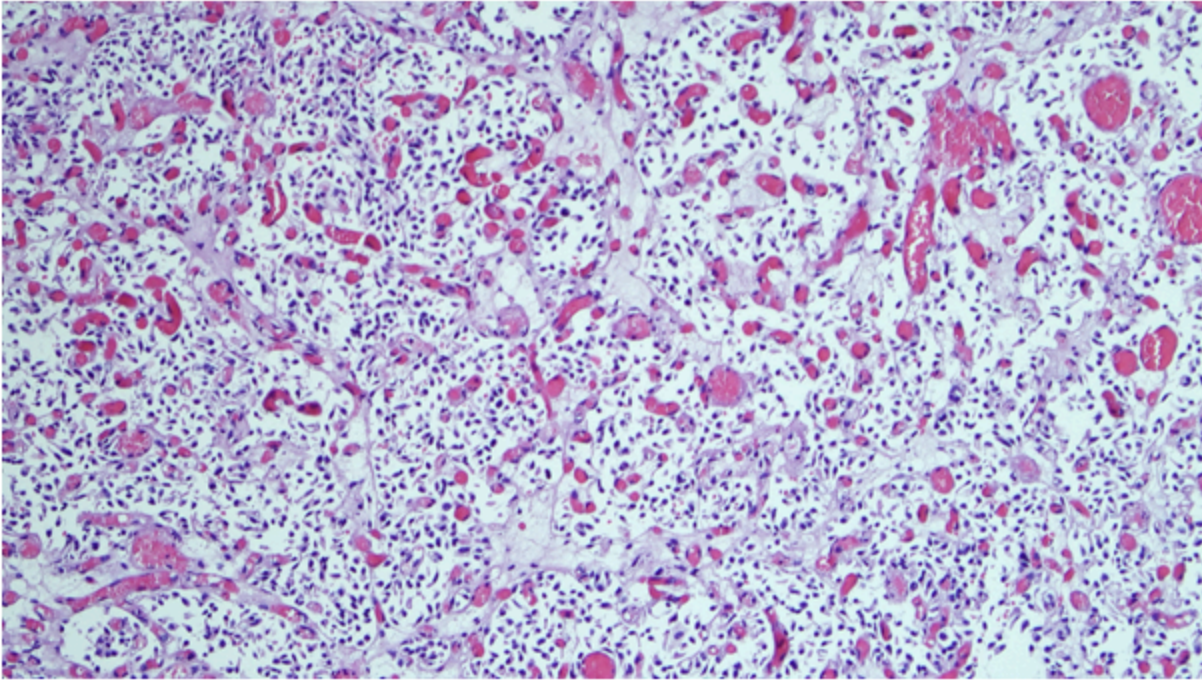


Figure 4

Photomicrograph showing a well-differentiated neuroendocrine tumor composed of nests and trabeculae of uniform cells separated by delicate fibrovascular stroma and a prominent vascular network. The tumor cells display round to oval nuclei with finely granular salt and pepper chromatin. Hematoxylin and eosin stain, ×200.

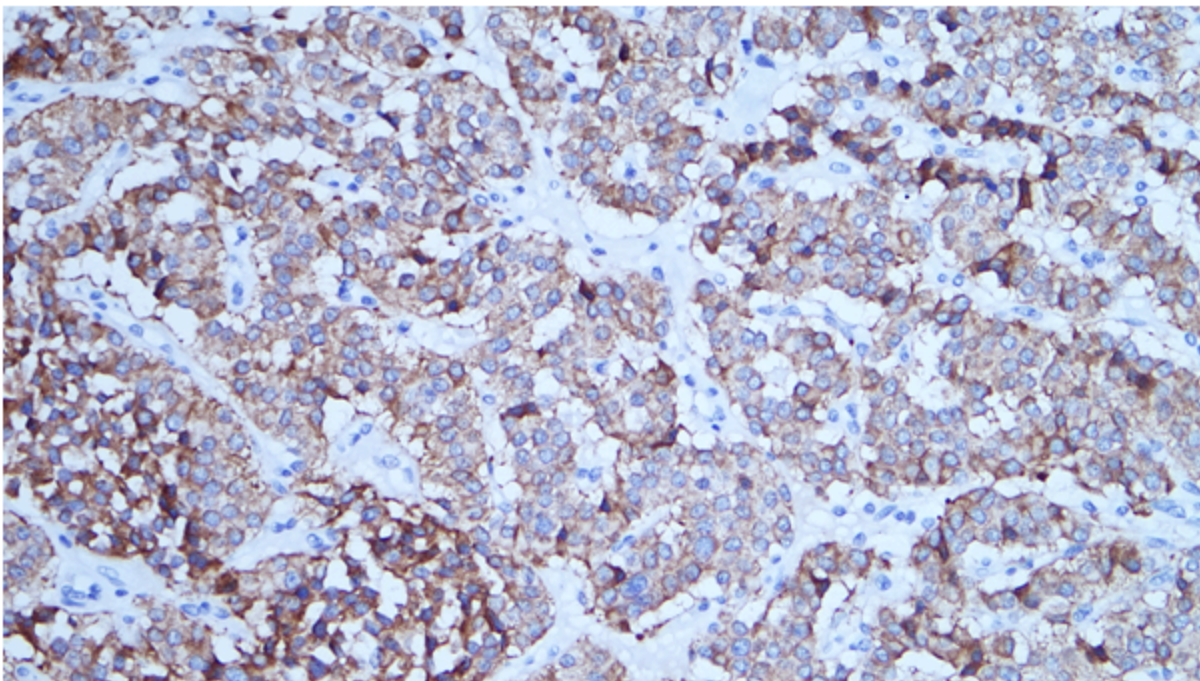


Figure 5

Immunohistochemical stain for synaptophysin showing diffuse cytoplasmic positivity in the tumor cells, supporting neuroendocrine differentiation. ×200.