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## INTRODUCTION

- Primary tracheal tumors are extremely rare and often malignant<sup>2</sup>, making up less than 0.1% of all cancers.<sup>1</sup>
- Due to their location, they can result in severe airway obstruction, esophageal displacement, and neurogenic dysfunction.
- Due to their nonspecific presentation symptoms, such as shortness of breath and cough, diagnosis is often delayed, resulting in a higher morbidity and mortality rate.<sup>3</sup>
- Histologically, only 10% of tracheal tumors are small cell, and association with syndrome of inappropriate antidiuretic hormone (SIADH) is a poor prognostic factor.<sup>4,5,6</sup>

## PATIENT PRESENTATION

### History of Present Illness:

- A 63-year-old woman with known medical history of obesity, hypertension, and COPD presented with worsening productive cough, dyspnea, wheezing, and recent sick contact concerning for COPD exacerbation.
- Her social history was notable for a fifty-two pack year cigarette smoking history. She further endorsed intermittent worsening of productive cough requiring multiple courses of antibiotics within the previous four months.

### Physical Exam:

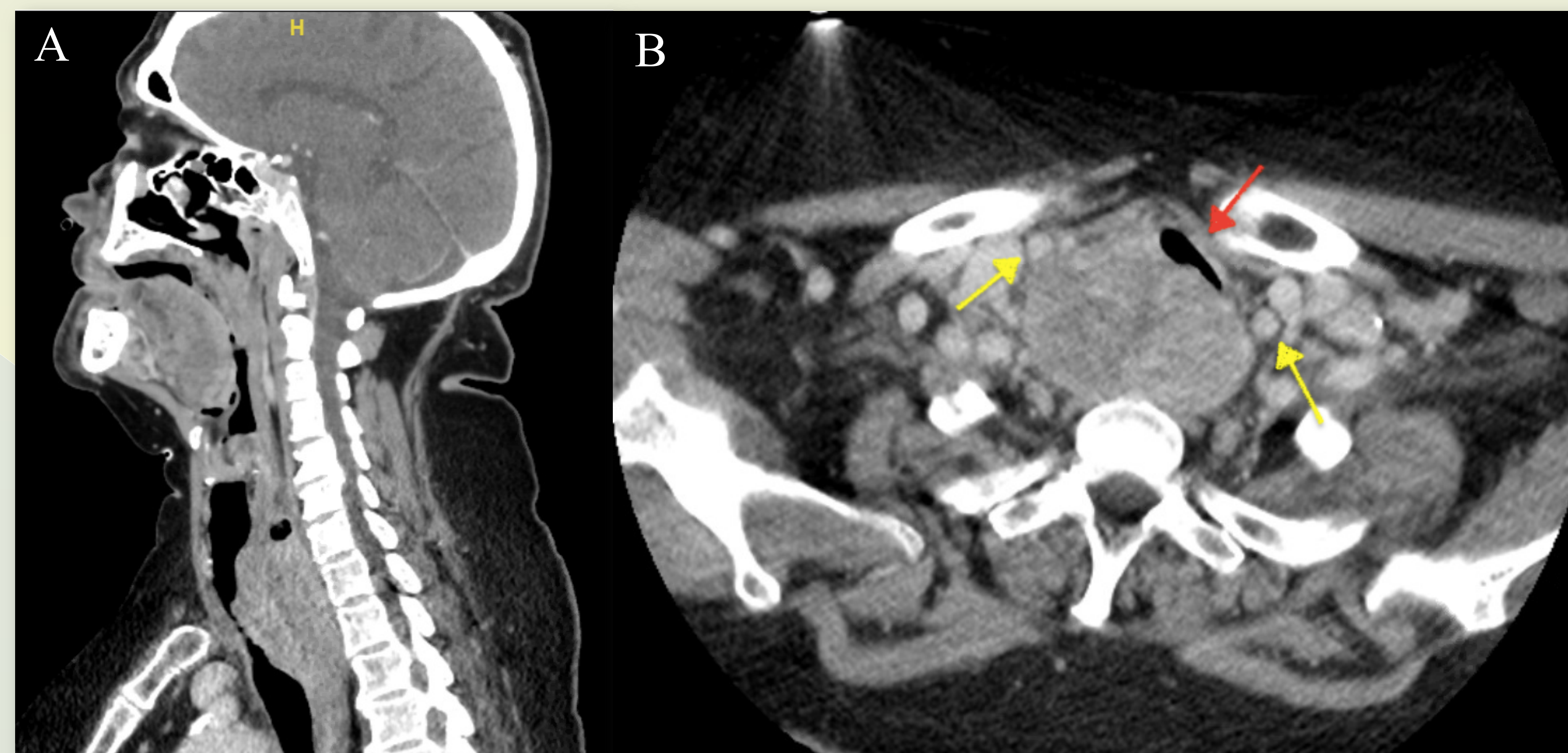
- Vitals: temperature 97.6 °F, heart rate 100 beats/minute, blood pressure 163/81 mmHg, respiratory rate 20 breaths per minute, and blood oxygen saturation of 96% on ambient air.
- She was alert, oriented and easily engaged in conversation, though only able to speak in short sentences. She was sitting upright in a chair due to significant orthopnea, along with an audible stridor that was exacerbated when speaking and lying supine. A large anterior neck mass was palpable.

### Diagnostic Workup:

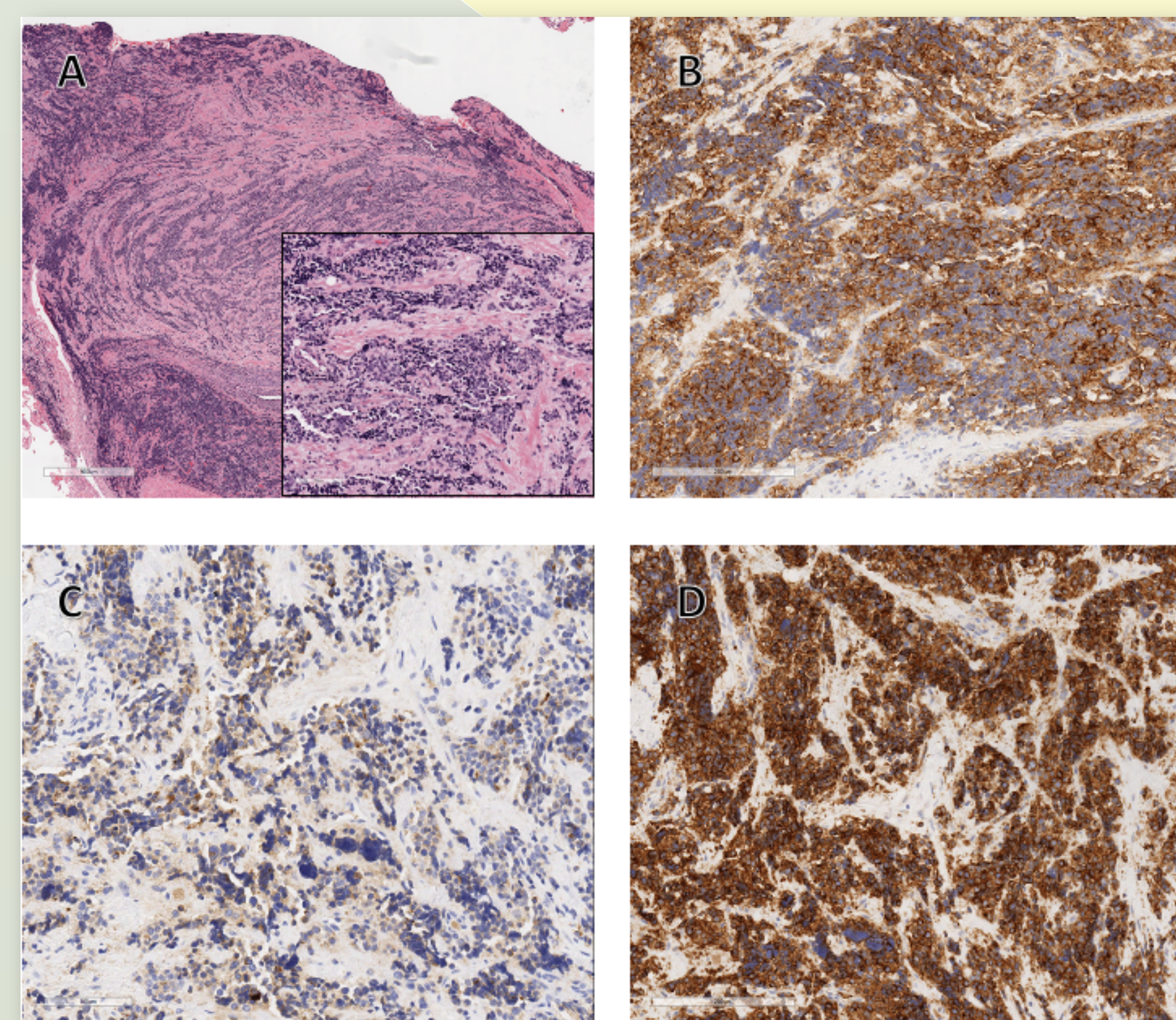
- Significant laboratory findings: serum sodium of 129, white blood cell count of 7.7 with 89% neutrophil predominance. Troponin, brain natriuretic peptide, and lactic acid levels were all within normal limits.
- Computer tomography (CT) with intravenous contrast: large right paratracheal mass that compressed 80% of the tracheal lumen and extended to the superior and anterior mediastinum (Figure 1), multiple hypoattenuating liver lesions, largest of which was 2.1cm with regional lymphadenopathy (Figure 2). A 3.6 cm mass in the left adrenal gland. Lung parenchyma was negative for malignancy.
- Histology of both the paratracheal and liver mass: infiltrating round blue cells with nuclei consistent with small cell neuroendocrine carcinoma (SCNC) (Figure 3, 4).
- She was also found to have euvolemic hyposmolar hyponatremia with high urine sodium and osmolality, which in the setting of SCNC, was determined to be secondary to paraneoplastic SIADH requiring sodium tablets for correction. Workup for other possible endocrine syndromes was negative.

### Follow-up:

- Due to her critical tracheal compression and tumor invasion inside the trachea, there was concern that minor irritation or aspiration could result in airway compromise.
- Additionally, a regular sized endotracheal tube would not fit the stenosed trachea in the setting of an emergency, thus the patient underwent prophylactic tracheostomy and percutaneous endoscopic gastrostomy (PEG) tube placement.
- She is currently receiving outpatient chemotherapy treatment with Carboplatin, Etoposide, and Atezolizumab.



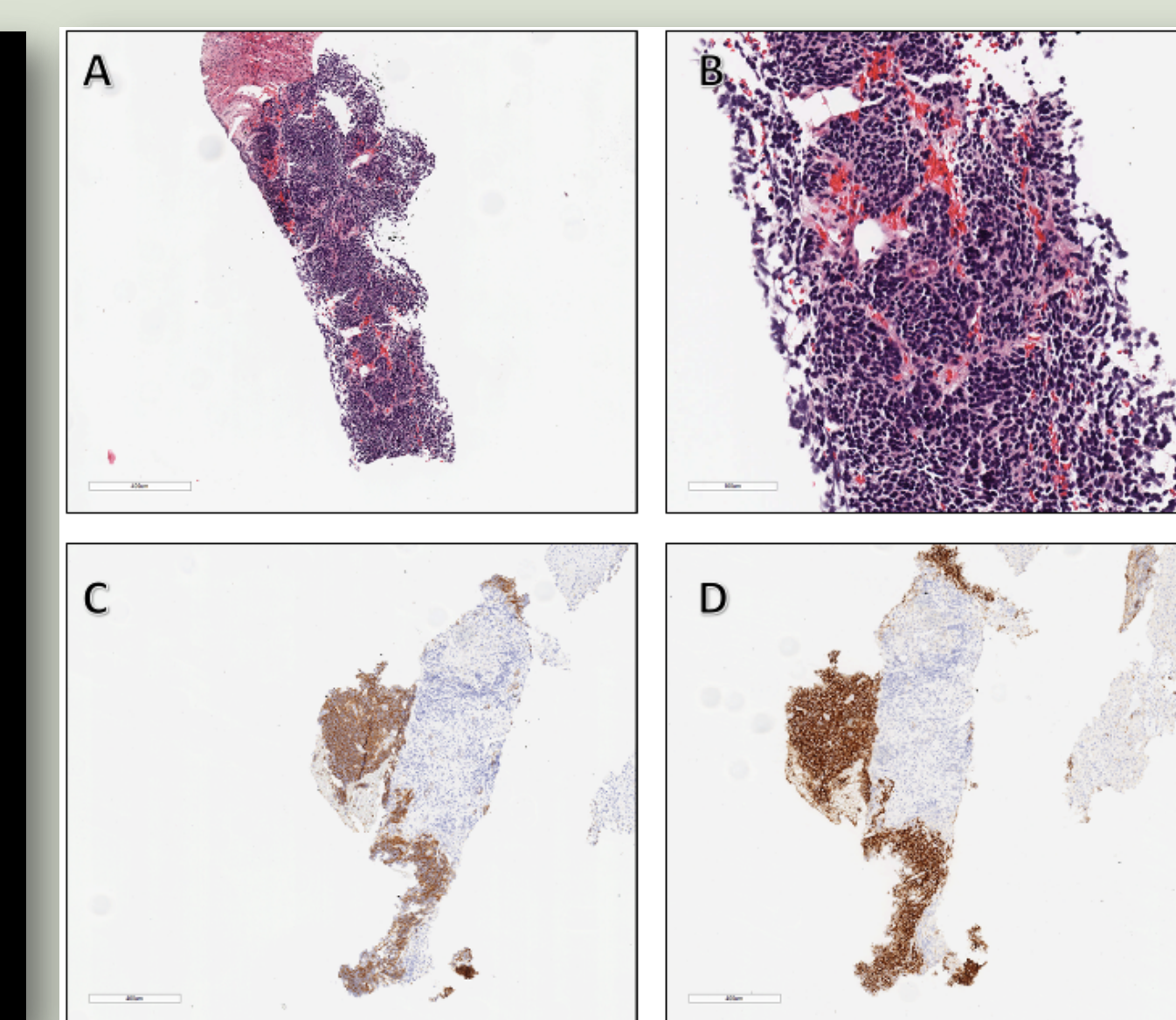
**Figure 1:** (A) CT of soft tissue neck displaying heterogeneous enhancing right paratracheal mass (measuring 5.8 x 4 x 5.8 cm) contiguous with the thyroid that extended to superior and anterior mediastinum with resultant compression of the trachea (causing 80% stenosis) and esophagus. (B) Displacement of the carotid arteries (yellow arrows) and tracheal compression (red arrow) caused by the tumor.



**Figure 3:** (A) Photomicrograph showing a paratracheal mass (H&E, 100X); inset showing infiltrating cells with nuclei of classic salt and pepper chromatin (400X). (B, C, D) Immunohistochemical profile of the mass. Photomicrograph showing (B) CD56, (C) Chromogranin, and (D) Synaptophysin staining of the mass (immunohistochemistry, 400X).



**Figure 2:** CT of liver displaying multiple hypoattenuating liver lesions concerning for metastatic disease



**Figure 4:** (A) Photomicrograph showing metastatic mass in the liver (H&E, 100X) (B) Higher magnification of the cells showing classic salt and pepper chromatin (400X). (C, D) Immunohistochemical profile of the mass. Photomicrograph showing (C) CD56, (D) Synaptophysin staining of the mass (immunohistochemistry, 100X).

## DISCUSSION

- Here we present the first reported case of tracheal SCNC associated with SIADH. Previous published cases of tracheal SCNC do not describe any paraneoplastic syndrome association.<sup>3</sup> Furthermore, our case demonstrates a lower tracheal tumor, rather than the upper, which adds rarity to our presentation.<sup>1</sup>
- Because of nonspecific clinical presentation, tracheal SCNC tumors can be easily missed, resulting in late presentation,<sup>3</sup> as demonstrated by our patient's 80% tracheal stenosis, resulting in increased morbidity (i.e. tracheostomy, PEG tube) in an attempt to prevent fatal airway compromise.
- Furthermore, SIADH, a diagnosis of exclusion, was established after ruling out other etiologies for hyposmolar hyponatremia. Although SIADH is most commonly associated with small cell cancer,<sup>5</sup> this is the first known reported case associated with tracheal tumor.
- Interestingly, malignancy associated SIADH was found to be associated with worse outcomes than SIADH as a result of other etiologies in cancer patients,<sup>5</sup> with severity of low serum sodium concentrations at short-term follow up associated with shorter median survival.<sup>5</sup> Our patient has maintained normal serum sodium concentration at 3-month follow up, as she continues to receive chemotherapy.
- Due to the rarity of tracheal cancers, especially neuroendocrine small cell carcinomas, there is no clear treatment guideline. Currently, concurrent chemotherapy is the practice and in certain cases concomitant radiotherapy and surgery.<sup>6</sup>

## CONCLUSION

- To our knowledge, this is the first known case of tracheal small cell neuroendocrine carcinoma associated with paraneoplastic SIADH.
- In a patient with recurrent COPD exacerbations, one must create a wide differential, including the possibility of malignancy to avoid late diagnosis.

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