

Thymic carcinoma diagnosed by using endoscopic ultrasound with fine-needle aspiration

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ABSTRACT

There is a paucity of literature on the use of endoscopic ultrasound (EUS) for evaluating superior mediastinal structures, especially the thymus gland. We report a case of thymic carcinoma diagnosed by using EUS elastography with strain ratio and fine-needle aspiration (FNA). A 64-year-old woman presented with altered mental status and was diagnosed with autoimmune encephalitis. Further work-up suggested a superior mediastinal mass, for which she underwent EUS. A hypoechoic mass was found in the superior mediastinum at the level of the aortic arch. Real-time EUS elastography showed a predominantly blue hue to the mass concerning for malignancy. FNA of the mass was performed, which revealed numerous large neoplastic cells under a background of a small lymphoid infiltrate. Immunohistochemistry was strongly positive for PAX8, pancytokeratin, and CAM5.2. The pathologic and immunohistochemical stains were consistent with thymic carcinoma.

Key words: Elastography, endoscopic ultrasound (EUS), fine-needle aspiration (FNA), mediastinum mass, thymic carcinoma

INTRODUCTION

Since its introduction in the early 1980s, endoscopic ultrasound (EUS) is a well-established imaging modality and plays an important role in the diagnostic and therapeutic management of gastrointestinal and pancreatobiliary diseases.^[1,2] However, over time it has also established its role in the evaluation of mediastinal and abdominal lymph nodes,^[3,4] lung cancer staging,^[5,6] and thyroid,^[7,8] kidney,^[9-11] adrenal,^[12,13] and genitourinary pathologies. However, there is paucity in literature on the use of EUS for evaluating superior mediastinal structures, especially the thymus gland. We report a case of thymic carcinoma diagnosed by using EUS-guided

fine-needle aspiration (FNA), that is, EUS-FNA. This is the first case of thymic carcinoma evaluated by EUS elastography with strain ratio.

CASE REPORT

A 64-year-old woman with no significant past medical history presented with progressive upper and lower extremity weakness, head tremors, and cognitive impairment over a 3-month period. Further work-up revealed a diagnosis of autoimmune

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encephalitis [positive anti-Sjögren's-syndrome-related antigen A (SSA) and anti-Purkinje cell antibodies] from a presumed paraneoplastic syndrome. For work-up of underlying malignancy, a computed tomography (CT) chest was obtained, which showed a 1.8 × 2.0 cm² soft-tissue density in the superior mediastinum at the level of the aortic arch in close vicinity to the esophagus. The patient underwent EUS for further evaluation of the superior mediastinal mass.

EUS examination using a Pentax EG-3870UTK: (Montvale, New Jersey, USA) Ultrasound Video Gastroscope and Hitachi Hi VISION 900 (HV900): (Twinsburg, Ohio, USA) Ultrasound Scanner system revealed normal esophageal wall layers. A 12 mm × 31 mm well-circumscribed, hypoechoic, and heterogeneous superior mediastinal mass was seen at the level of the aortic arch without invasion of the esophagus or surrounding structures [Figure 1]. Additionally, adjacent to this mass was a 4 mm × 10 mm enlarged, hypoechoic lymph node. Real-time elastography of the mediastinal mass showed a predominantly blue hue suggestive of malignancy [Figure 2]. Quantitative EUS elastography revealed

a strain ratio of 19. Under EUS guidance, using a capillary suction technique, six passes were successfully obtained from the mediastinal mass with a 25-gauge needle. Onsite cytopathology evaluation showed numerous large neoplastic cells under a background of a small lymphoid infiltrate [Figure 3, left]. Further histopathological examination under hematoxylin and eosin (H&E) [Figure 3, right] and immunohistochemistry stains were strongly positive for PAX8, pancytokeratin, and CAM5.2 [Figure 4]. Final pathology results were diagnostic for high-grade thymic carcinoma. The patient tolerated the procedure well without any technical difficulties, and no postprocedure complications were observed.

Given the patient's advanced neurological symptoms, after discussion with the family and oncologic team, the decision was made to pursue hospice care. The patient was discharged home with hospice care.

DISCUSSION

The thymus is located in the superior aspect of the anterior mediastinum and weighs 12-15 g at birth, reaches its maximum weight of 40 g around puberty,

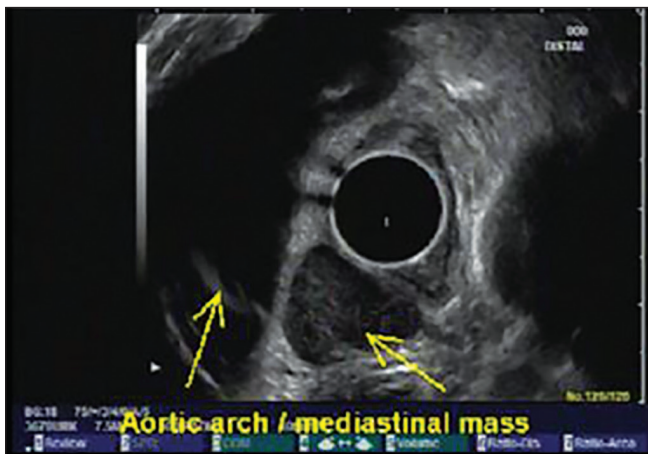


Figure 1. EUS showing mediastinal mass at the level of aortic arch

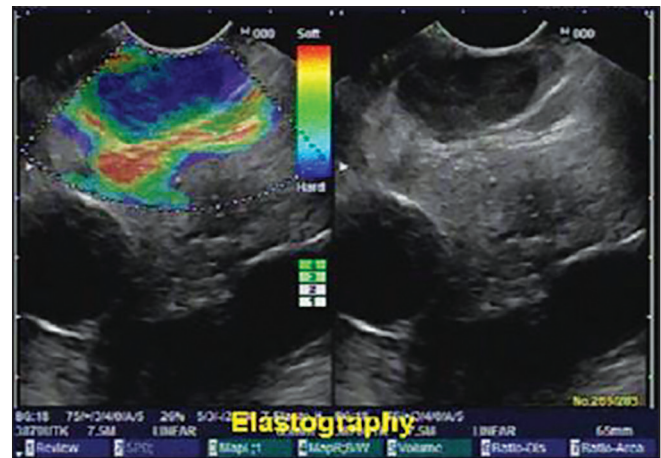


Figure 2. Real-time elastography showing blue hue to the mediastinal mass suggestive of solid tissue, concerning for malignancy

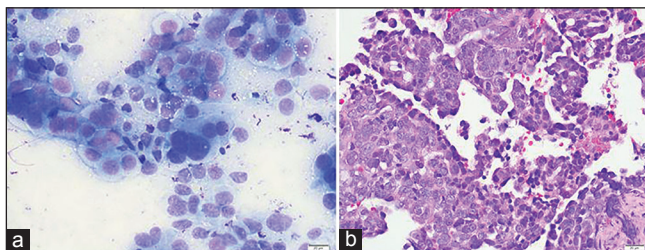


Figure 3. (a) Onsite pathology showing large malignant cell on the background of small lymphocytes (b) Final H&E staining showing malignant cells on the background of small lymphocytes

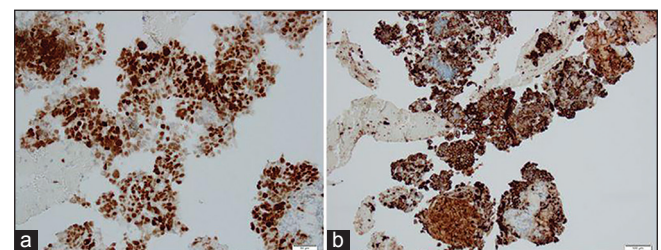


Figure 4. (a) Immunohistochemistry stain positive for PAX8 (b) Immunohistochemistry stain positive for pancytokeratin

and then involutes and persists in an atrophic state into old age.^[14] Thymic carcinoma is a rare tumor of the thymus and represent <1% of all thymic neoplasms. It is more aggressive than thymoma and frequently metastasizes, with a 5-year overall survival rate of 40%.^[15,16]

Because of its location in the superior anterior mediastinum, diagnosis of thymus pathology can be made by either transcutaneous CT or ultrasound (US)-guided biopsy, through mediastinoscopy, transbronchial US, or EUS techniques. So far, to our knowledge there has been only one reported case of recurrent thymic carcinoma diagnosed by EUS-FNA.^[17] In that case, the lesion biopsied was a posterior mediastinal lymph node and not the thymus itself. In contrast, in our case, the thymus mass itself was biopsied.

The esophagus provides a direct access pathway along the entire length of the junction between the posterior and middle mediastinum. Transesophageal EUS allows for imaging and biopsy of masses in the middle and posterior mediastinum with high frequency, and high-resolution US with superior precision to diagnosis.

EUS-FNA of superior mediastinal masses may be technically difficult because of close proximity to large vessels, especially when the lesion is located near the upper esophageal sphincter. Because of this, it is sometimes preferred to biopsy the lesion located in the superior mediastinum through either CT- or US-guided transcutaneous biopsy or mediastinoscopy. In comparison to these techniques, EUS-FNA is less invasive and can be performed under conscious sedation, which has the advantage of being a 1-day surgery, making it relatively inexpensive. In addition, CT- or US-guided biopsy is also associated with a higher rate of complications including, importantly, pneumothorax. Pneumothorax is reported to occur in 10-60% of cases, necessitating chest tube placement in 5-25% of patients.^[18] In addition to being less invasive, less expensive, and with lower complications rates, EUS-FNA has a sensitivity and specificity approaching 89% and 100%, respectively.^[19-20] Transcutaneous and mediastinoscopic biopsy approaches have a diagnostic yield of 74-90% and 83-90%, respectively, depending upon the size and location of the lesion.^[21-26]

The utility of quantitative EUS elastography in the differential diagnosis of pancreaticobiliary masses has been

evaluated in multiple recent studies.^[27-31] It has a sensitivity of 100%, specificity of 92.9%, positive predictive value (PPV) of 96.7%, and negative predictive value (NPV) of 100% for the detection of malignancy.^[30] However, no prior study have been performed to evaluate the utility of quantitative EUS elastography to assess the thymus and other superior mediastinal mass.

In summary, thymic carcinoma is a relatively rare tumor, located in the superior mediastinum, and can be successfully diagnosed by EUS-FNA in experienced hands. Despite technical difficulty, because of its minimal invasiveness, low cost, fewer complications, and better yield, much emphasis should be focused on EUS-guided biopsy of thymus or any superior mediastinal masses. In addition, we believe that the diagnostic accuracy of EUS-FNA can be enhanced by the simultaneous use of real-time EUS elastography. Further case studies are needed to evaluate the safety and efficacy of EUS-FNA and elastography in the diagnosis of superior mediastinal mass.

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Conflicts of interest

There are no conflicts of interest.

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