CASE REPORT

Appendiceal Metastasis From Thymic Carcinoma: An Unusual Presentation of a Rare Cancer

Shannon Swift, RN, BSN,[a] Osório Lopes Abath Neto, MD,[b] Mohammad Hadi Bagheri, MD,[c] Alfred Saleh, MD,[d] Patrick J. Loehrer, Sr., MD,[e] Arun Rajan, MD[a,*]

[a]*Thoracic and Gastrointestinal Malignancies Branch, Center for Cancer Research, National Cancer Institute, National Institutes of Health, Bethesda, Maryland*
[b]*Laboratory of Pathology, Center for Cancer Research, National Cancer Institute, National Institutes of Health, Bethesda, Maryland*
[c]*Radiology and Imaging Sciences Department, Clinical Center, National Institutes of Health, Bethesda, Maryland*
[d]*Sharp Healthcare, San Diego, California*
[e]*Department of Medicine, Indiana University Melvin and Bren Simon Comprehensive Cancer Center, Indianapolis, Indiana*

Received 30 March 2020; revised 31 March 2020; accepted 1 April 2020
Available online - 13 April 2020

Thymomas and thymic carcinomas arise from thymic epithelial cells and have a predilection for intrathoracic spread.[1,2] Extrathoracic metastases occur less frequently, are observed more often in patients with thymic carcinoma and tend to involve the liver, lymph nodes, soft tissues and bone.[2,3] Patients with thymic epithelial tumors are at increased risk for development of secondary malignancies.[4] The distinction between thymic metastases and an extrathymic primary tumor is of clinical relevance because it can influence treatment options. To our knowledge, metastasis of thymic carcinoma to the appendix has not been described previously.

A 73-year-old man presented with an anterior mediastinal mass and was diagnosed with Masaoka stage IVA thymic carcinoma. Previous treatments included five lines of systemic therapy delivered over an 8-year period, interspersed by periods of slowly progressive, residual intrathoracic disease that was treated with surgical resection and radiation therapy. His most recent treatment resulted in disease stability for 12 months followed by worsening of symptoms, including pain in the right side of the chest wall, fatigue, anorexia, and weight loss. Systemic therapy was discontinued, and the patient received palliative radiation therapy to a growing right paravertebral mass resulting in improvement of symptoms. After 6 months, the patient presented to his

*Corresponding author.

Disclosure: The authors declare no conflict of interest.

Address for correspondence: Arun Rajan, MD, Thoracic and Gastrointestinal Malignancies Branch, National Cancer Institute, National Institutes of Health, 10-CRC, Room 4-5330, 10 Center Drive, Bethesda, MD 20892. E-mail: rajana@mail.nih.gov

Cite this article as: Swift S, et al. Appendiceal Metastasis From Thymic Carcinoma: An Unusual Presentation of a Rare Cancer. JTO Clin Res Rep 1:100039

ISSN: 2666-3643

https://doi.org/10.1016/j.jtocrr.2020.100039

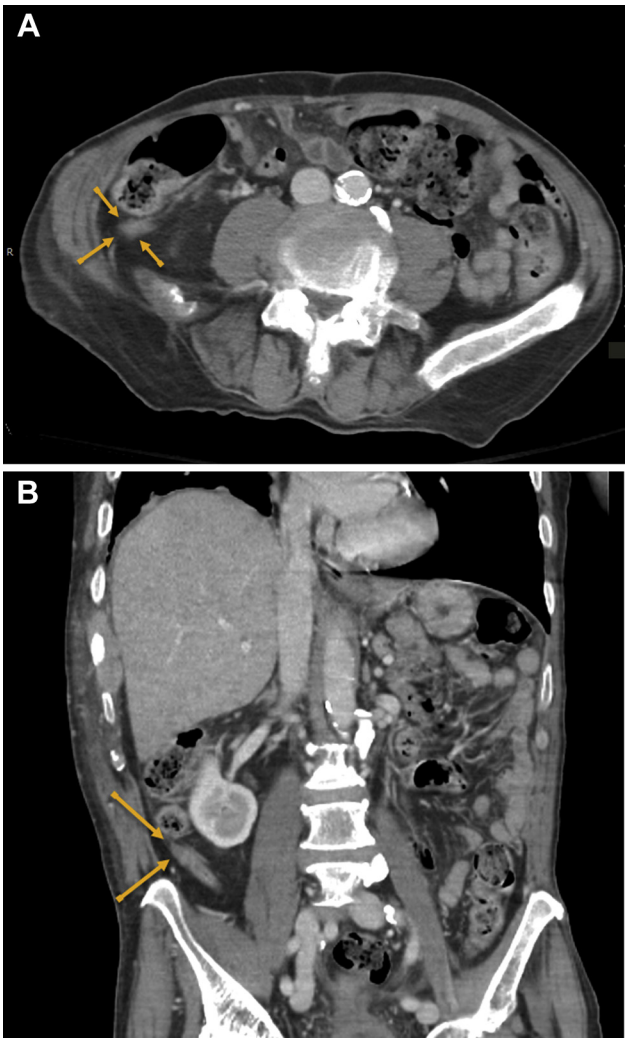

Figure 1. (*A*) Axial and (*B*) coronal computed tomography images of the abdomen revealing borderline dilated appendix measuring 9 mm in thickness (arrows), with mild associated wall thickening and minimal infiltration of the surrounding fat.

local emergency room with acute right lower quadrant abdominal pain, urinary retention, constipation, and poor oral intake. Laboratory workup revealed leukocytosis (31.7 K/μL). A computed tomography scan revealed an enlarged appendix measuring approximately 9.3 mm in thickness, with surrounding inflammation, but no periappendiceal abscess, free fluid, or bowel obstruction (Fig. 1*A* and *B*). These changes were consistent with acute appendicitis. So, a laparoscopic appendectomy was performed. The appendix appeared slightly enlarged with a nodule near its tip. Macroscopically, the appendix measured 3.3 cm by 0.8 cm by 0.8 cm with a tan, raised nodular lesion measuring 0.7 cm by 0.5 cm by 0.5 cm located 0.5 cm from the distal end. Microscopic examination of the nodular lesion revealed a poorly differentiated carcinoma. Histologic comparison of the appendiceal mass with archival samples derived from the anterior mediastinal mass revealed morphologic and immunohistochemical similarities (Fig. 2*A*–*L*). After 3 days of the surgery, the patient was discharged home in good condition.

To our knowledge, this is the first report of thymic carcinoma metastasizing to the appendix. Secondary appendiceal tumors are uncommon; the ovary and colorectum are the most common sites of primary malignancy and thoracic tumors, including lung cancer, rarely metastasize to the appendix.[5] As thymic epithelial tumors increase the risk for development of secondary malignancies of the gastrointestinal tract,[4] it is important to distinguish between metastatic thymic carcinoma and primary appendiceal carcinoma. In this case, similar morphologic features of the tumor cells in the appendiceal lesion and the mediastinal mass, focal squamous differentiation of the appendiceal tumor, and expression of c-Kit (CD117) and mesothelin support a diagnosis of metastatic thymic carcinoma. This case underscores the

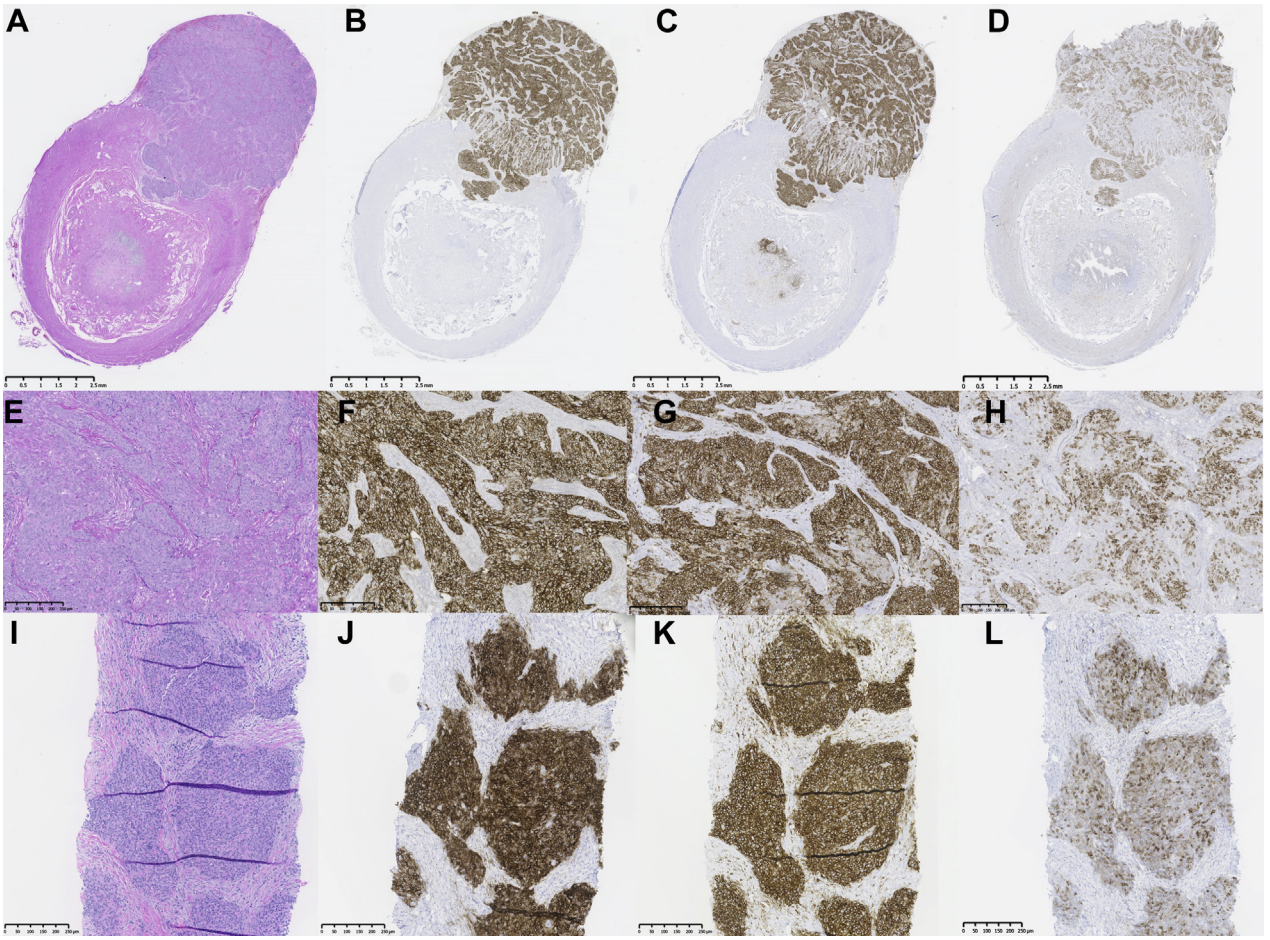

Figure 2. Photomicrographs of the appendiceal and thoracic specimens. (*A*) Low-power view of a cross-section of the appendix revealing tumor measuring 6.0 × 4.9 mm with mural infiltration (hematoxylin and eosin [H&E], ×20 magnification); (*B*) tumor is strongly and diffusely positive for mesothelin (×20 magnification); (*C*) tumor is also diffusely and strongly positive for CD5 (×20 magnification); (*D*) c-Kit (CD117) immunostain is partially positive in tumor cells; (*E*) closer view of the cross-section depicted in (*A*) revealing nests of epithelioid cells having pleomorphic nuclei with prominent nucleoli, increased mitotic activity, and focal squamous differentiation with abundant eosinophilic cytoplasm (H&E, ×200 magnification); (*F-H*) corresponding ×200 magnifications of mesothelin, CD5, and c-Kit (CD117) stains, respectively; (*I*) core biopsy of the thoracic mass revealing nests of tumor cells morphologically similar to the ones identified in the appendix (H&E, ×200 magnification); (*J*) tumor cells in the core biopsy are positive for mesothelin (×200 magnification); (*K*) they are also positive for CD5 (×200 magnification); (*L*) they are also focally positive for c-Kit (CD117), in a pattern similar to the appendiceal metastasis (×200 magnification).

importance of abdominal surveillance under appropriate clinical circumstances and the value of a biopsy from a new lesion at an unusual site in a patient with thymic carcinoma to distinguish between metastasis and an extrathymic primary tumor.

Acknowledgments

This research was supported in part by the Intramural Research Program of the National Institutes of Health, National Cancer Institute, Center for Cancer Research (Dr. Rajan), and P30 CA082709 (Dr. Loehrer).

References

1. Hsu CH, Chan JK, Yin CH, Lee CC. Chem CU, Liao CI. Trends in the incidence of thymoma, thymic carcinoma, and thymic neuroendocrine tumor in the United States. *PLoS One*. 2019;14:e0227197.
2. Khandelwal A, Sholl LM, Araki T, Ramaiya NH, Hatabu H, Nishino M. Patterns of metastasis and recurrence in thymic epithelial tumours: longitudinal imaging review in correlation with histological subtypes. *Clin Radiol*. 2016;71:1010-1017.
3. Vladislav T, Jain RK, Alvarez R, et al. Extrathoracic metastases of thymic origin: a review of 35 cases. *Mod Pathol*. 2012;25:370-377.
4. Kamata T, Yoshida S, Wada H, et al. Extrathymic malignancies associated with thymoma: a forty-year experience at a single institution. *Interact Cardiovasc Thorac Surg*. 2017;24:576-581.
5. Yoon WJ, Yoon YB, Kim JK, Ryu JK, Kim YT. Secondary appendiceal tumors: a review of 139 Cases. *Gut Liver*. 2010;4:351-356.