Ontario Health
Cancer Care Ontario

Thymic Cancers Radiographic Imaging Educational Tool

Version 2025.07

Background

The Thymic Cancers Working Group created case examples of radiographic imaging findings for clinical guidance on each stage of thymic epithelial tumours, including thymoma, thymic carcinoma, and thymic neuroendocrine tumours (NETs). These radiographic images are based on the 8th edition of the Thymoma/Thymic Carcinoma TNM Staging System. This resource can be used by family physicians, nurse practitioners, radiologists, radiation oncologists, medical oncologists, surgical oncologists, general surgeons, and residents.

This educational tool accompanies the Diagnosis, Treatment and Follow-up Thymic Cancer Pathway Maps, which can be accessed via Thymic Cancer Pathway Map | Cancer Care Ontario.

A list of the expert clinicians in the Thymic Cancer Working Group is located in the Thymic Cancer Pathway Map Acknowledgements.

Radiographic Imaging in Thymic Cancer

Case Example 1: Radiographic Imaging for Thymus

Figure 1: An anterior mediastinal mass was found on a staging CT scan (A). The mass was homogenous with smooth contours and suggestive of thymic hyperplasia. An MRI was performed for confirmation. Uniform signal intensity on axial T1 weighted in-phase (B) and drop of signal on out-of-phase (C) with calculated signal intensity of 34% and chemical shift ratio of 0.6 were in keeping with benign thymic tissue.

Case Example 2: Radiographic Imaging for Thymoma, Stage 1

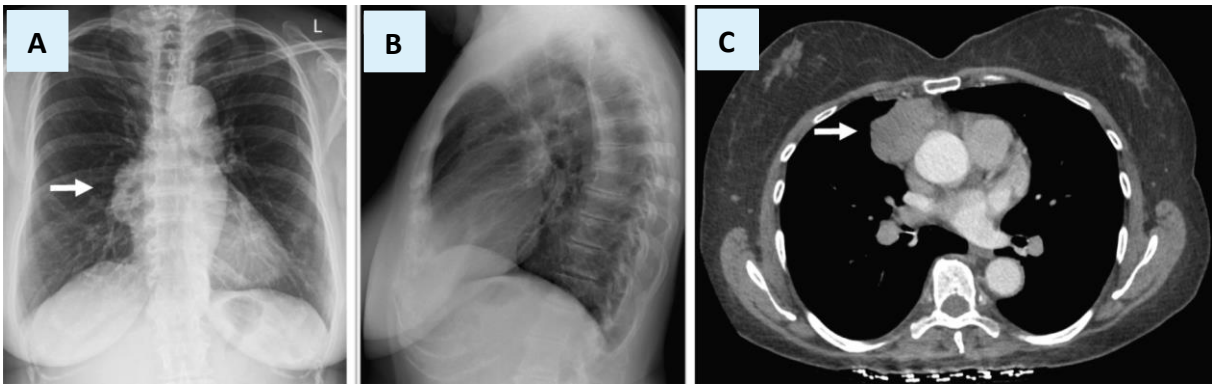

Figure 2: Chest X-ray (CXR) posteroanterior (PA) view (1A) and lateral view (1B) were performed for cough and revealed an incidental right anterior mediastinal mass best seen on the PA view (arrow). Axial image CT scan of the chest (1C) shows the soft tissue mass (arrow) abutting the pericardium without imaging evidence of invasion. Pathology post-surgical resection was Thymoma type AB with negative surgical margins. Stage 1, pT1a pN0.

Case Example 3: Radiographic Imaging for Thymoma, Stage 1

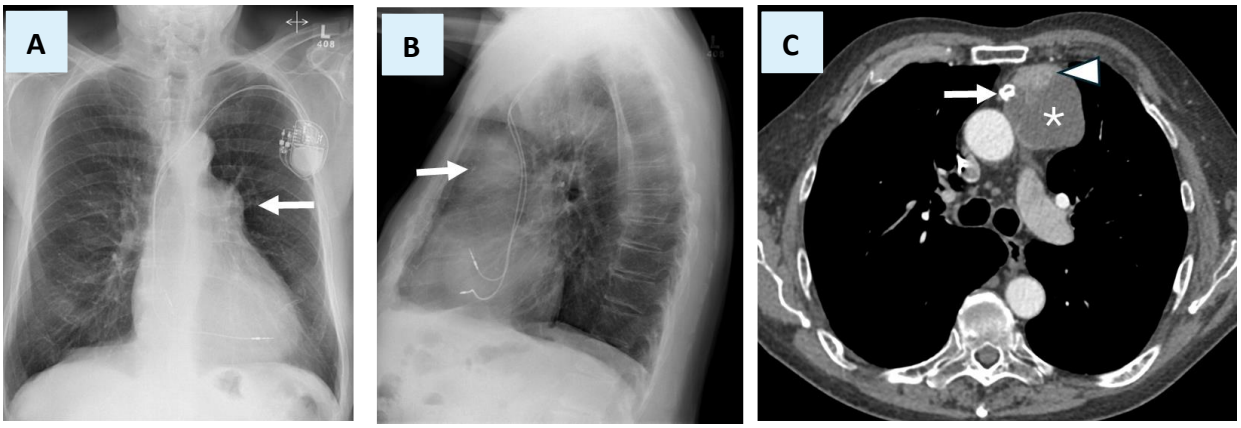

Figure 3: A mediastinal mass was found on chest X-ray (CXR) posteroanterior (PA) view (A) and lateral view (B). A mass with enhancing solid (arrow) and low-density cystic components (asterisk) and a small calcification (arrowhead) was seen on CT scan (C). The mass was not invading the pericardium, lung parenchyma, or mediastinal structures. The mass was surgically resected. The pathology was thymoma with lymphoid stroma and the surgical margins were negative. Stage 1, pT1a pN0.

Case Example 4: Radiographic Imaging for Thymoma, Stage 1

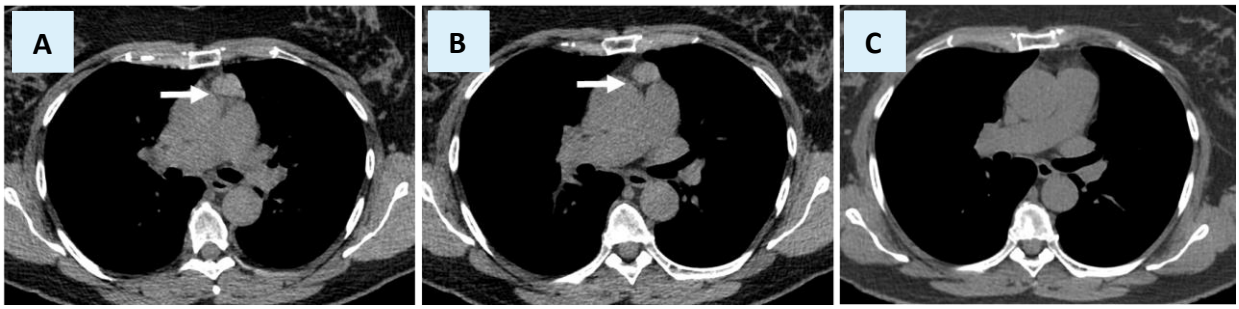

Figure 4: A well-defined anterior mediastinal tumor (A and B) was found on CT scan; it was separated from the underlying main pulmonary artery and ascending aorta by a thin layer of fat (arrow). The tumor was resected. Pathology was in keeping with thymoma pT1b pNo due to microscopic invasion. A follow-up CT scan (C) showed no recurrence or metastasis four years after resection. Stage 1.

Case Example 5: Radiographic Imaging for Thymoma, Stage 3A

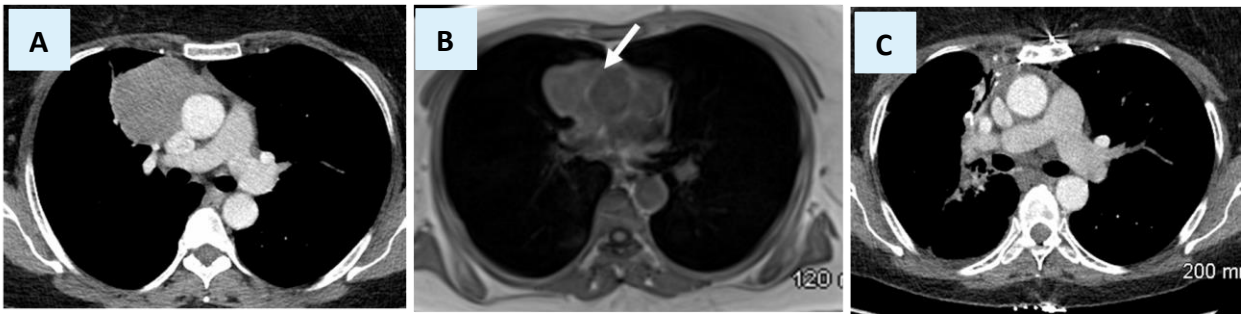

Figure 5: An anterior mediastinal tumor was found on CT scan in a patient with myasthenia gravis (A). On MRI, three weeks later, there is a clear fat plane between the mass and the ascending aorta (arrow). The smaller size of the mass was because of interval corticosteroid therapy for the myasthenia gravis. The mass was resected, there was invasion of the adjacent right upper lobe lung parenchyma, pT3 N0 (type B1/B2), the surgical resection margins were negative for tumor, stage 3A. The patient received adjuvant radiation. A follow-up CT scan, 1 year later, showed no local recurrence or metastasis.

Case Example 6: Radiographic Imaging of a mixed Thymoma and Thymic Carcinoma, Stage 4A (Thymic carcinoma with delayed pleural metastasis)

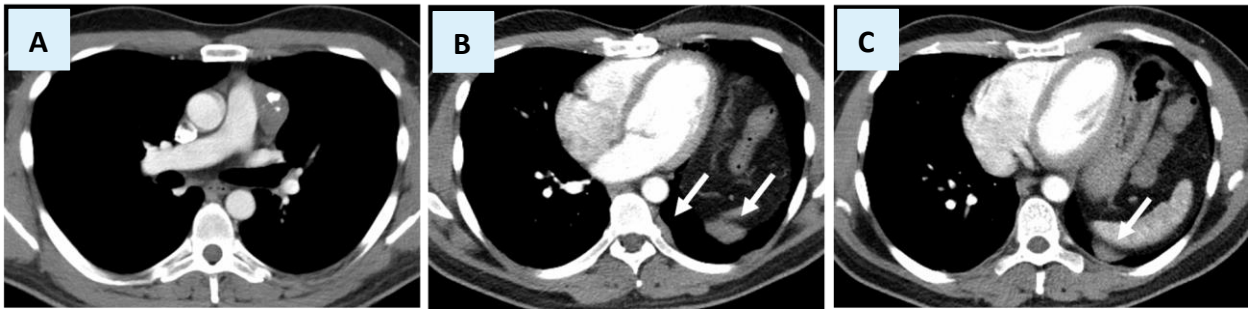

Figure 6: An incidental anterior mediastinal tumor was found on CT scan (A). The lesion was resected; pathology revealed a well-differentiated thymic squamous cell carcinoma arising from a type B2 thymoma with involvement of the parietal pericardium and visceral pleura without extension into lung parenchyma. One of eleven (1/11) anterior mediastinal lymph nodes was positive pT3 N1. No tumor was present at the surgical resection margin. The patient was placed on surveillance, 6 years later, the annual follow-up CT (B and C), demonstrated left lower pleural metastases (arrows).

Case Example 7: Radiographic Imaging for Thymoma, Stage 4A.

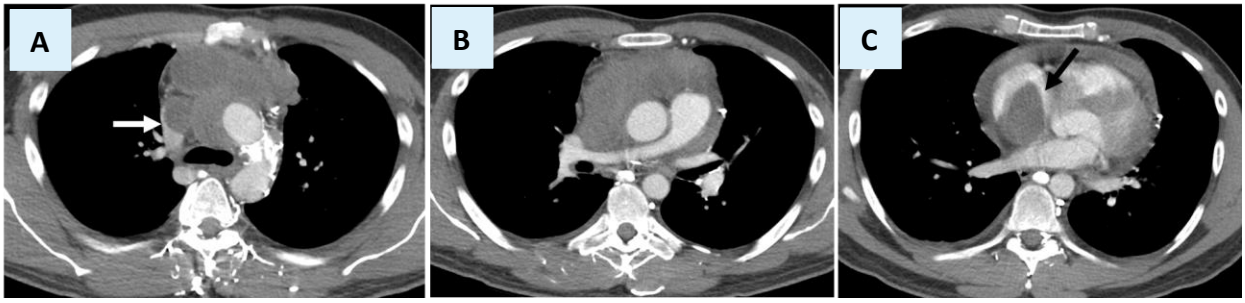

Figure 7: A large anterior mediastinal mass with extension into the superior vena cava (A, white arrow) and right atrium (C, black arrow) was identified on CT scan. The mass, a focal segment of the aorta, SVC and right atrium were resected. The pathology results determined a Thymoma type B3, and two out of nine (2/9) resected lymph nodes were positive. Stage 4A, pT4 N1.

Case Example 8: Radiographic Imaging for Thymic Carcinoma, Stage 1

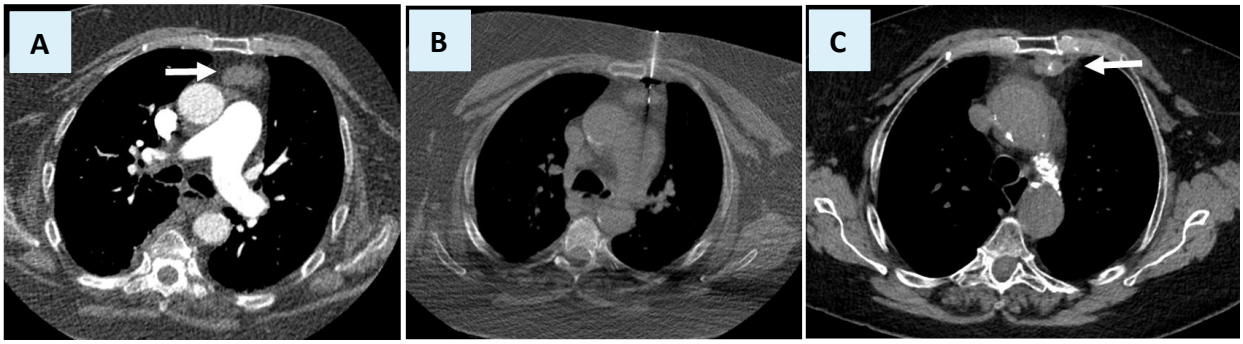

Figure 8: An incidental anterior mediastinal mass, with ill-defined contours, was found on CT pulmonary angiography (A) which suggested infiltration of the surrounding mediastinal fat. The patient was not a candidate for surgical resection. A CT-guided core biopsy was performed (B), and the result was in keeping with a squamous cell carcinoma. The metastatic workup was negative. The patient was referred to radiation oncology and based on multidisciplinary discussion was treated with SBRT alone. A follow-up CT scan (C), 2 years after radiation therapy, showed the lesion remained small, and the surrounding fat haziness and small calcifications within the mass were radiation-induced. Stage 1.

Case Example 9: Radiographic Imaging for Thymic Carcinoma, Stage 3A.

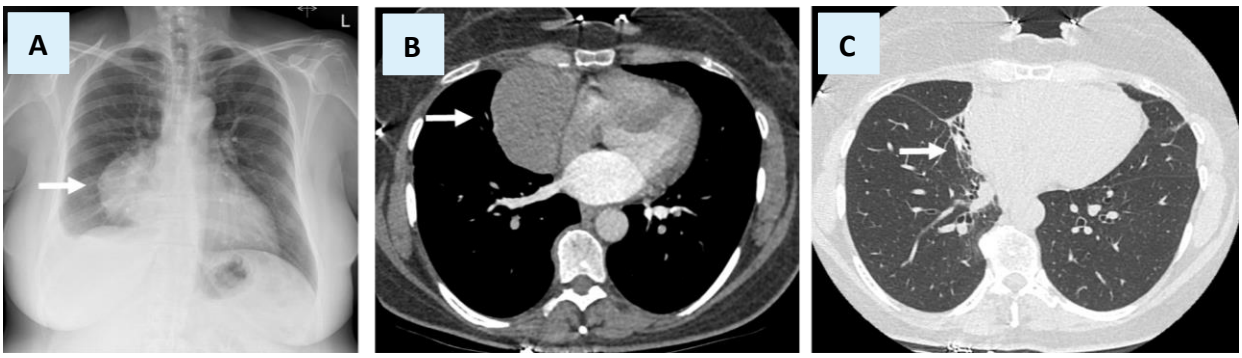

Figure 9: An anterior mediastinal mass was found on chest x-ray (A). The CT scan (B) showed a large right anterior mediastinal mass with smooth compression effect on the right atrium, without invasion or extra-thoracic extension. The image-guided needle biopsy result revealed a large cell neuroendocrine carcinoma. The patient received 4 cycles of neoadjuvant chemotherapy (cisplatin, doxorubicin, cyclophosphamide). The mass was subsequently removed with a wedge resection of the subjacent right middle and lower lobes, pT3 pN0 and a positive resection margin was noted. Therefore, adjuvant radiation therapy was prescribed. Image C, four years after resection shows radiation-induced changes in the para-mediastinal right lung, no recurrence or metastasis. Stage 3A, pT3.

Case Example 10: Radiographic Imaging for Thymic Carcinoma, Stage 4A

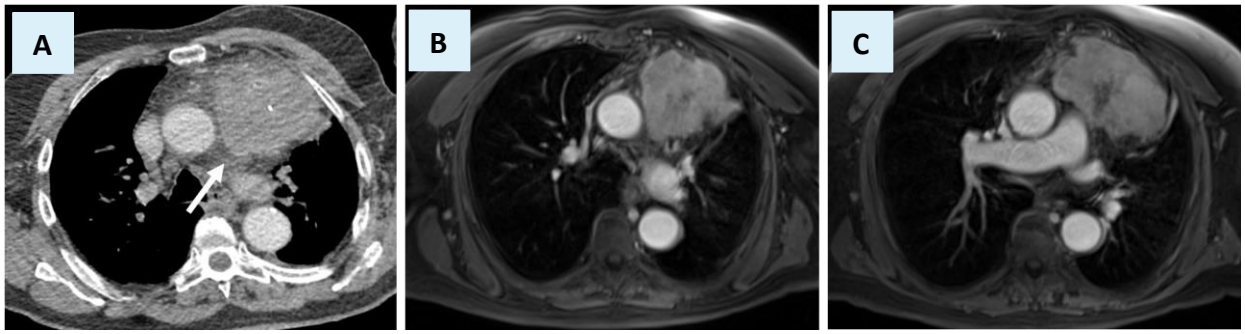

Figure 10: An incidental anterior mediastinal tumor was found on CT scan (A), with mediastinal fat invasion at the level of the AP window (arrow). A T1 weighted fat-saturated MRI with IV contrast (B and C) showed the mass had a wide base on the pericardium and confirmed limited invasion of the mediastinal fat at the level of the AP window. However, on cine images (not shown here) with cardiac pulsation, the main pulmonary artery, right ventricular outflow track and left ventricle moved separately from the mass, excluding direct invasion of the underlying vascular structures. The mass was resected; and pathology confirmed thymic squamous cell carcinoma, there was non-transmural invasion of pericardium and metastatic carcinoma to two of fifteen peri-thymic nodes. Stage 4A, pT2N1M0.