

Image Library

Chair of imaging educational module: Edith M. Marom

Contributing images in alphabetical order:

Galit Aviram

Edith M. Marom

Nicolas Girard

Noriyuki Tomiyama

Mylene T. Truong

Chitra Viswanathan

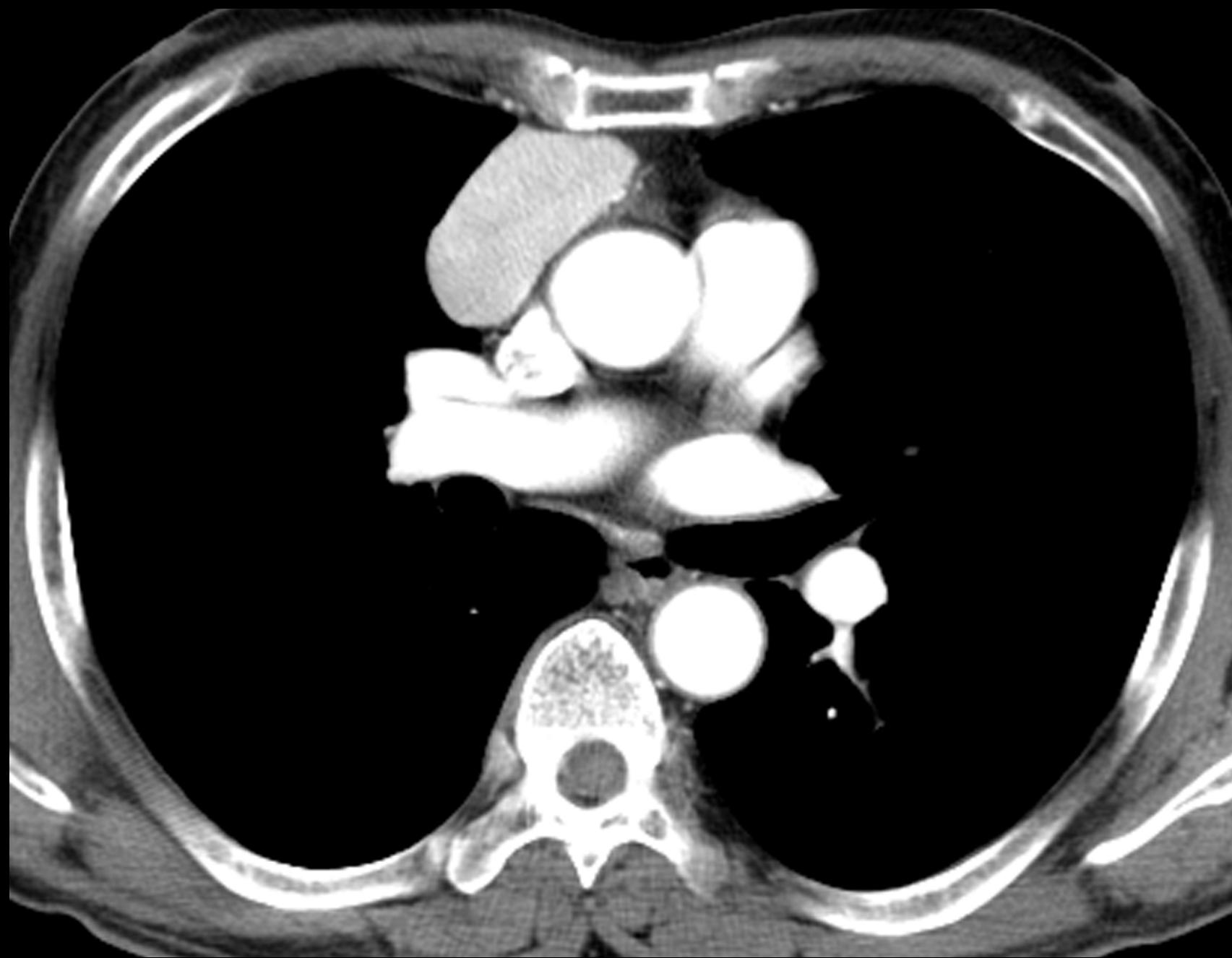
Instructions

This image library contains a collection of thymoma tumors, stages I to IV as well as a few miscellaneous mediastinal teaching cases.

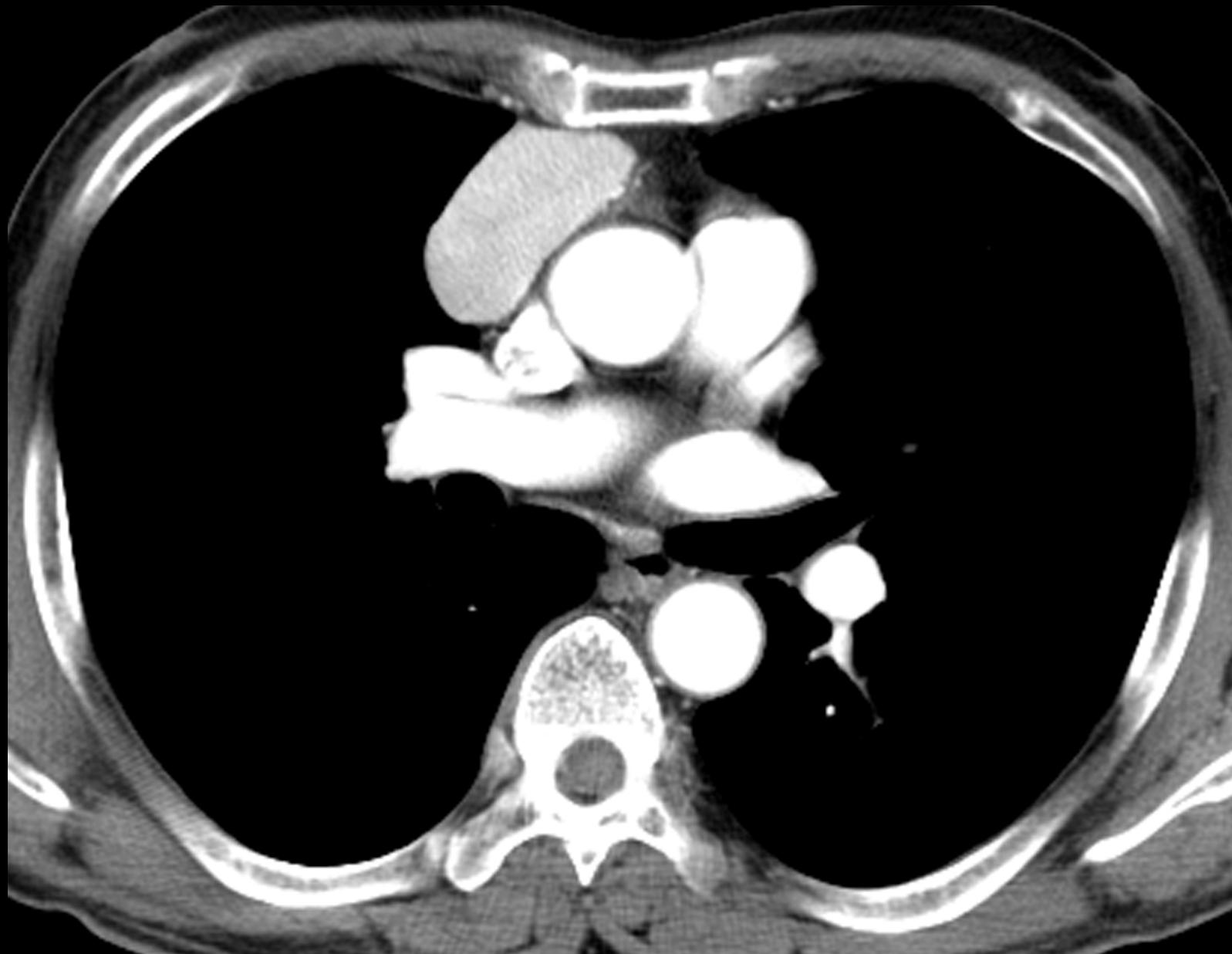
Please select the mode in which you would like to review this library:

- View in stage order with an explanatory legend
- View in stage order without an explanatory legend
- View in random order with an explanatory legend
- View in random order without an explanatory legend

Stage I

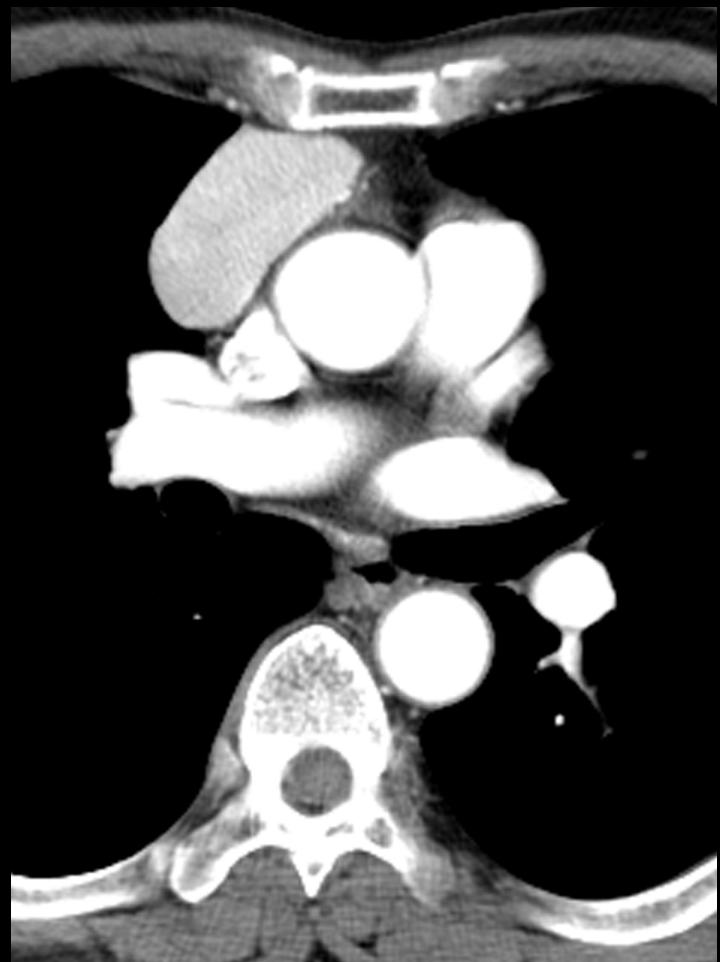


Stage I



Stage I

Axial image from a contrast enhanced chest CT at the level of the right pulmonary artery demonstrates an anterior mediastinal mass with a maximal diameter of 5.5 cm. The mass shows homogenous enhancement and abuts the pericardium. Fat planes around the tumor are preserved with no fatty infiltration. There are no pleural nodules and no enlarged lymph nodes. This CT image is suggestive of an early stage thymoma, that is stage I or II. At surgery, the tumor was found to be completely encapsulated, that is stage I.



Stage I

Axial image from a contrast enhanced chest CT at the level of the **right pulmonary artery (RPO)** demonstrates an anterior mediastinal mass with a maximal diameter of 5.5 cm. The mass shows homogenous enhancement and abuts the pericardium. Fat planes around the tumor are preserved with no fatty infiltration. There are no pleural nodules and no enlarged lymph nodes. This CT image is suggestive of an early stage thymoma, that is stage I or II. At surgery, the tumor was found to be completely encapsulated, that is stage I.



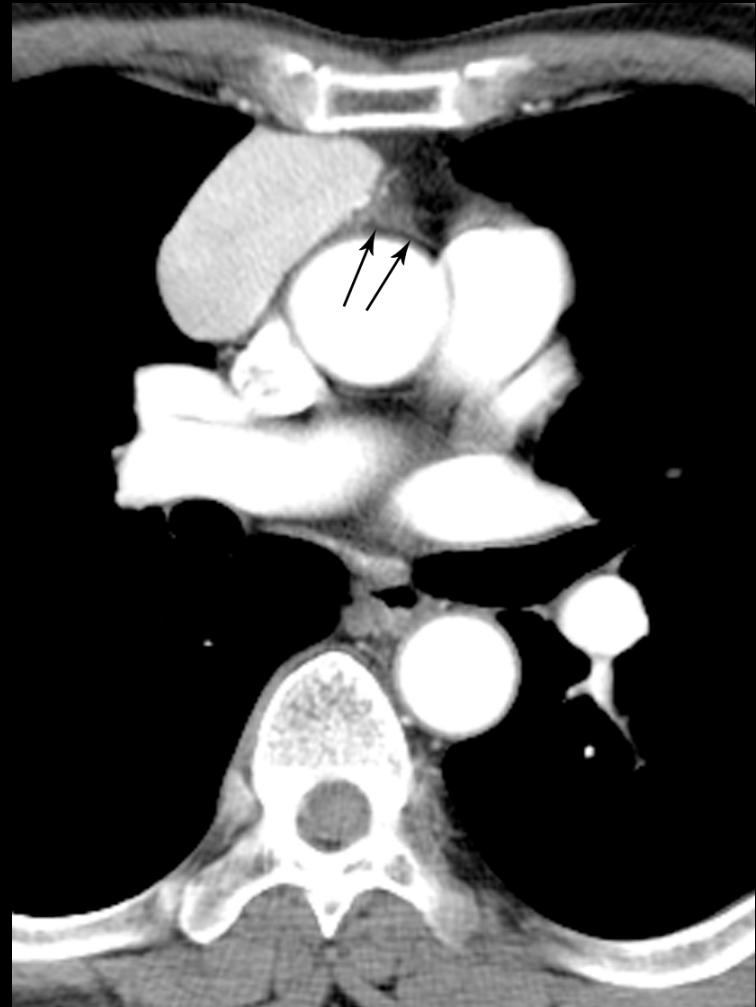
Stage I

Axial image from a contrast enhanced chest CT at the level of the right pulmonary artery demonstrates an **anterior mediastinal mass (arrow)** with a maximal diameter of 5.5 cm. The mass shows homogenous enhancement and abuts the pericardium. Fat planes around the tumor are preserved with no fatty infiltration. There are no pleural nodules and no enlarged lymph nodes. This CT image is suggestive of an early stage thymoma, that is stage I or II. At surgery, the tumor was found to be completely encapsulated, that is stage I.

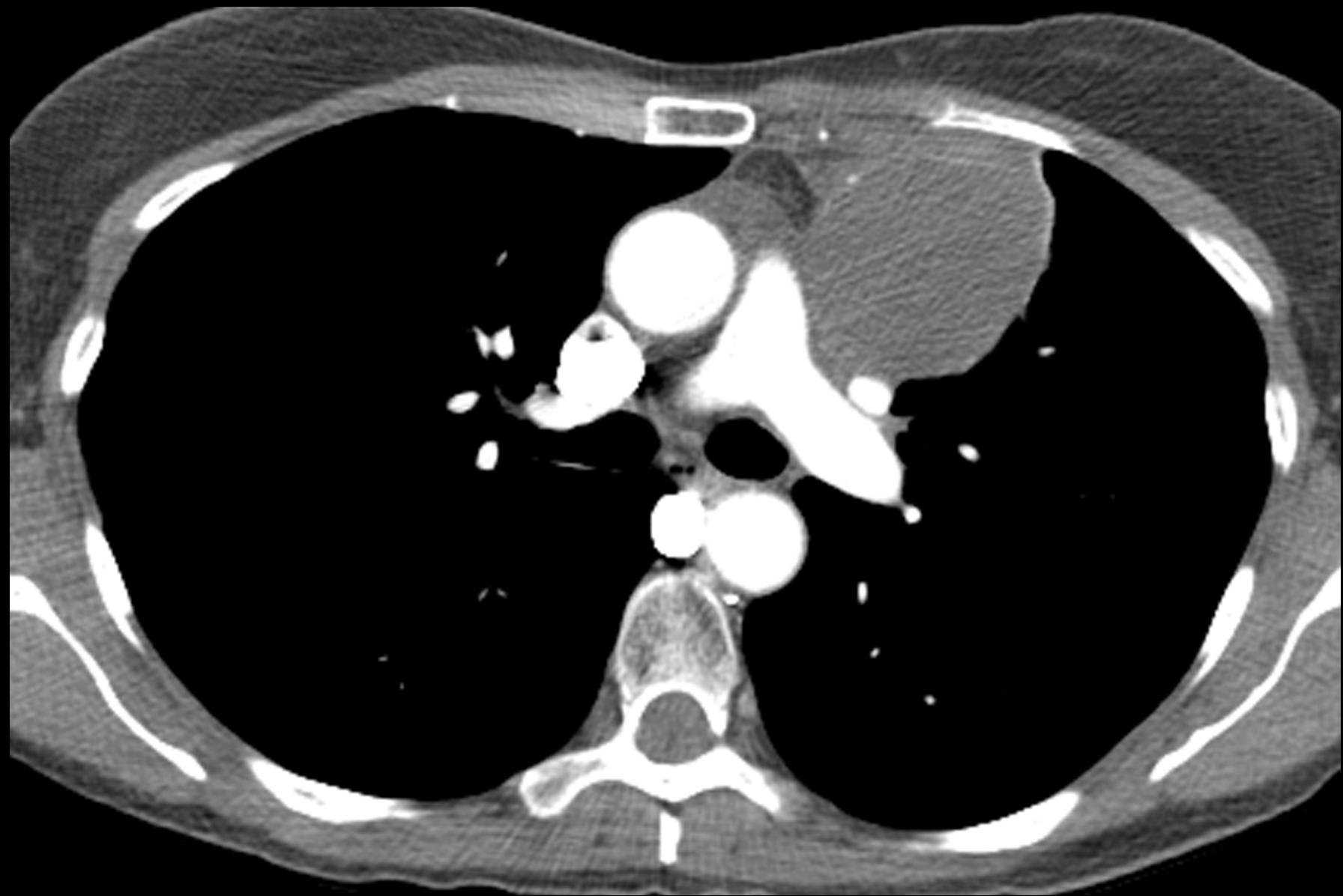


Stage I

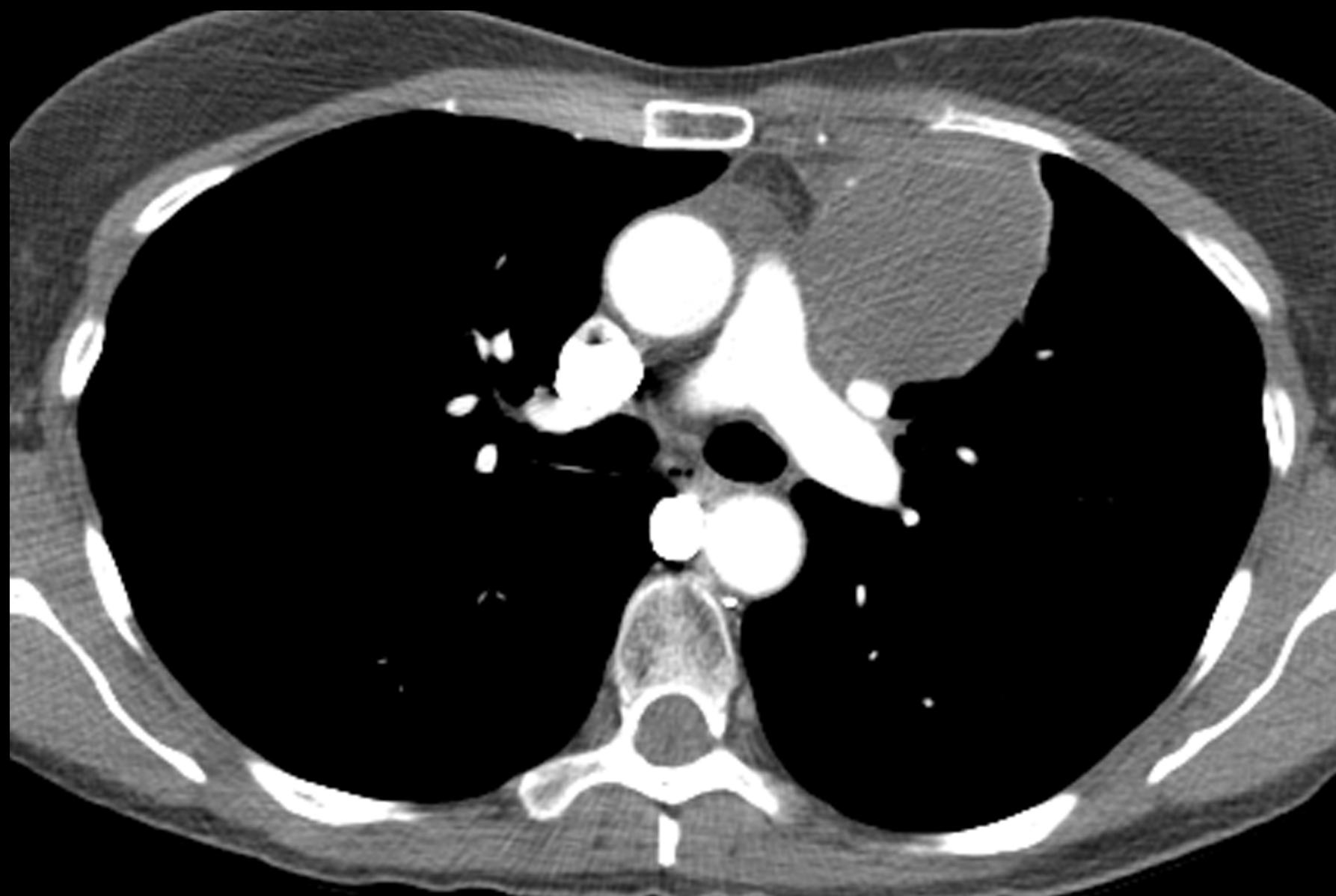
Axial image from a contrast enhanced chest CT at the level of the right pulmonary artery demonstrates an anterior mediastinal mass with a maximal diameter of 5.5 cm. The mass shows homogenous enhancement and abuts the **pericardium (arrows)**. Fat planes around the tumor are preserved with no fatty infiltration. There are no pleural nodules and no enlarged lymph nodes. This CT image is suggestive of an early stage thymoma, that is stage I or II. At surgery, the tumor was found to be completely encapsulated, that is stage I.



Stage I

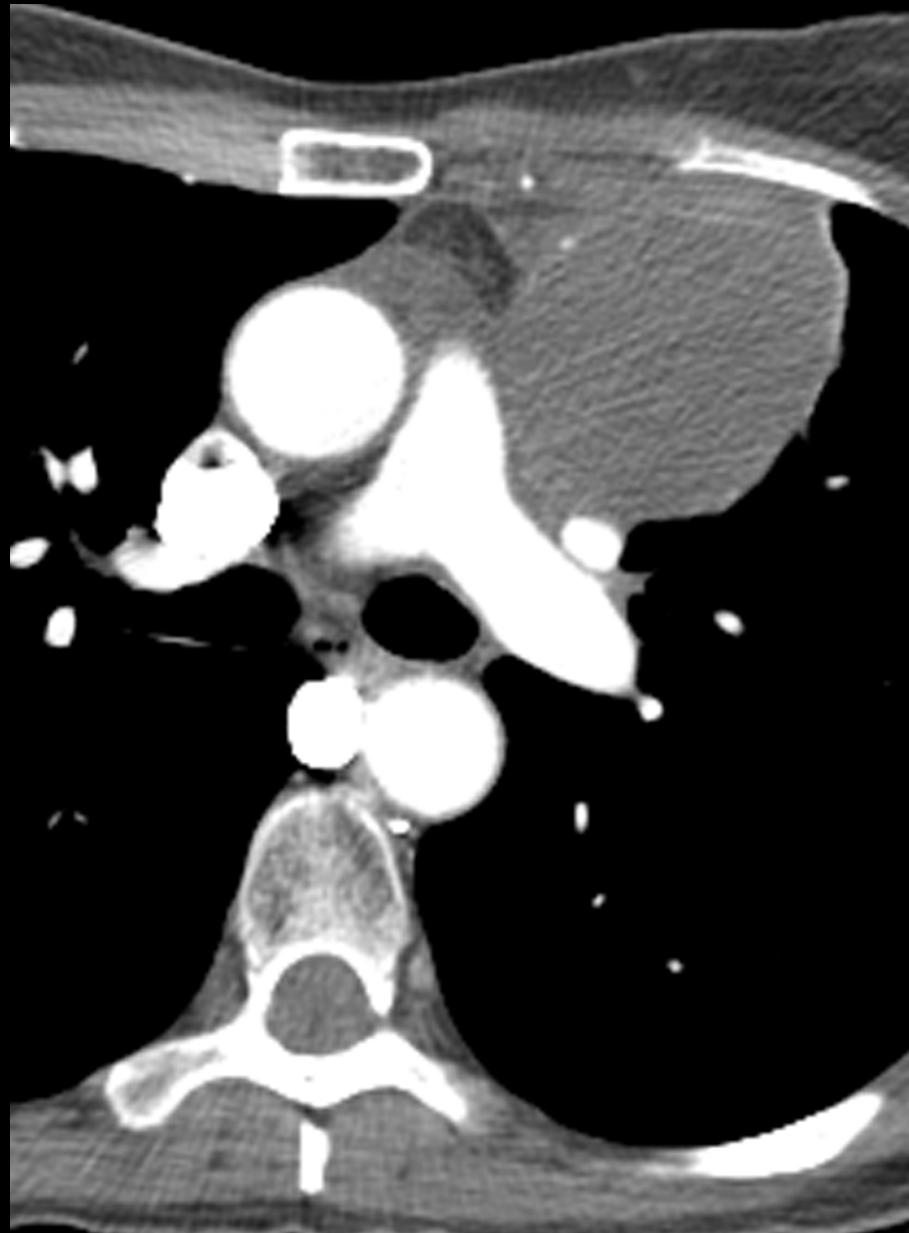


Stage I



Stage I

Axial contrast enhanced CT demonstrates a homogeneous low density left anterior mediastinal mass biopsy proven to be an encapsulated thymoma with a small amount of fluid in the pericardial space anterior to the aorta (A) and pulmonary trunk (P). At resection, the pericardium was not involved and pericardial biopsy revealed fibroconnective tissue with mild inflammation and no evidence of malignancy. Note the pericardial space can have up to 20cc of fluid normally. Fluid in the pericardial recesses should not be confused with lymphadenopathy or tumor infiltration.



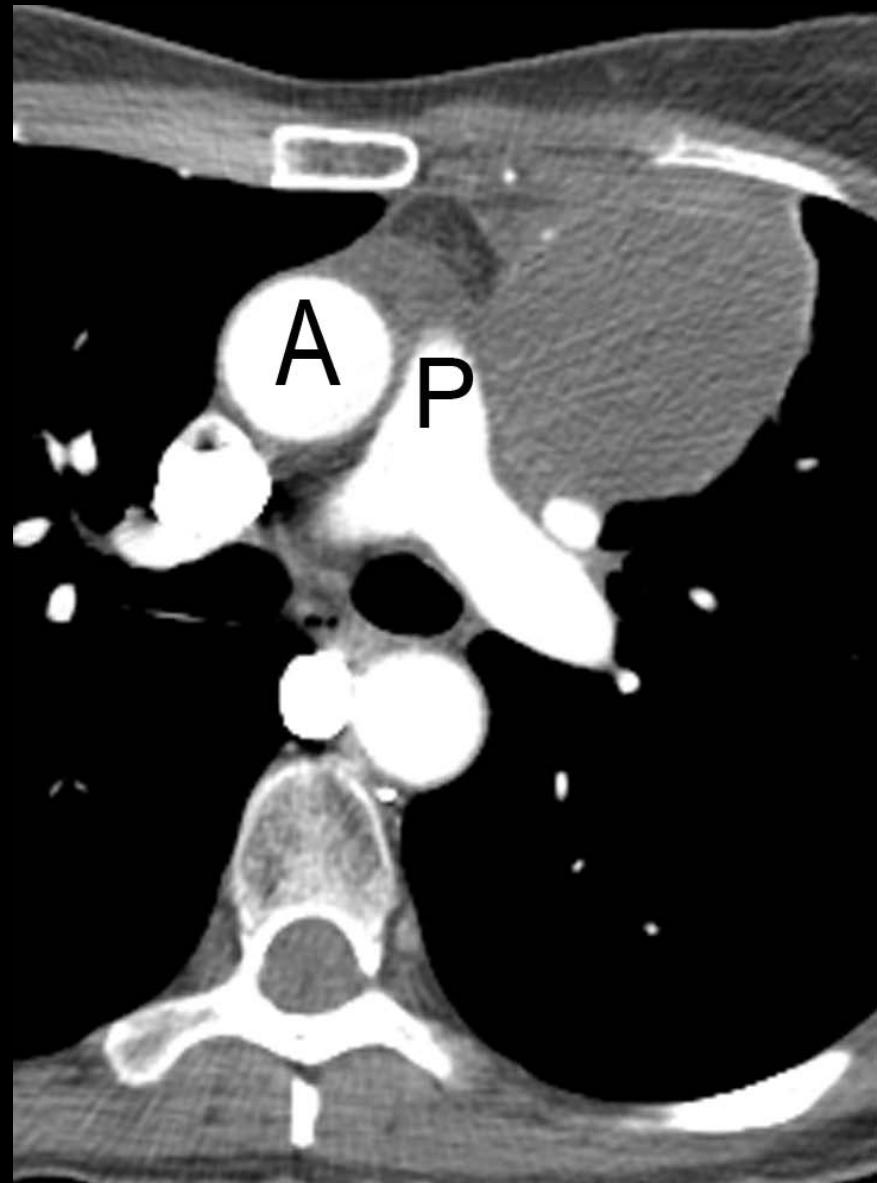
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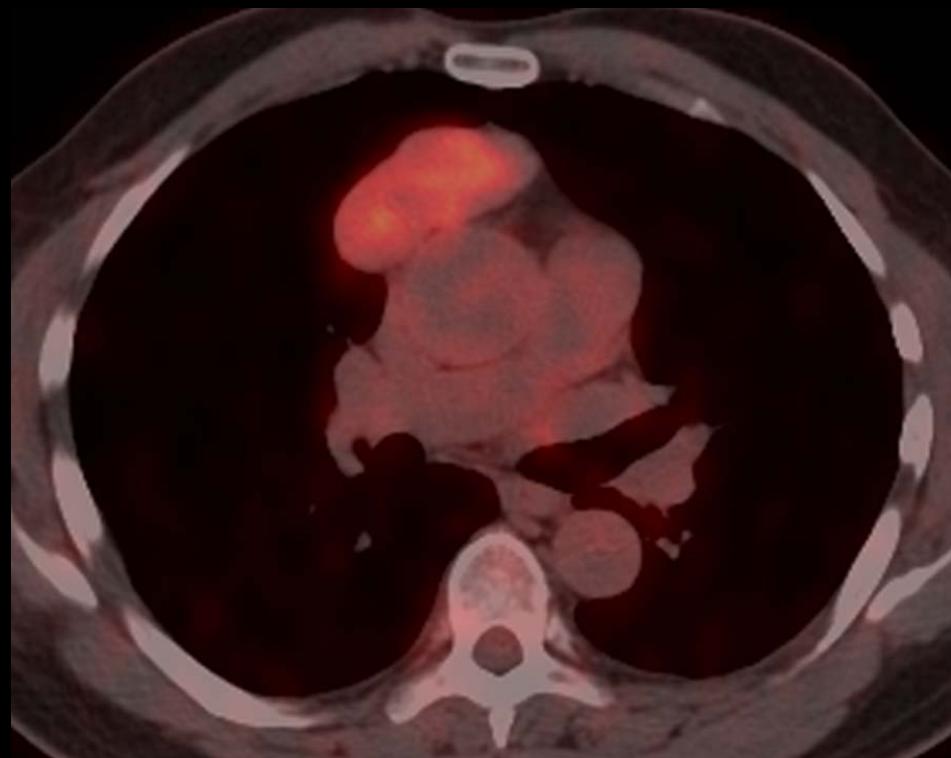
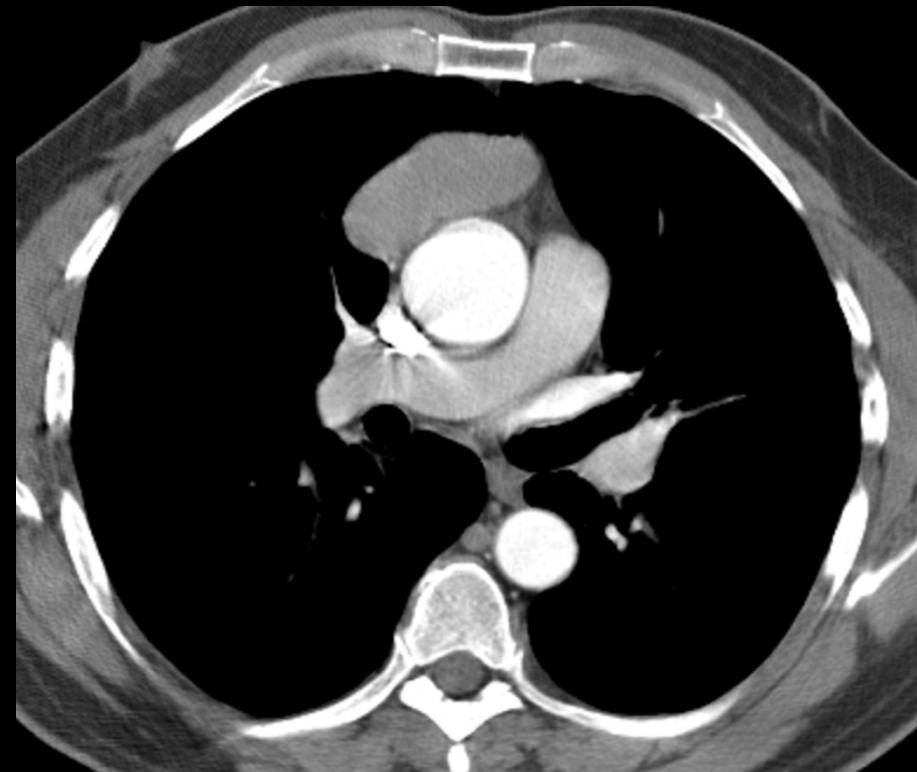


Stage I

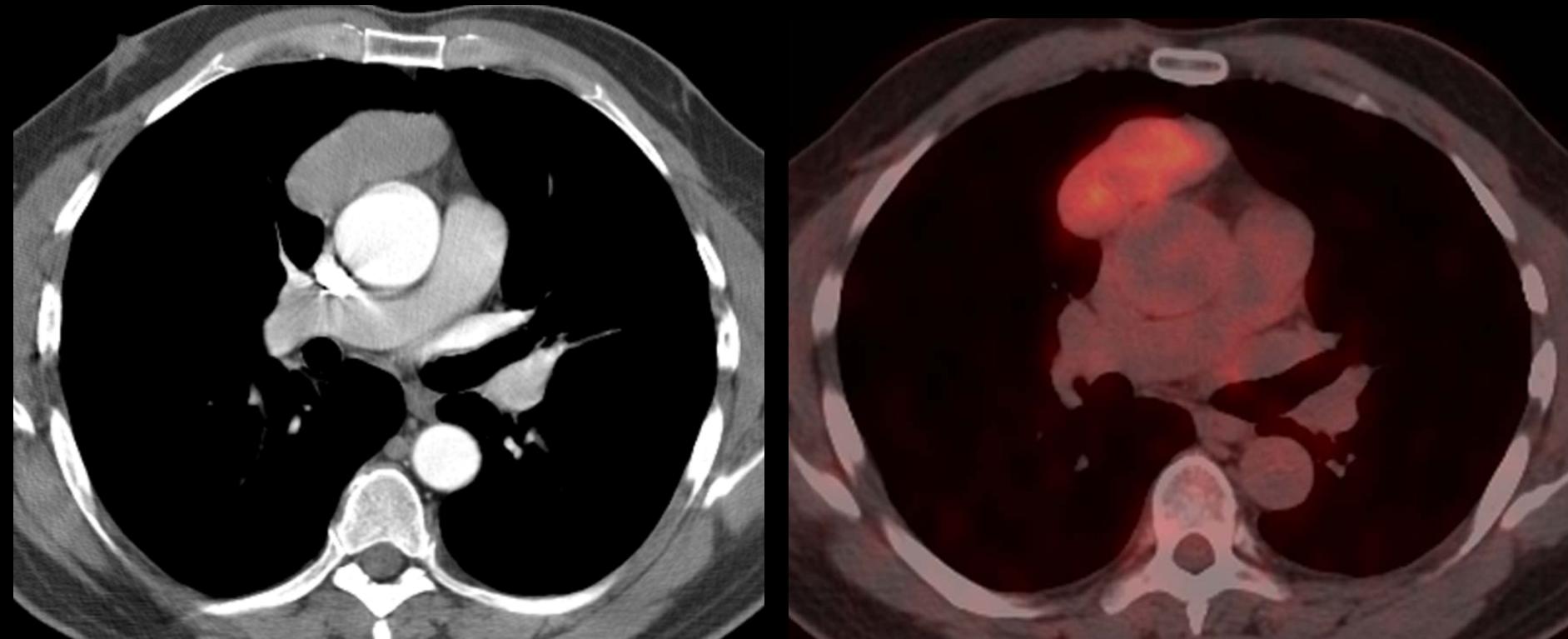
Axial contrast enhanced CT demonstrates a homogeneous low density left anterior mediastinal mass biopsy proven to be an encapsulated thymoma with a small amount of fluid in the pericardial space (*) anterior to the aorta (A) and pulmonary trunk (P). At resection, the pericardium was not involved and pericardial biopsy revealed fibroconnective tissue with mild inflammation and no evidence of malignancy. Note the pericardial space can have up to 20cc of fluid normally. Fluid in the pericardial recesses should not be confused with lymphadenopathy or tumor infiltration.



Stage I



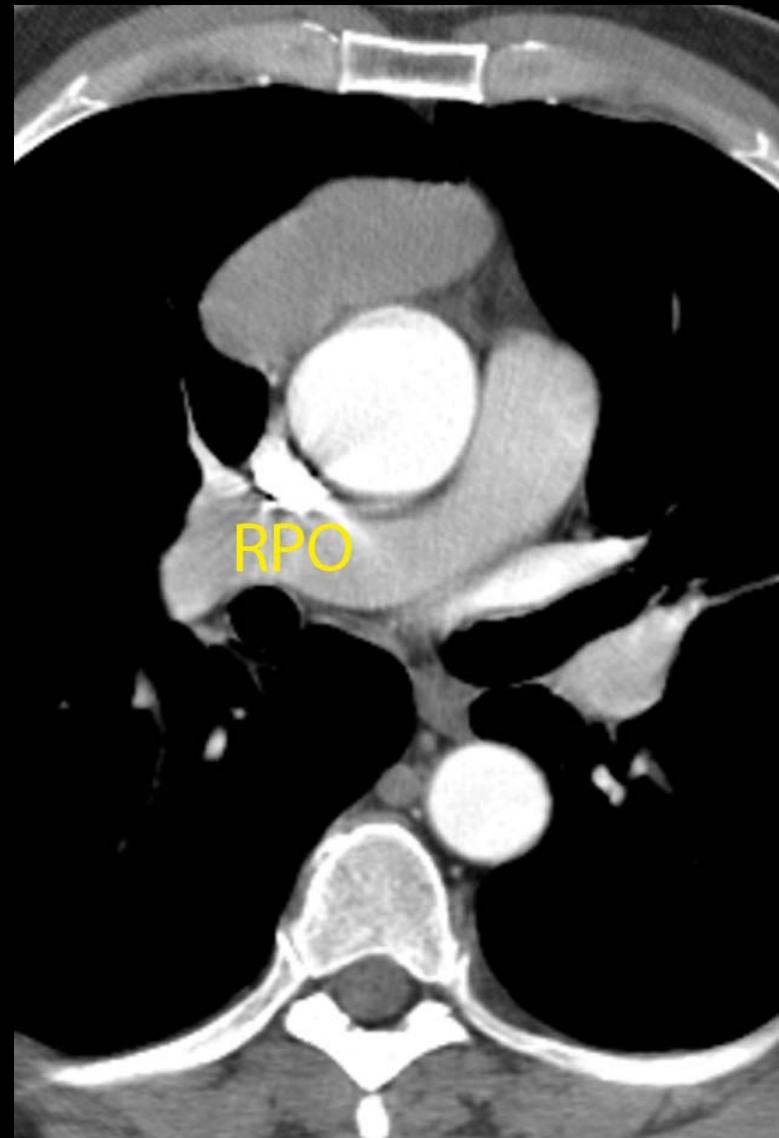
Stage I



Contrast enhanced CT at the level of the right pulmonary artery shows a well-circumscribed homogenous anterior mediastinal mass separated from the ascending aorta by a fat plane. Surrounding mediastinal fat is preserved without infiltration. Corresponding fused axial PET-CT image at the same level shows mild diffuse FDG uptake within the mass. The CT features are suggestive of early stage thymoma. At surgery this was found to be an encapsulated thymoma, stage I disease.

Stage I

Contrast enhanced CT at the level of the **right pulmonary artery (arrow)** shows a well-circumscribed homogenous anterior mediastinal mass separated from the ascending aorta by a fat plane. Surrounding mediastinal fat is preserved without infiltration. Corresponding fused axial PET-CT image at the same level shows mild diffuse FDG uptake within the mass. The CT features are suggestive of early stage thymoma. At surgery this was found to be an encapsulated thymoma, stage I disease.



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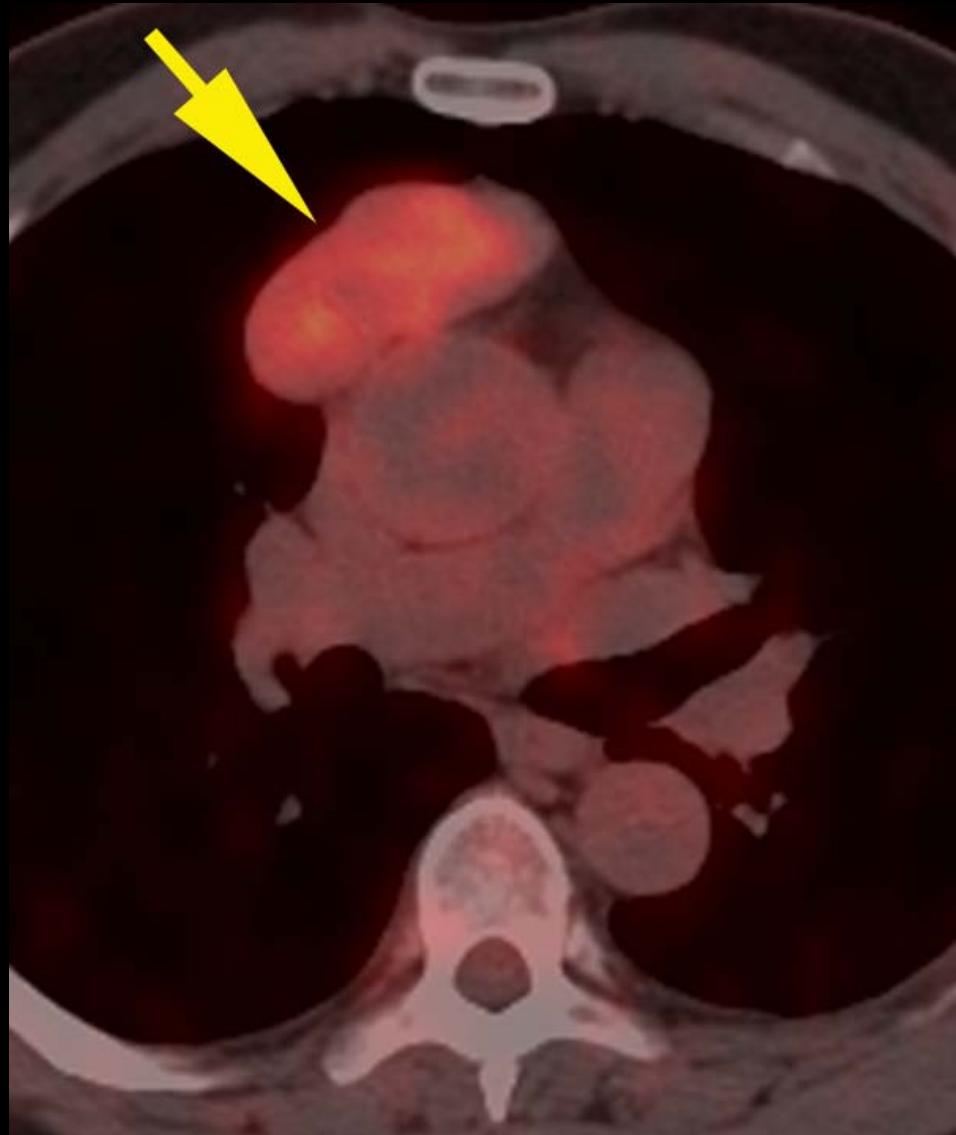
Stage I

Contrast enhanced CT at the level of the right pulmonary artery shows a well-circumscribed homogenous anterior mediastinal mass (arrow) separated from the ascending aorta by a **fat plane (arrows)**. Surrounding mediastinal fat is preserved without infiltration. Corresponding fused axial PET-CT image at the same level shows mild diffuse FDG uptake within the mass. The CT features are suggestive of early stage thymoma. At surgery this was found to be an encapsulated thymoma, stage I disease.



Stage I

Contrast enhanced CT at the level of the right pulmonary artery shows a well-circumscribed homogenous anterior mediastinal mass (arrow) separated from the ascending aorta by a fat plane (arrows). Surrounding mediastinal fat is preserved without infiltration. Corresponding fused axial PET-CT image at the same level shows **mild diffuse FDG uptake within the mass (arrow)**. The CT features are suggestive of early stage thymoma. At surgery this was found to be an encapsulated thymoma, stage I disease.



Stage II





Stage II



Contrast enhanced CT at the level of the left pulmonary artery shows a well-circumscribed anterior mediastinal mass. There is a lobular focus that appears to extend into the mediastinal fat. Focal capsular invasion was found at resection, stage II.

Stage II

Contrast enhanced CT at the level of the left pulmonary artery (**L**) shows a well-circumscribed anterior mediastinal mass. There is a lobular focus that appears to extend into the mediastinal fat. Focal capsular invasion was found at resection, stage II.



Stage II

Contrast enhanced CT at the level of the left pulmonary artery (L) shows a well-circumscribed **anterior mediastinal mass** (arrow).

There is a lobular focus that appears to extend into the mediastinal fat. Focal capsular invasion was found at resection, stage II.



Stage II

Contrast enhanced CT at the level of the left pulmonary artery (L) shows a well-circumscribed anterior mediastinal mass (arrow). There is a lobular focus that appears to extend into the mediastinal fat (arrow). Focal capsular invasion was found at resection, stage II.



Stage II

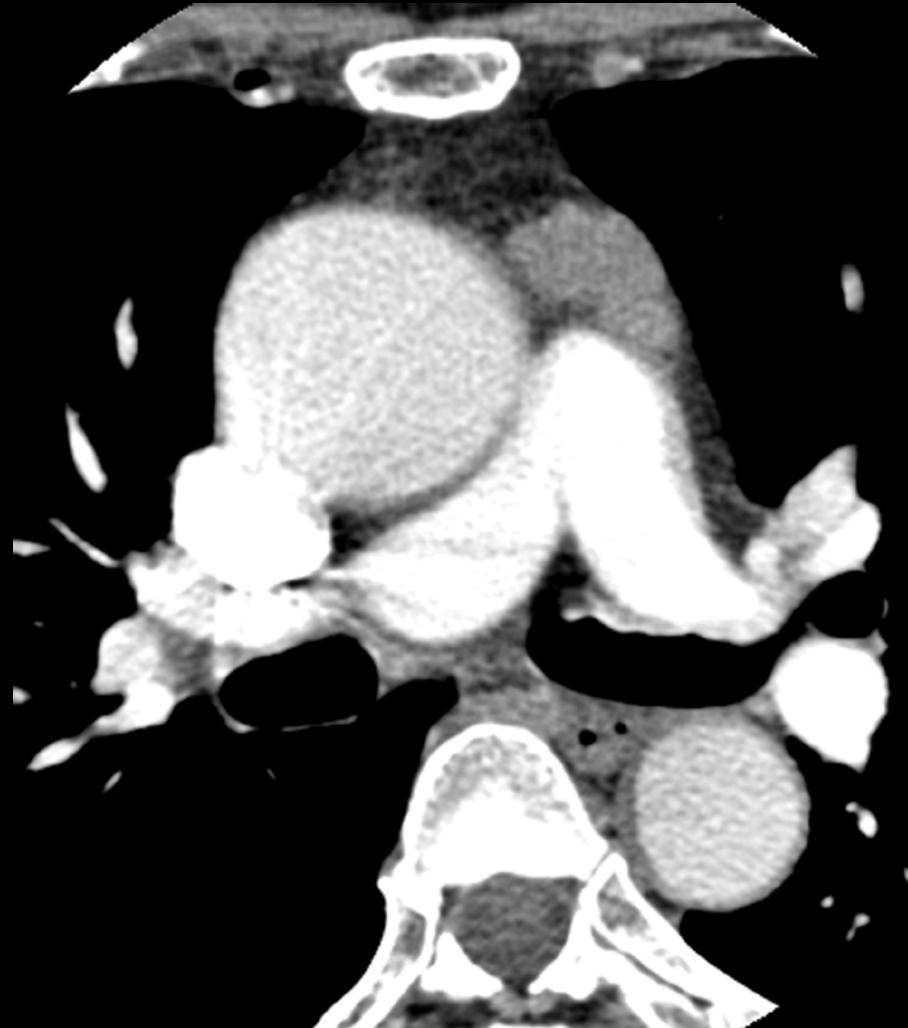


Stage II



Stage II

Axial contrast enhanced chest CT at the level of pulmonary trunk demonstrates a 2.6cm anterior mediastinal mass. The mass enhances homogeneously. There is one location in which the fat separating the mass from the pulmonary trunk is indistinct. No lymphadenopathy and no pleural nodules were seen in the remainder of the CT. This CT image is suggestive of an early stage thymoma, stage I or stage II. After resection, it was shown to be due to a stage II thymoma, with microscopic invasion of the surrounding mediastinal fat.



Stage II

Axial contrast enhanced chest CT at the level of pulmonary trunk (T) demonstrates a 2.6cm anterior mediastinal mass. The mass enhances homogeneously. There is one location in which the fat separating the mass from the pulmonary trunk is indistinct. No lymphadenopathy and no pleural nodules were seen in the remainder of the CT. This CT image is suggestive of an early stage thymoma, stage I or stage II. After resection, it was shown to be due to a stage II thymoma, with microscopic invasion of the surrounding mediastinal fat.



Stage II

Axial contrast enhanced chest CT at the level of pulmonary trunk (T) demonstrates a 2.6cm **anterior mediastinal mass**. The mass enhances homogeneously. There is one location in which the fat separating the mass from the pulmonary trunk is indistinct. No lymphadenopathy and no pleural nodules were seen in the remainder of the CT. This CT image is suggestive of an early stage thymoma, stage I or stage II. After resection, it was shown to be due to a stage II thymoma, with microscopic invasion of the surrounding mediastinal fat.



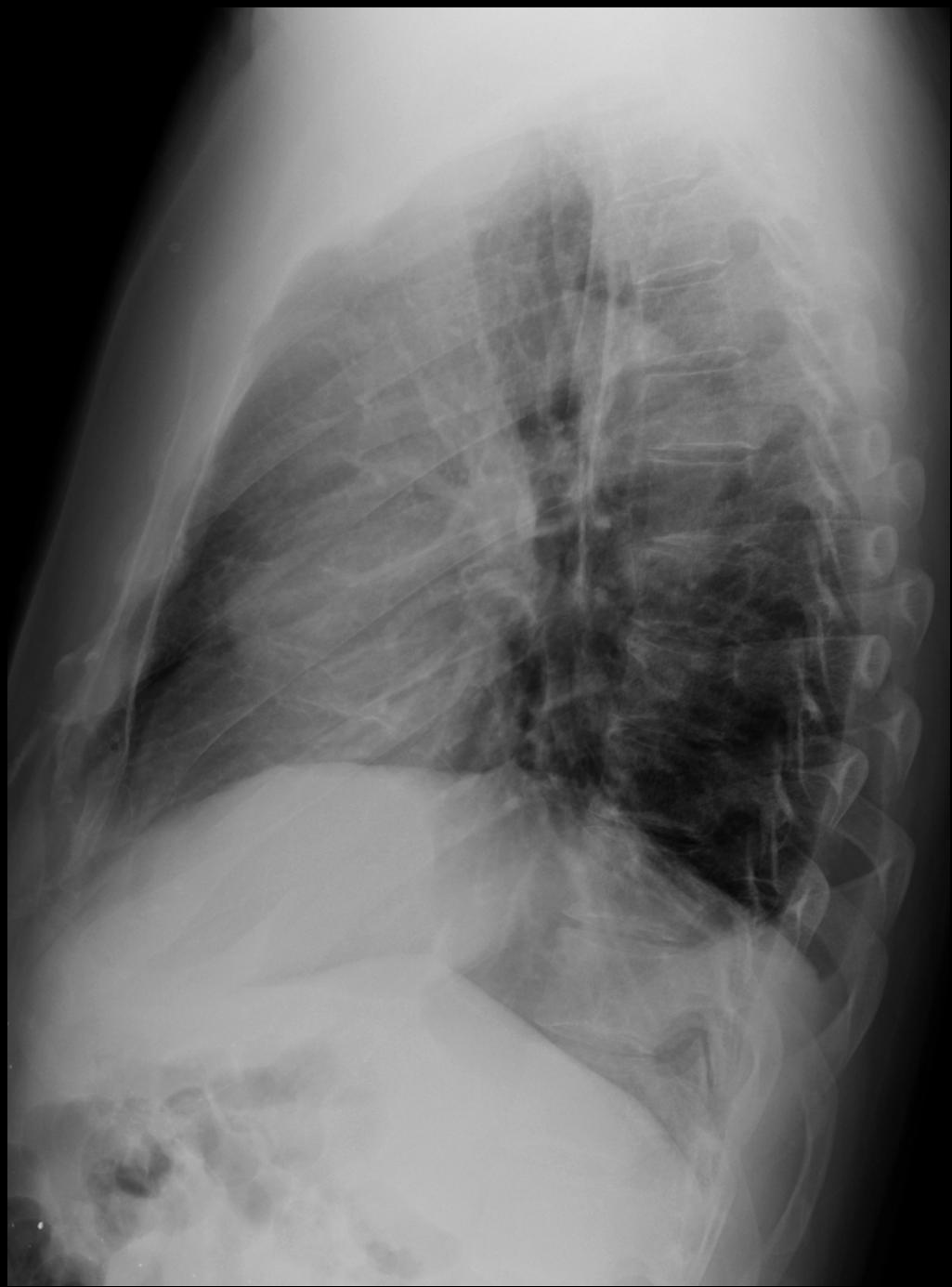
Stage II

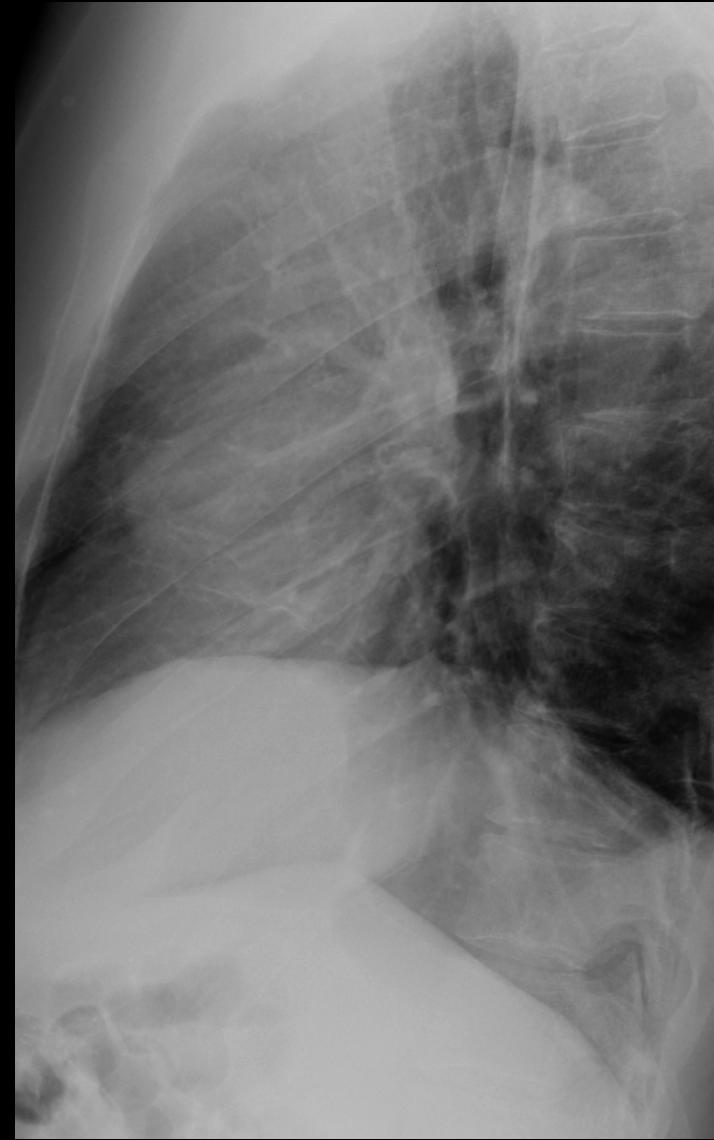
Axial contrast enhanced chest CT at the level of pulmonary trunk (T) demonstrates a 2.6cm anterior mediastinal mass. The mass enhances homogeneously. There is one location in which the **fat separating the mass from the pulmonary trunk is indistinct** (arrow). No lymphadenopathy and no pleural nodules were seen in the remainder of the CT. This CT image is suggestive of an early stage thymoma, stage I or stage II. After resection, it was shown to be due to a stage II thymoma, with microscopic invasion of the surrounding mediastinal fat.



Stage III





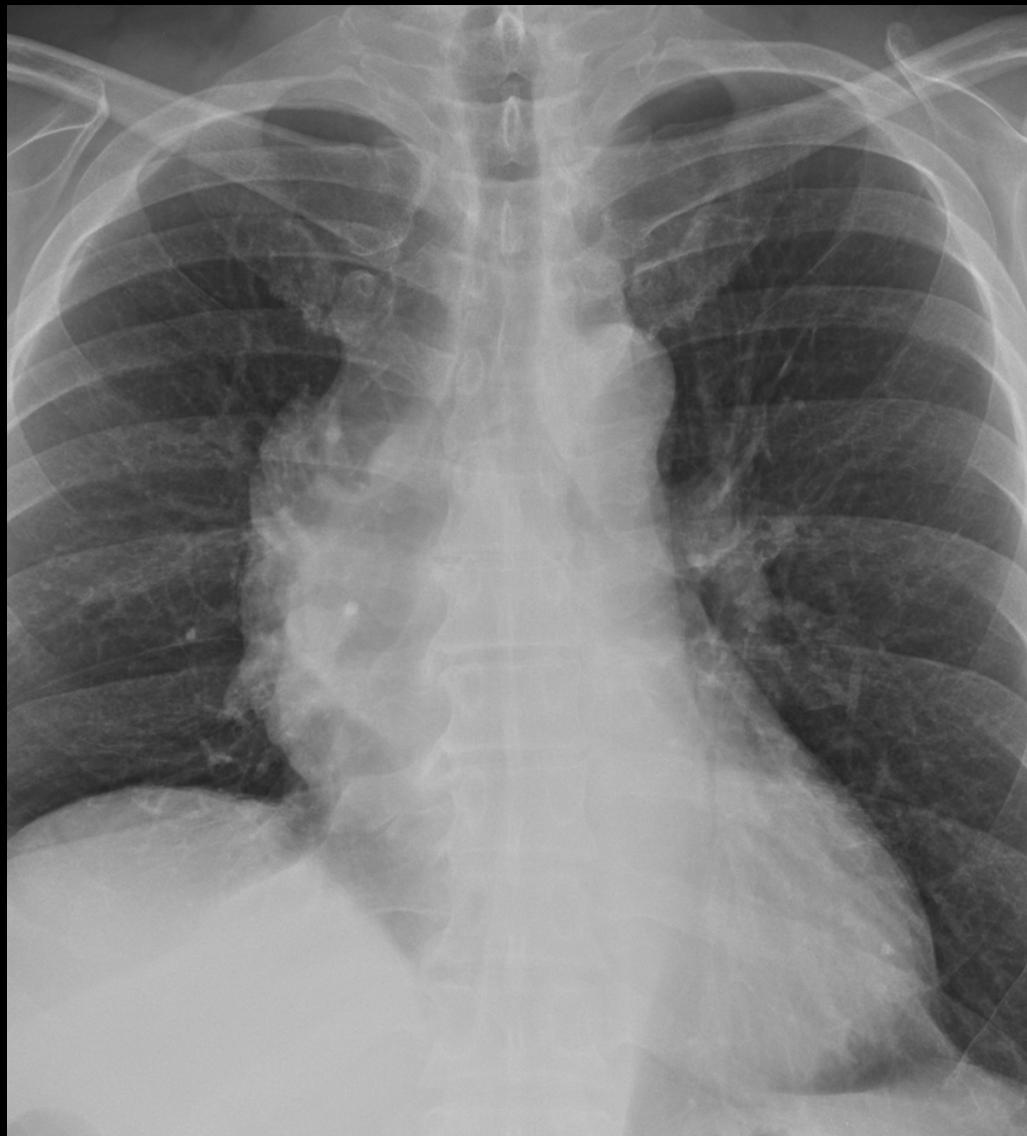


Stage III



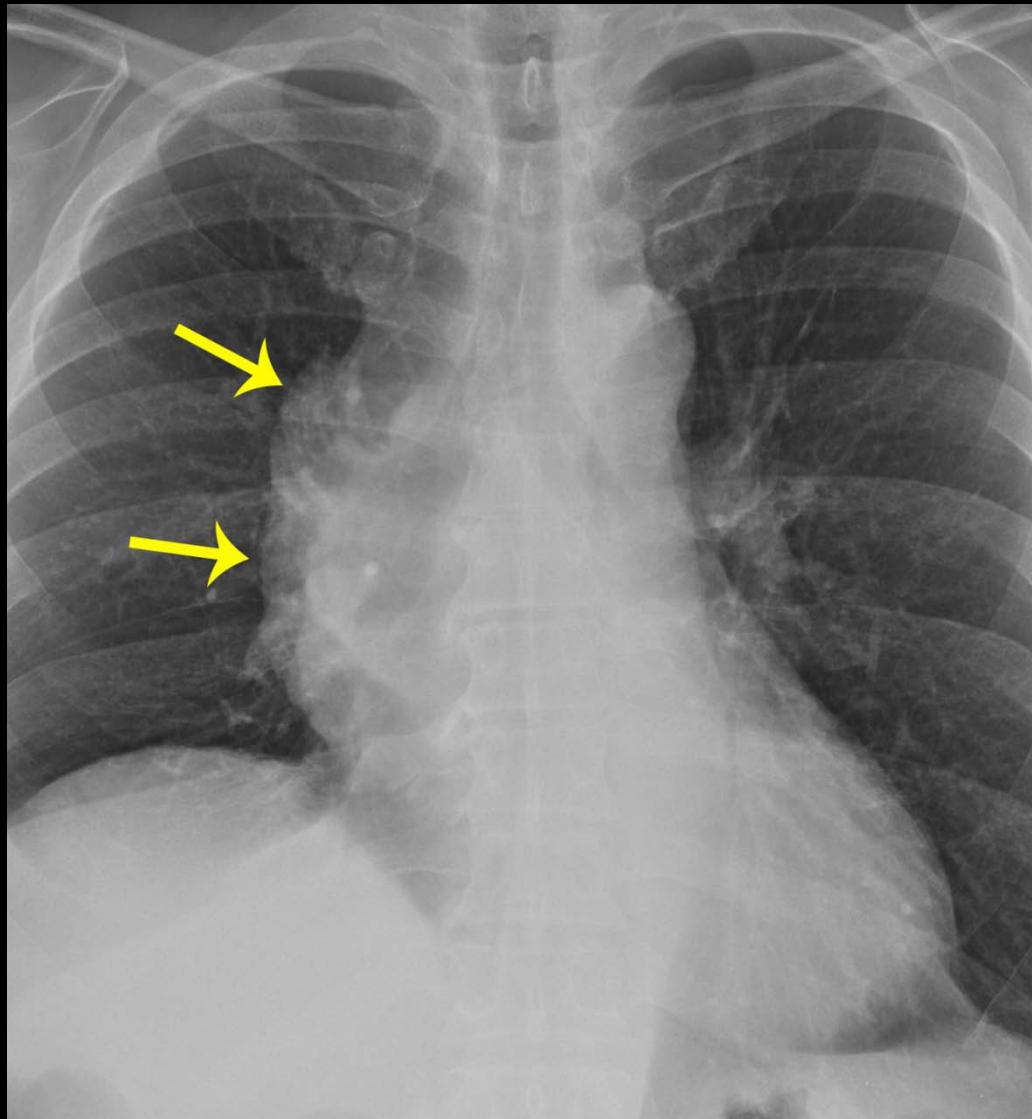
Stage III

Posterior anterior chest radiograph demonstrates a right anterior mediastinal mass with elevation of the right hemidiaphragm. Note the mass fills up the retrosternal air space on the lateral chest radiograph. There are no pleural effusions. The lungs are normal. The right phrenic nerve descends along the superior vena cava, right atrium, and inferior vena cava and spreads over the right hemidiaphragm. Due to involvement of the right phrenic nerve by the anterior mediastinal mass biopsy-proven to be thymoma, there is elevation of the right hemidiaphragm.



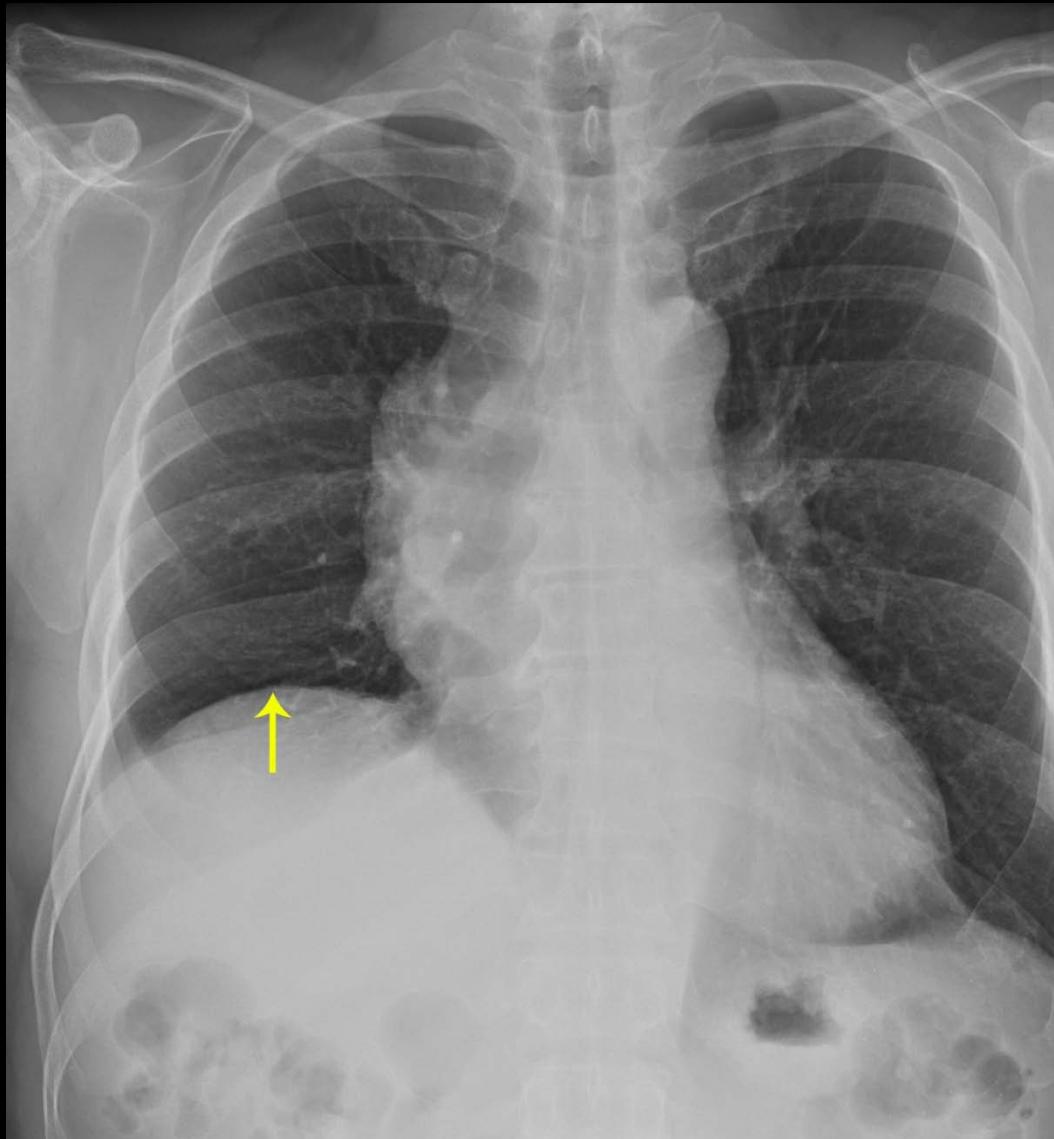
Stage III

Posterior anterior chest radiograph demonstrates a **right anterior mediastinal mass** with elevation of the right hemidiaphragm . Note the mass fills up the retrosternal air space on the lateral chest radiograph. There are no pleural effusions. The lungs are normal. The right phrenic nerve descends along the superior vena cava, right atrium, and inferior vena cava and spreads over the right hemidiaphragm. Due to involvement of the right phrenic nerve by the anterior mediastinal mass biopsy-proven to be thymoma, there is elevation of the right hemidiaphragm.

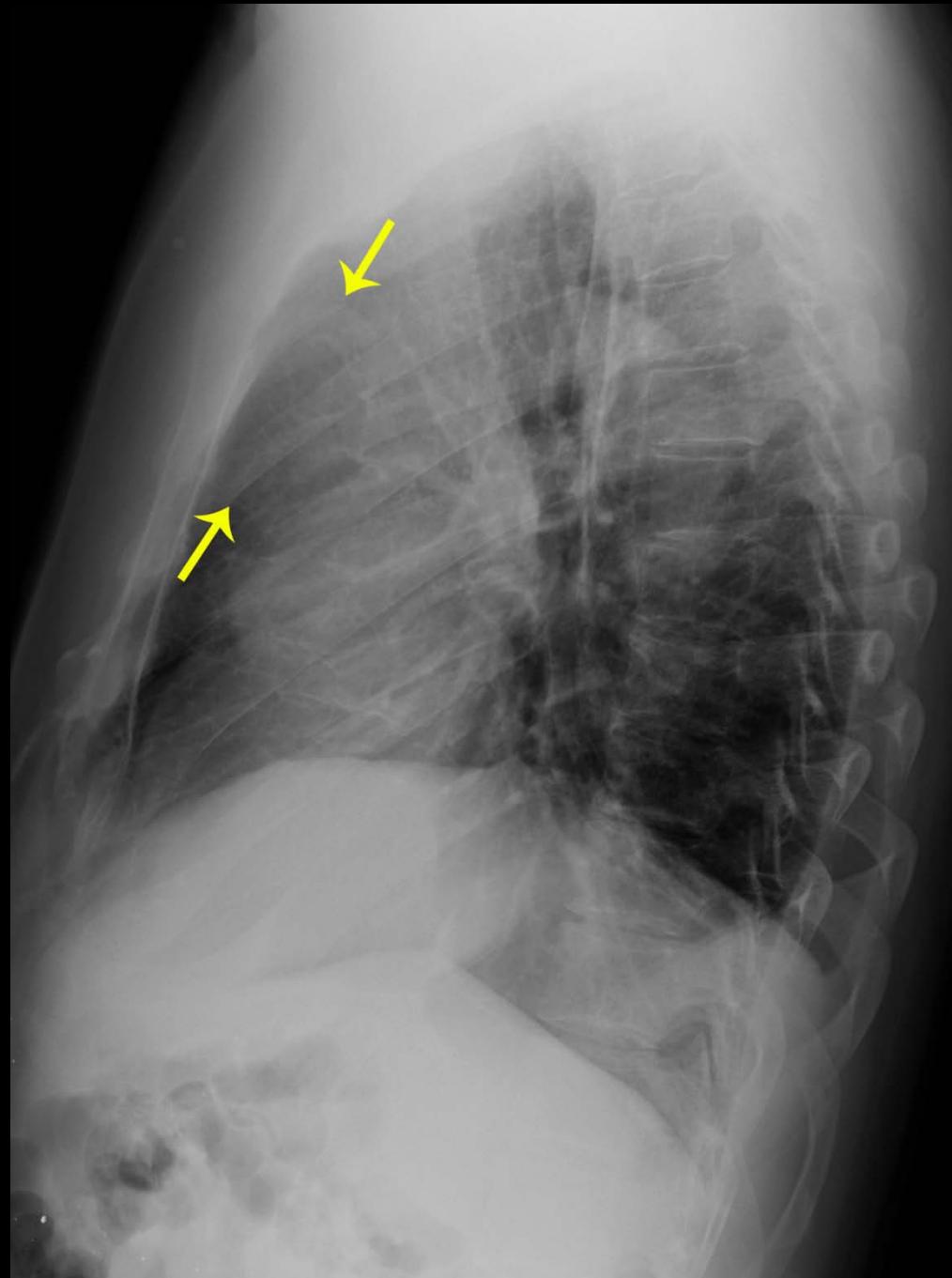


Stage III

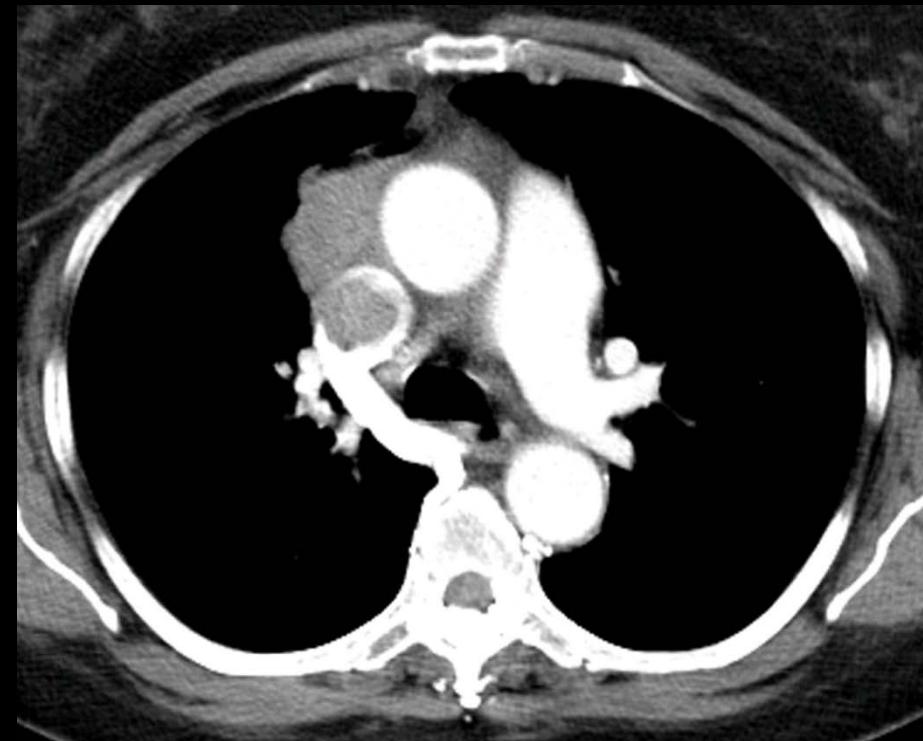
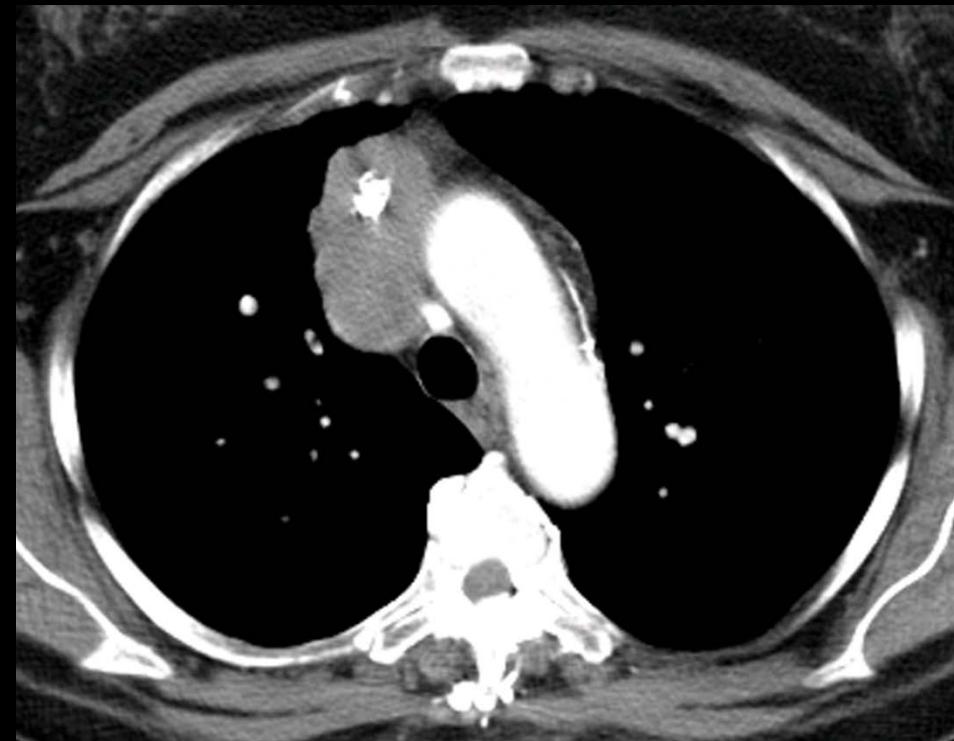
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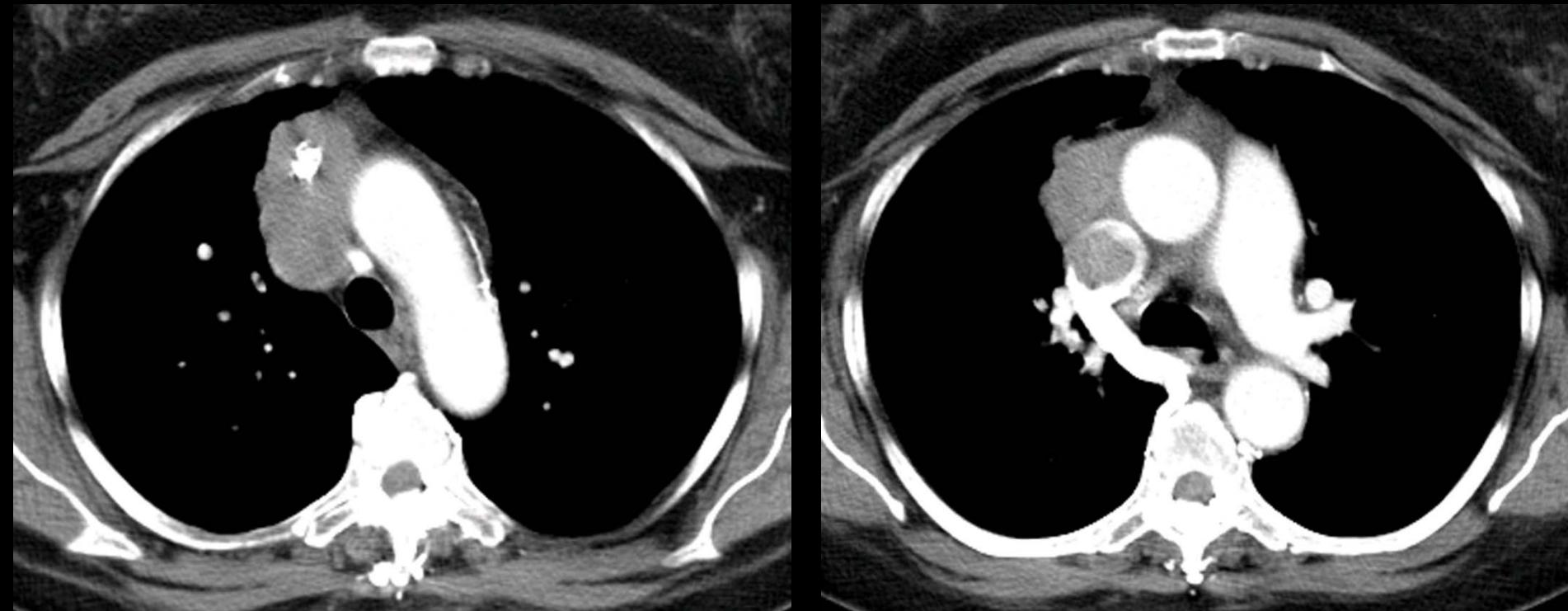
Posterior anterior chest radiograph demonstrates a right anterior mediastinal mass with elevation of the right hemidiaphragm . Note the **mass fills up the retrosternal air space** on the lateral chest radiograph. There are no pleural effusions. The lungs are clear. The right phrenic nerve descends along the superior vena cava, right atrium, and inferior vena cava and spreads over the right hemidiaphragm. Due to involvement of the right phrenic nerve by the anterior mediastinal mass biopsy-proven to be thymoma, there is elevation of the right hemidiaphragm.



Stage III



Stage III



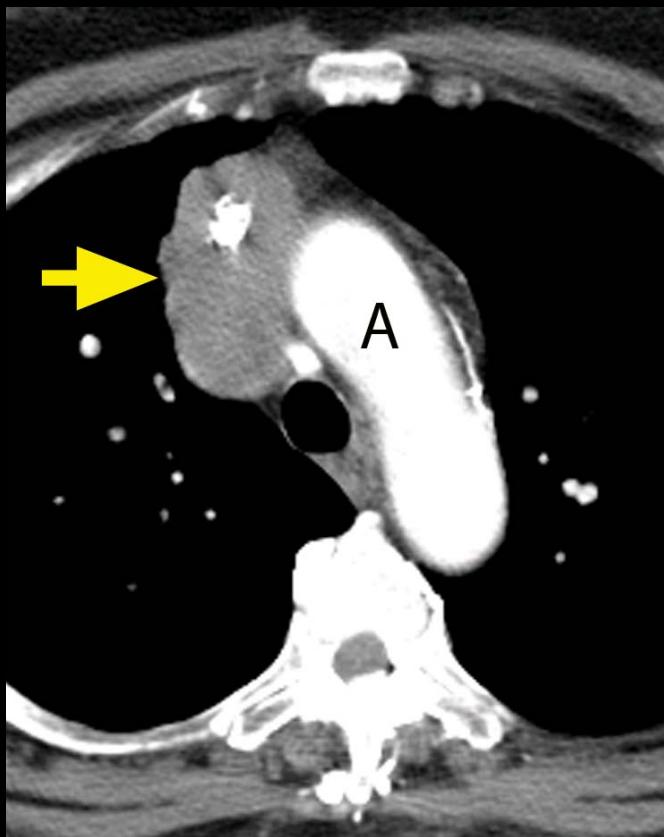
Contrast enhanced CT images at the level of the transverse aorta and left pulmonary artery show a lobulated mass in the right anterior mediastinum. The mass contains a coarse calcification and grows into the superior vena cava. Note collateral circulation due to the obstruction of the superior vena cava. This is an example of Stage III disease.

Stage III



Contrast enhanced CT images at the level of the **transverse aorta (A)** and **pulmonary trunk (T)** show a lobulated mass in the right anterior mediastinum. The mass contains a coarse calcification and grows into the superior vena cava. Note collateral circulation due to the obstruction of the superior vena cava. This is an example of Stage III disease.

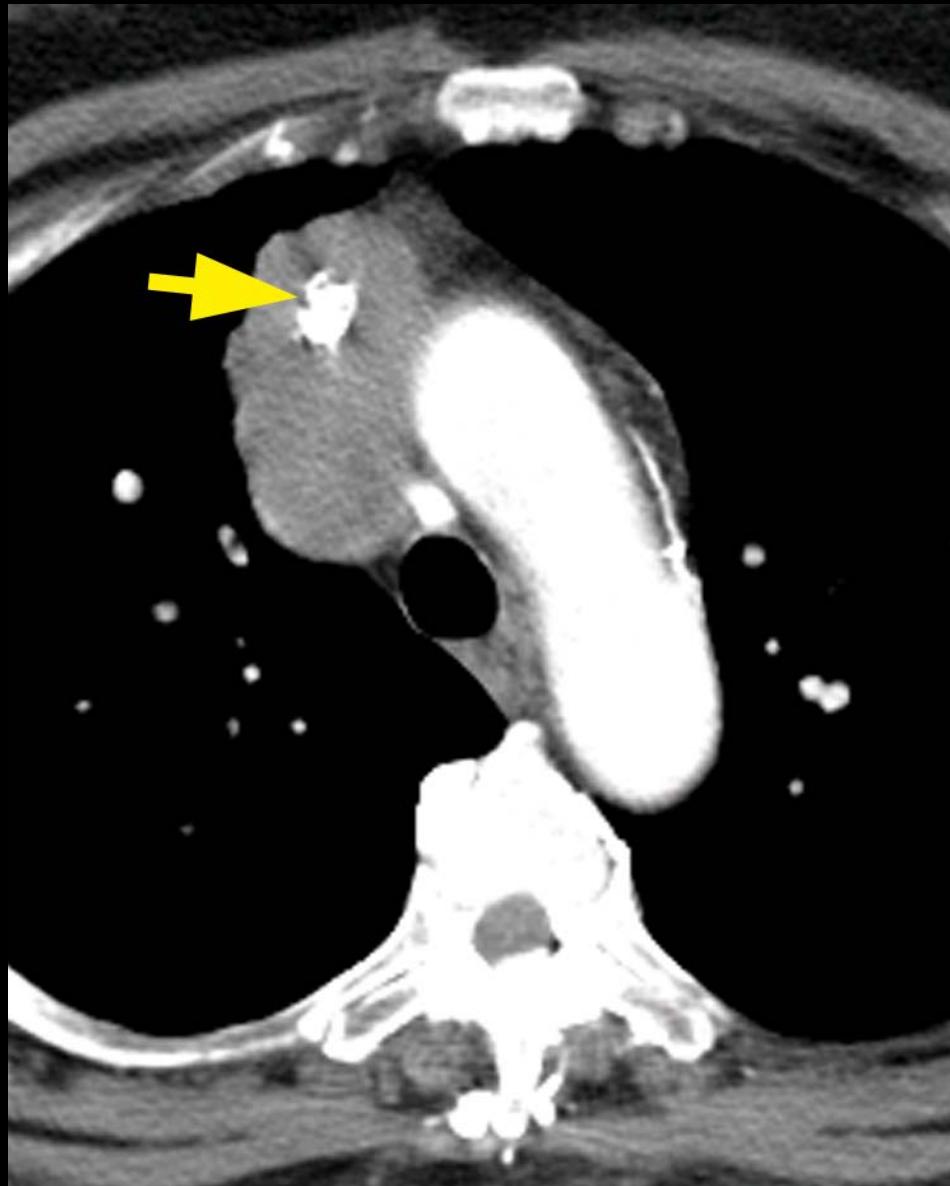
Stage III



Contrast enhanced CT images at the level of the transverse aorta (A) and pulmonary trunk (T) show a **lobulated mass (arrow)** in the right anterior mediastinum. The mass contains a coarse calcification and grows into the superior vena cava. Note collateral circulation due to the obstruction of the superior vena cava. This is an example of Stage III disease.

Stage III

Contrast enhanced CT images at the level of the transverse aorta and pulmonary trunk show a lobulated mass (arrow) in the right anterior mediastinum. The mass contains a **coarse calcification** (arrow) and grows into the superior vena cava. Note collateral circulation due to the obstruction of the superior vena cava. This is an example of Stage III disease.



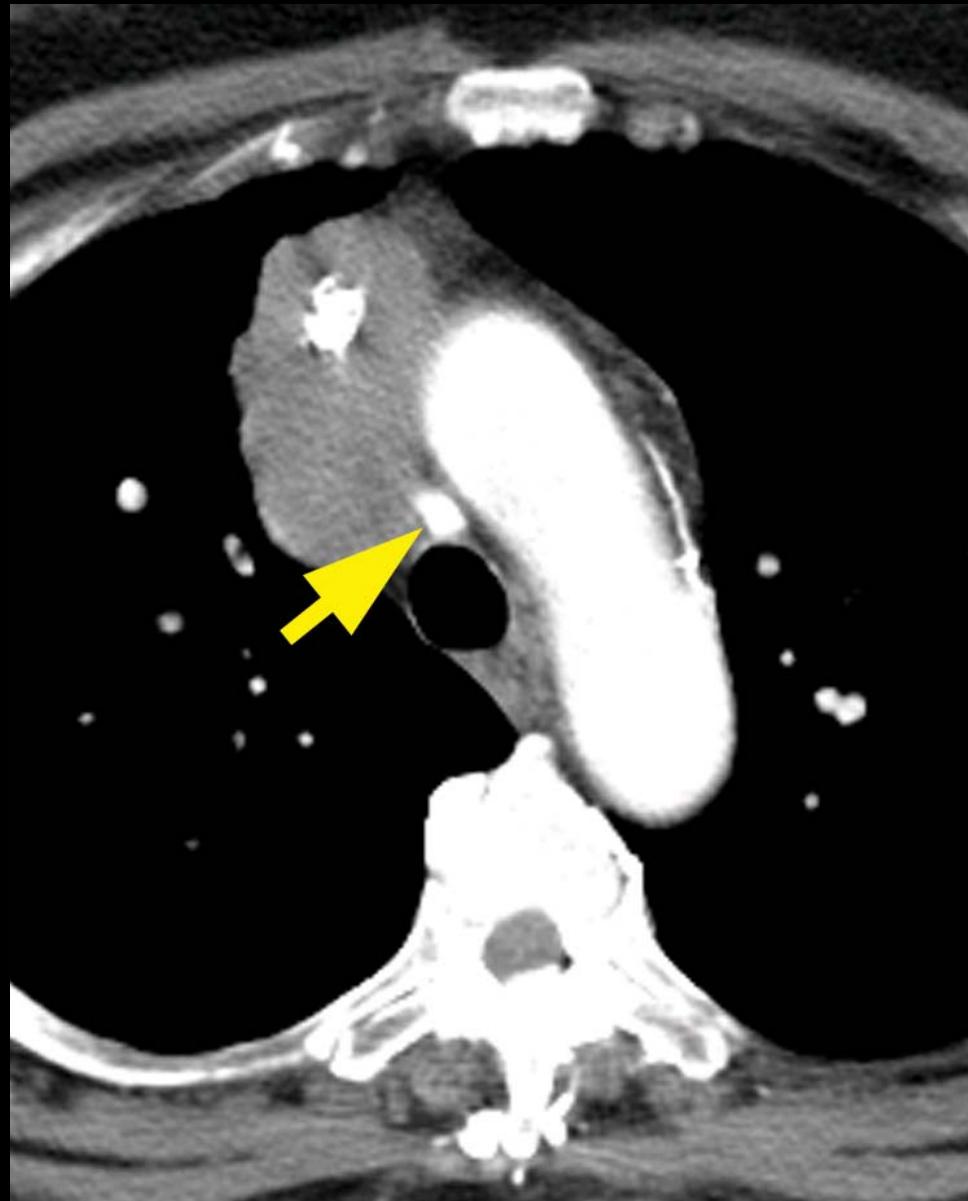
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Contrast enhanced CT images at the level of the transverse aorta and pulmonary trunk show a lobulated mass in the right anterior mediastinum. The mass contains a coarse calcification and grows into the superior vena cava (arrow). Note collateral circulation due to the obstruction of the superior vena cava. This is an example of Stage III disease.

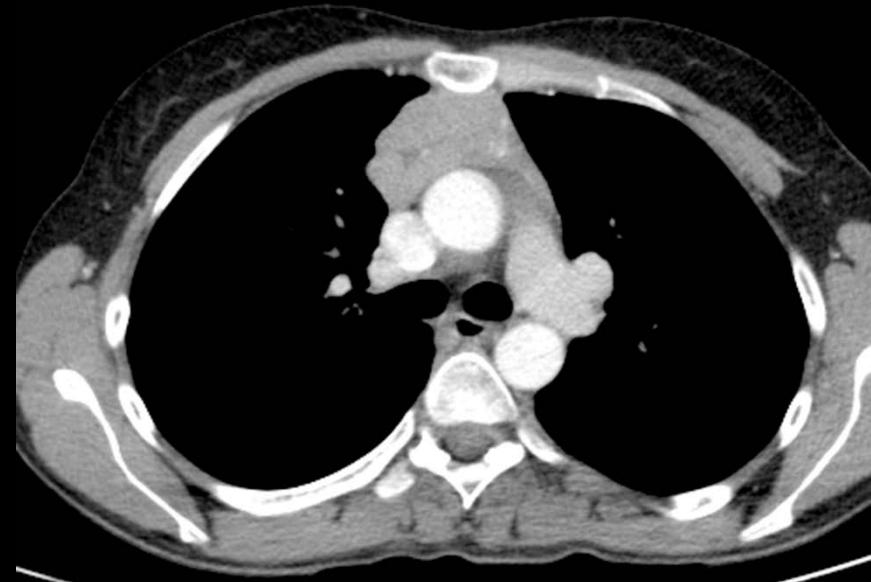


Stage III

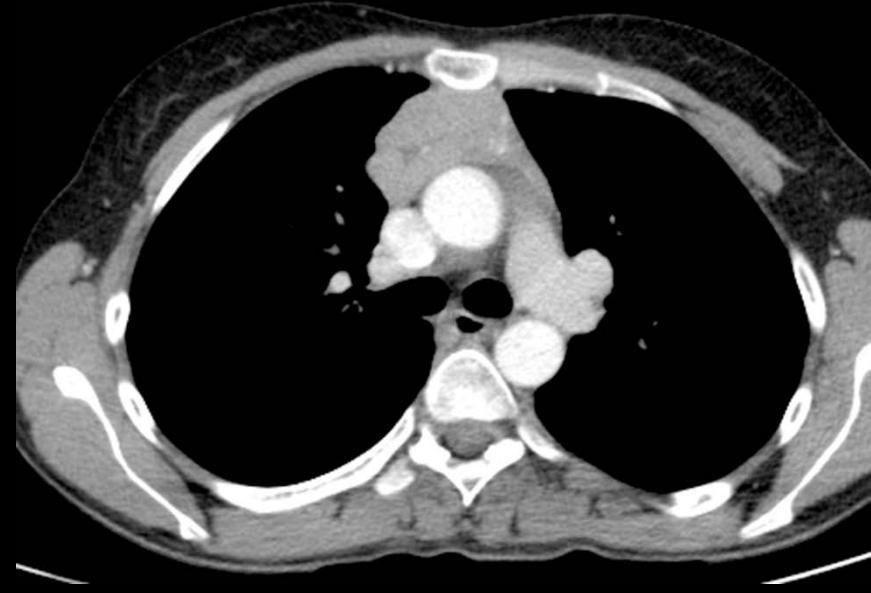
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Stage III



Stage III



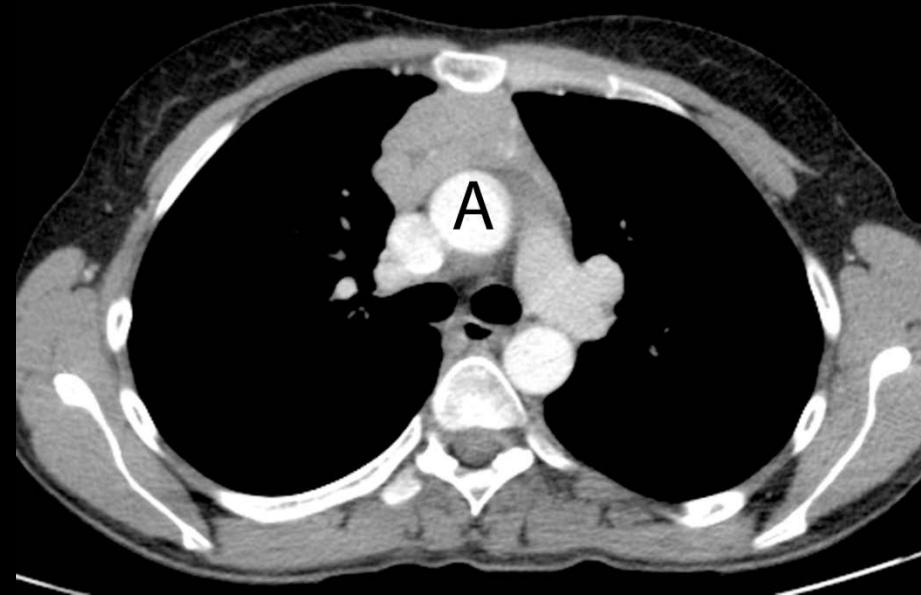
Axial CT

Axial and sagittal reconstruction from a contrast enhanced chest CT at the level of the ascending aorta demonstrates an anterior mediastinal mass. The mass shows a small regions of heterogeneity with a low attenuation region, and abuts the anterior aspect of the pericardium. There is a lobulated contour that abuts the lung . At surgery, the thymoma was found to invade the medaistinal fat as well as the right lung, without invasion into the aorta or other mediastinal vessels .



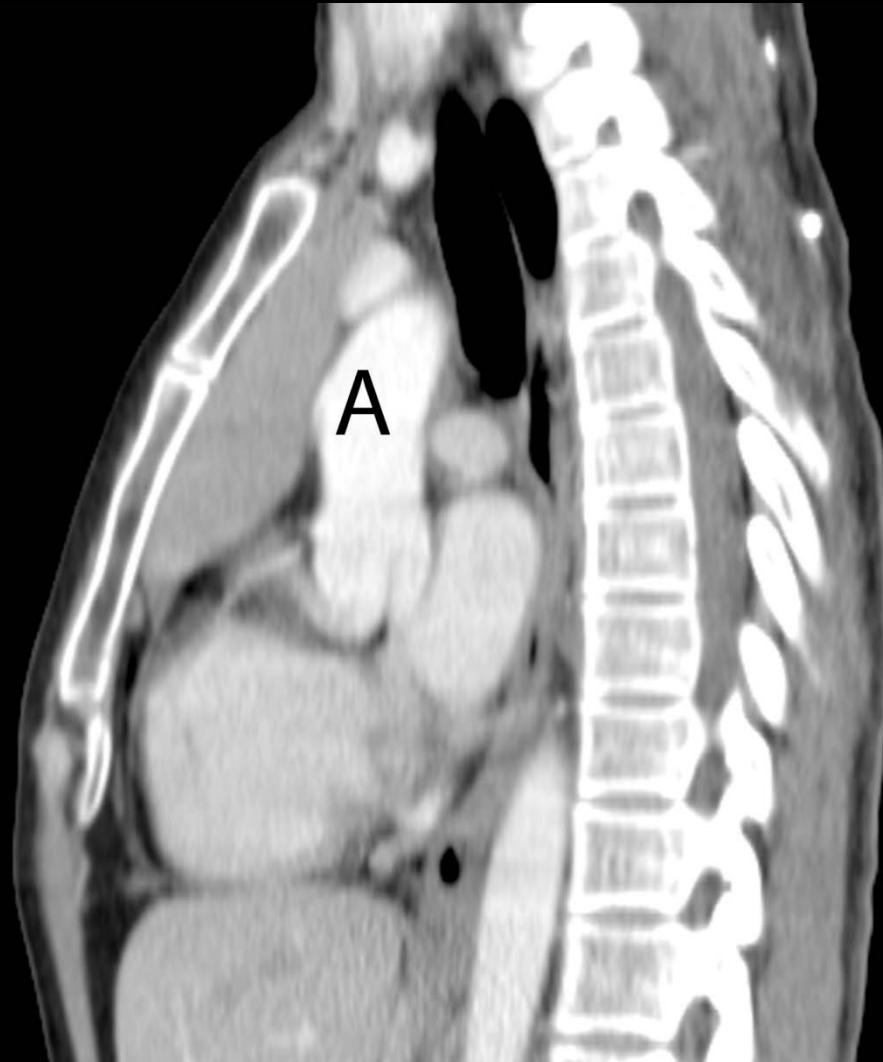
Sagittal reconstruction CT

Stage III



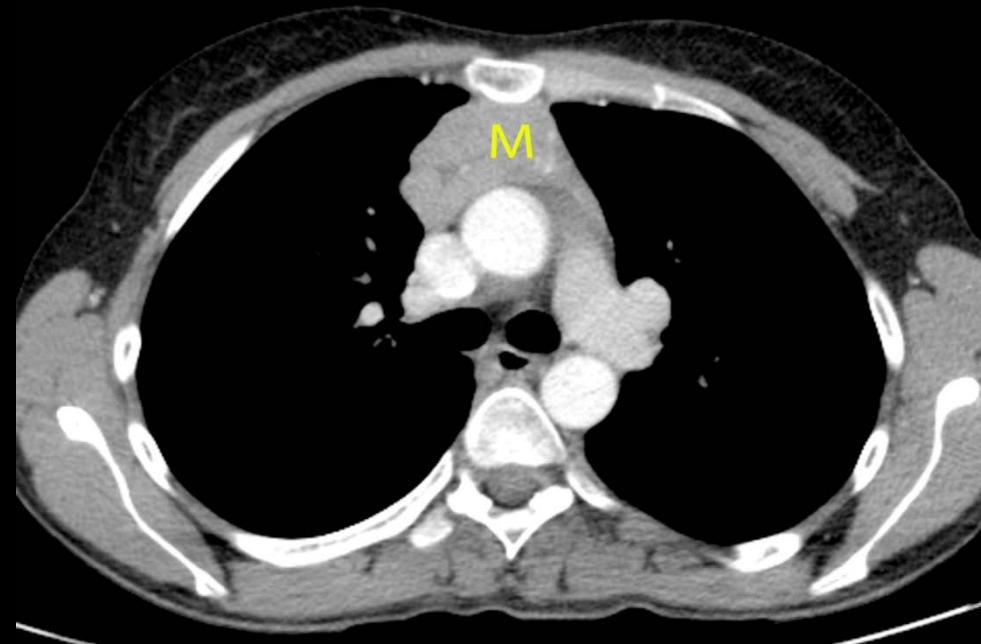
Axial CT

Axial and sagittal reconstruction from a contrast enhanced chest CT at the level of the **ascending aorta (A)** demonstrates an anterior mediastinal mass. The mass shows a small regions of heterogeneity with a low attenuation region, and abuts the anterior aspect of the pericardium. There is a lobulated contour that abuts the lung . At surgery, the thymoma was found to invade the medaistinal fat as well as the right lung, without invasion into the aorta or other mediastinal vessels .

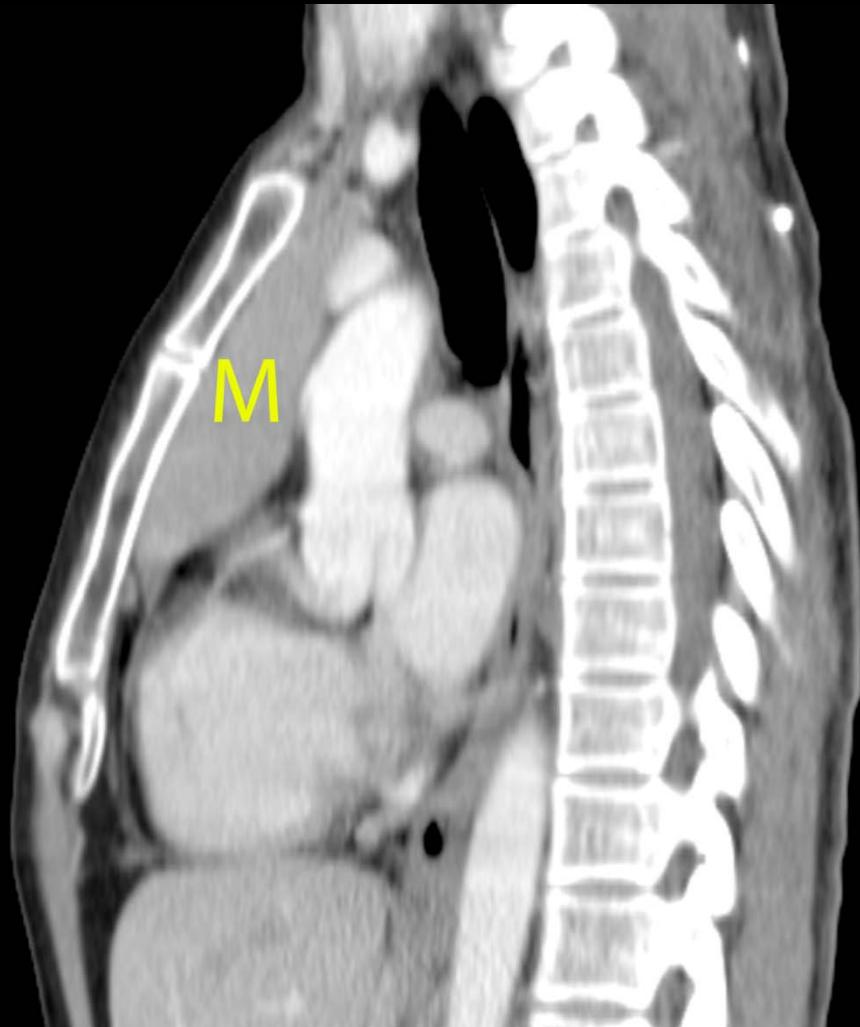


Sagittal reconstruction CT

Stage III



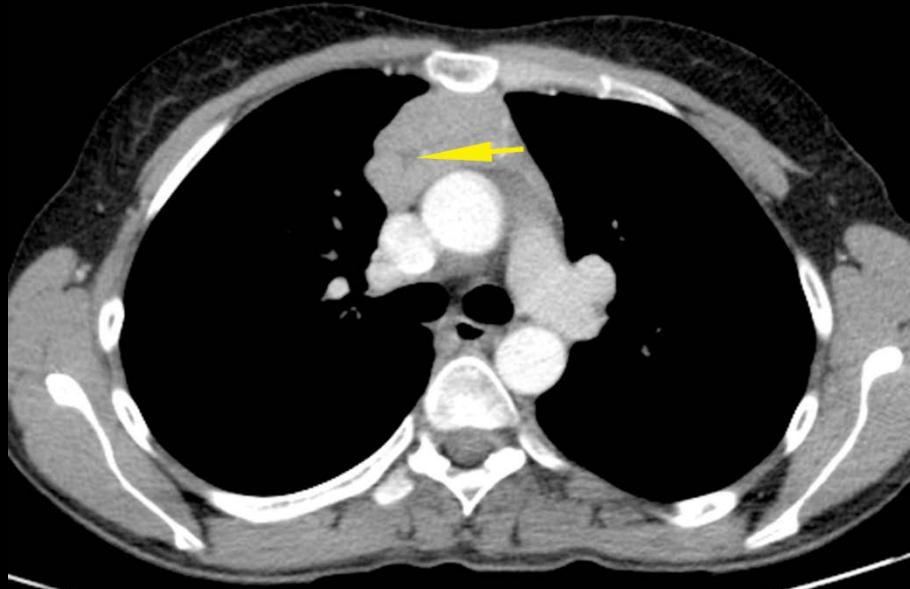
Axial CT



Sagittal reconstruction CT

Axial and sagittal reconstruction from a contrast enhanced chest CT at the level of the ascending aorta demonstrates an **anterior mediastinal mass (M)**. The mass shows a small regions of heterogeneity with a low attenuation region, and abuts the anterior aspect of the pericardium. There is a lobulated contour that abuts the lung . At surgery, the thymoma was found to invade the mediastinal fat as well as the right lung, without invasion into the aorta or other mediastinal vessels .

Stage III



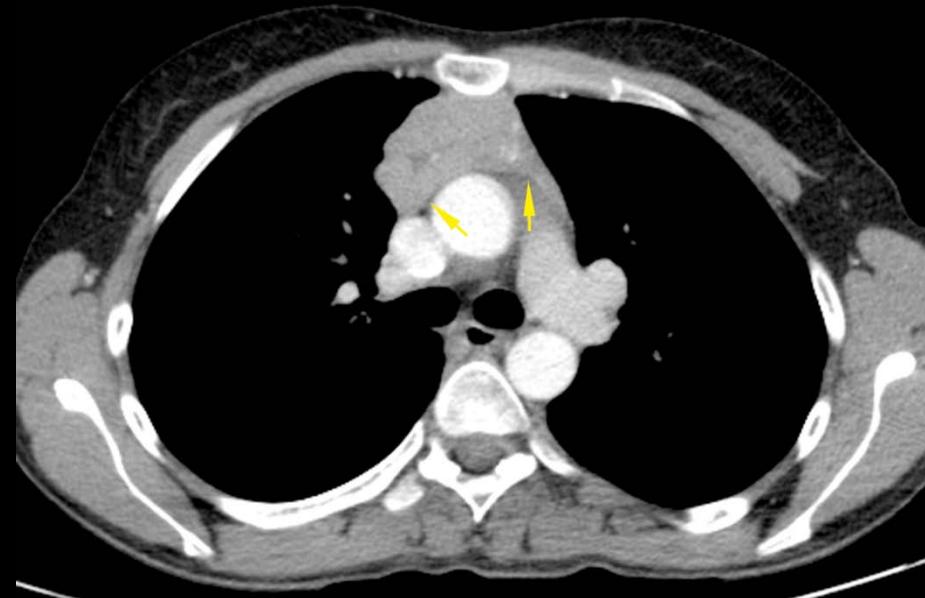
Axial CT



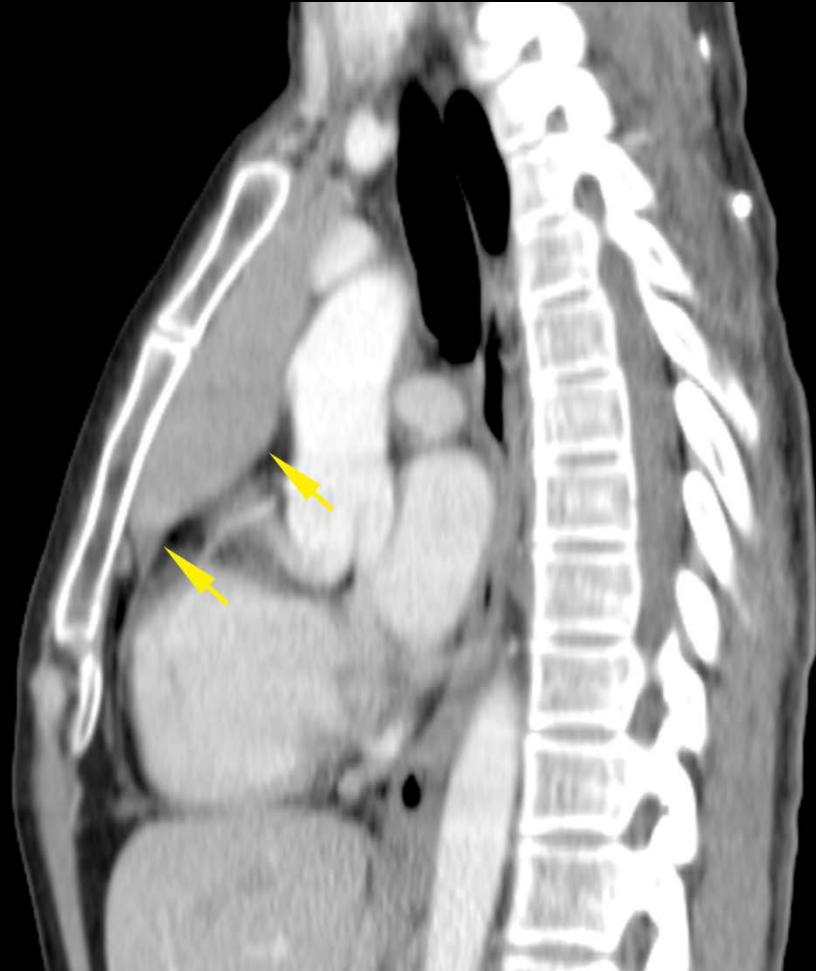
Sagittal reconstruction CT

Axial and sagittal reconstruction from a contrast enhanced chest CT at the level of the ascending aorta demonstrates an anterior mediastinal mass (M). The mass shows a small regions of heterogeneity (arrow) with a low attenuation region, and abuts the anterior aspect of the pericardium. There is a lobulated contour that abuts the lung . At surgery, the thymoma was found to invade the mediastinal fat as well as the right lung, without invasion into the aorta or other mediastinal vessels .

Stage III



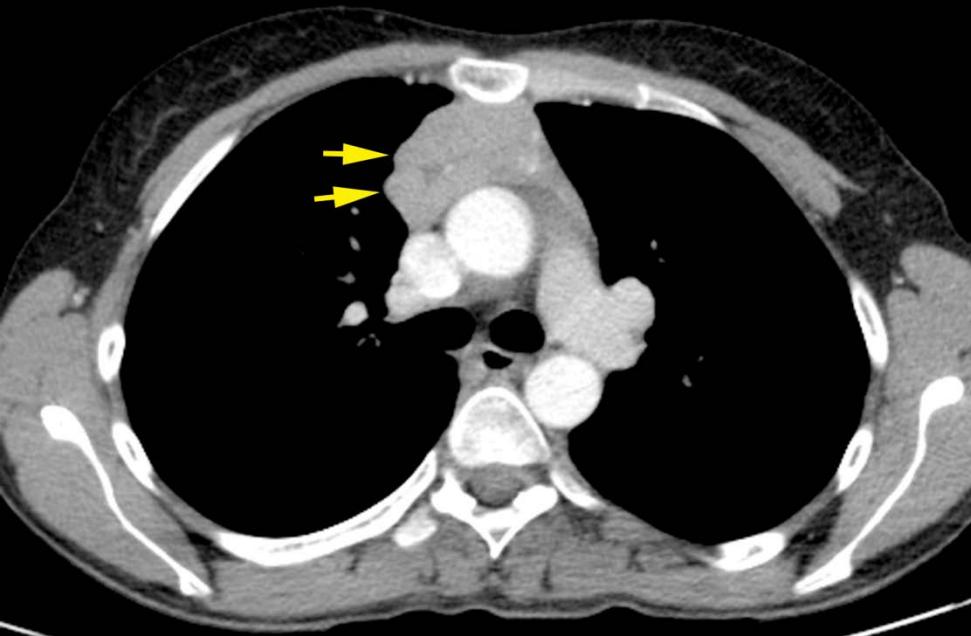
Axial CT



Sagittal reconstruction CT

Axial and sagittal reconstruction from a contrast enhanced chest CT at the level of the ascending aorta demonstrates an anterior mediastinal mass (M). The mass shows a small regions of heterogeneity with a low attenuation region, and abuts the anterior aspect of the pericardium (arrows). There is a lobulated contour that abuts the lung . At surgery, the thymoma was found to invade the mediastinal fat as well as the right lung, without invasion into the aorta or other mediastinal vessels .

Stage III



Axial CT



Sagittal reconstruction CT

Axial and sagittal reconstruction from a contrast enhanced chest CT at the level of the ascending aorta demonstrates an anterior mediastinal mass (M). The mass shows a small regions of heterogeneity with a low attenuation region, and abuts the anterior aspect of the pericardium (arrows). There is a lobulated contour that abuts the lung (arrows) . At surgery, the thymoma was found to invade the mediastinal fat as well as the right lung, without invasion into the aorta or other mediastinal vessels .

Stage III



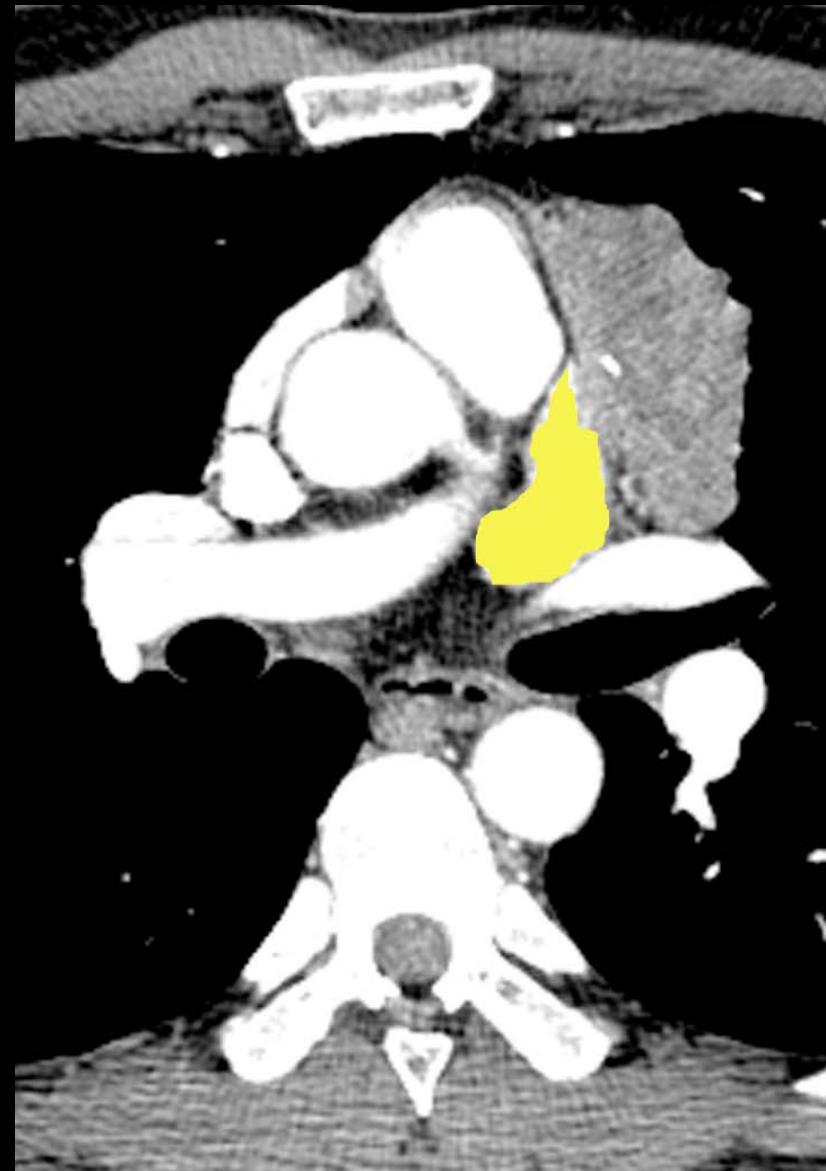
Stage III



Axial contrast enhanced CT at the level of left ventricular appendage demonstrates a 6.4cm anterior lobulated mediastinal mass. The mass contains a calcification and enhances heterogeneously. One of the mass lobulations appears to indent the left ventricular appendage contour where no pericardium and no fat separates the mass from the left ventricular appendage. The CT appearance of this primary mass is aggressive suggestive of a stage III thymoma. At surgery thymoma was found with macroscopic invasion of the pericardium, consistent with stage III disease.

Stage III

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Axial contrast enhanced CT at the level of left ventricular appendage demonstrates a 6.4cm anterior lobulated mediastinal mass (arrow). The mass contains a calcification and enhances heterogeneously. One of the mass lobulations appears to indent the left ventricular appendage contour where no pericardium and no fat separates the mass from the left ventricular appendage. The CT appearance of this primary mass is aggressive suggestive of a stage III thymoma. At surgery thymoma was found with macroscopic invasion of the pericardium, consistent with stage III disease.



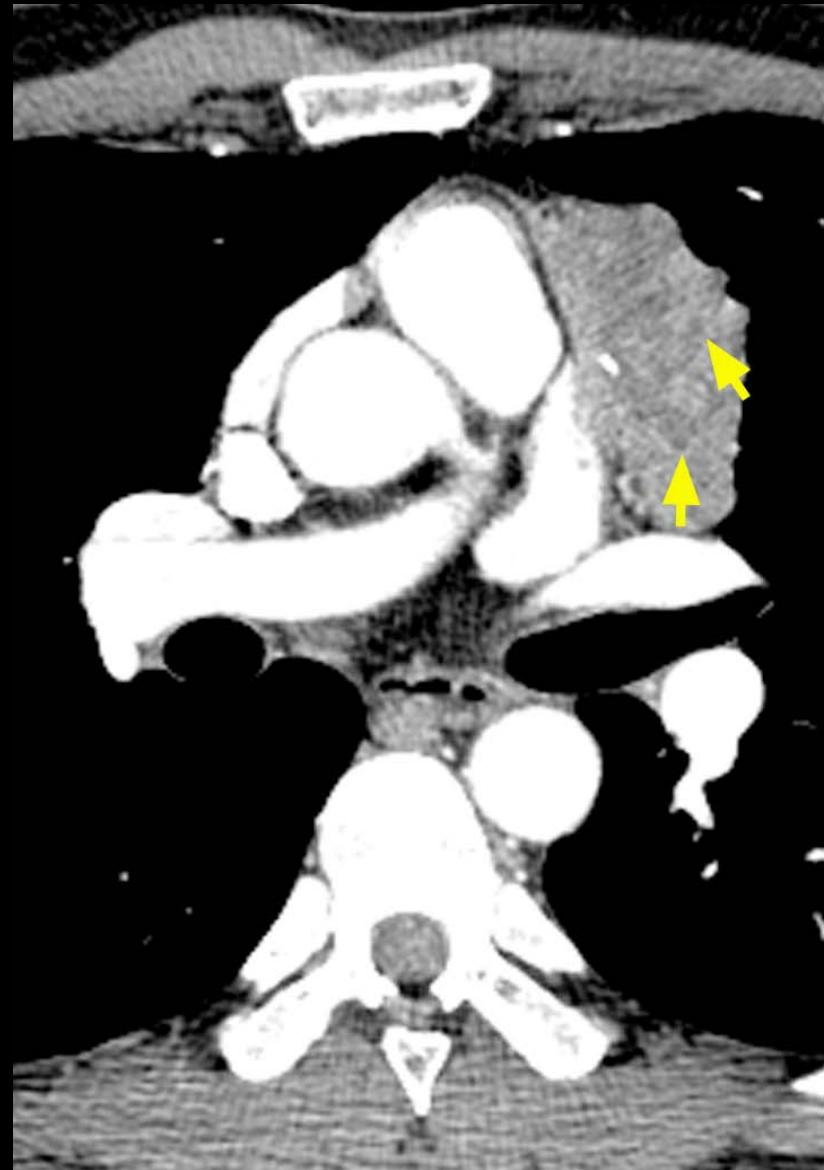
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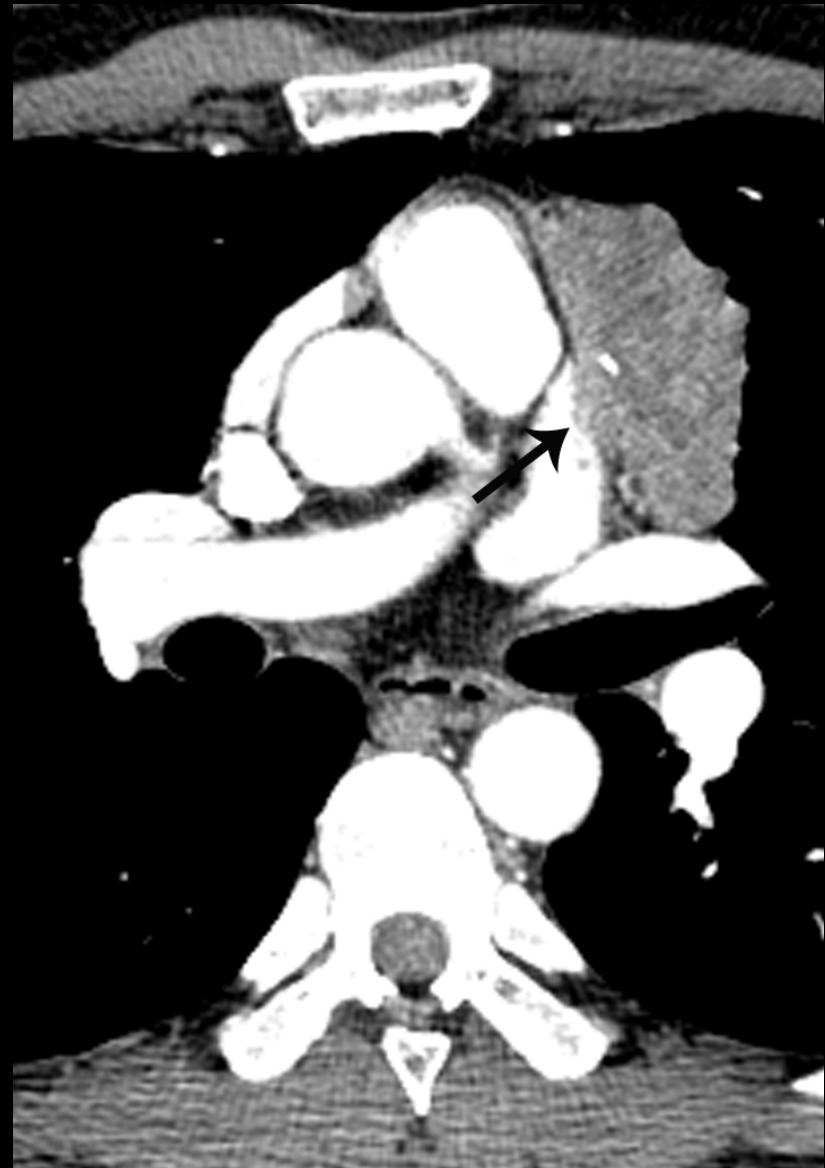
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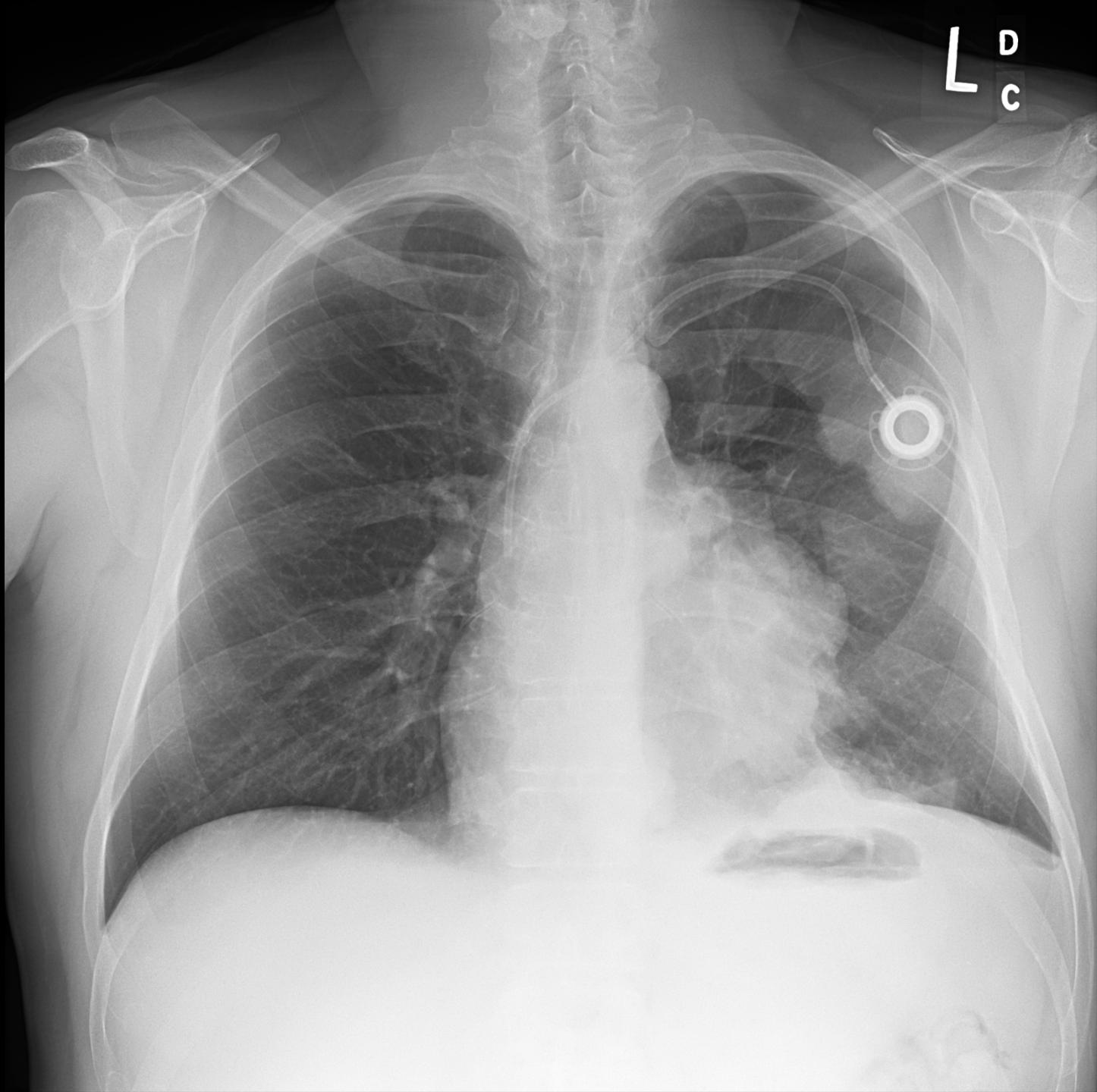
Stage III

Axial contrast enhanced CT at the level of left ventricular appendage demonstrates a 6.4cm anterior lobulated mediastinal mass. The mass contains a calcification (arrow) and enhances heterogeneously (arrows). One of the mass lobulations appears to indent the left ventricular appendage contour where no pericardium and no fat separates the mass from the left ventricular appendage (arrow). The CT appearance of this primary mass is aggressive suggestive of a stage III thymoma. At surgery thymoma was found with macroscopic invasion of the pericardium, consistent with stage III disease.

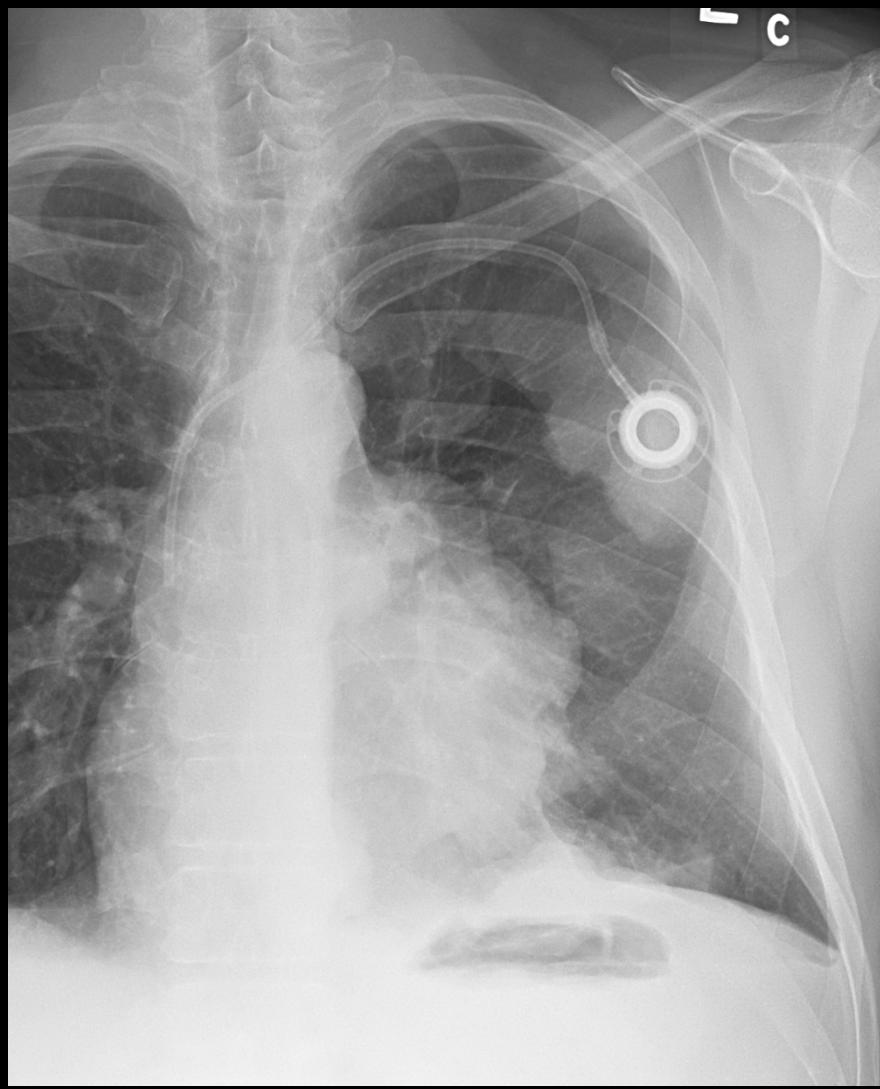


Stage IVa

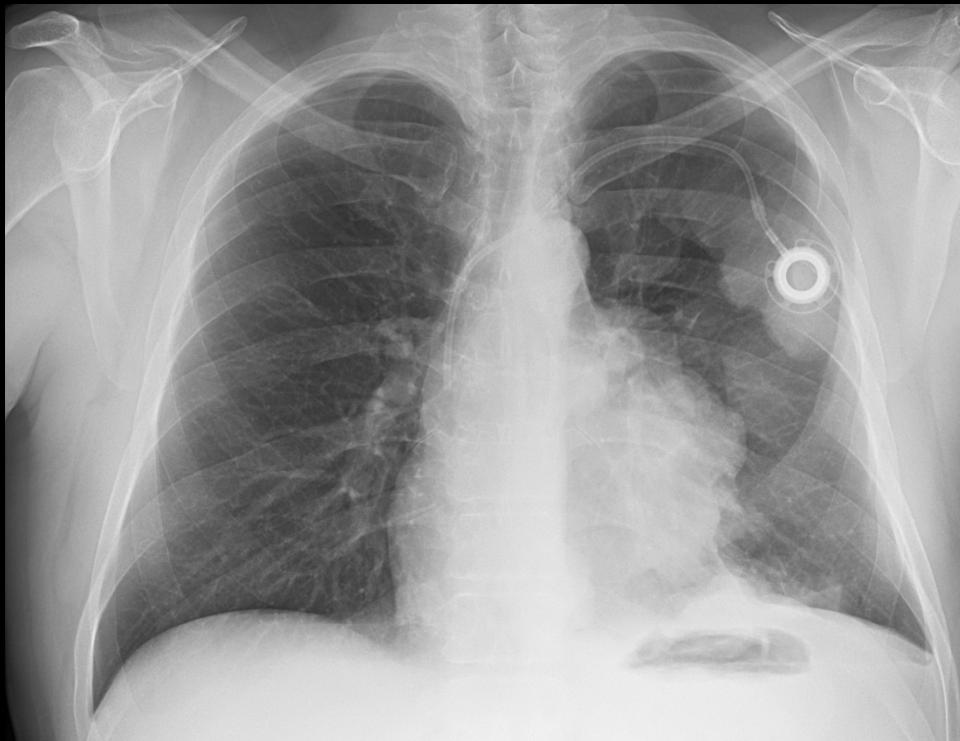
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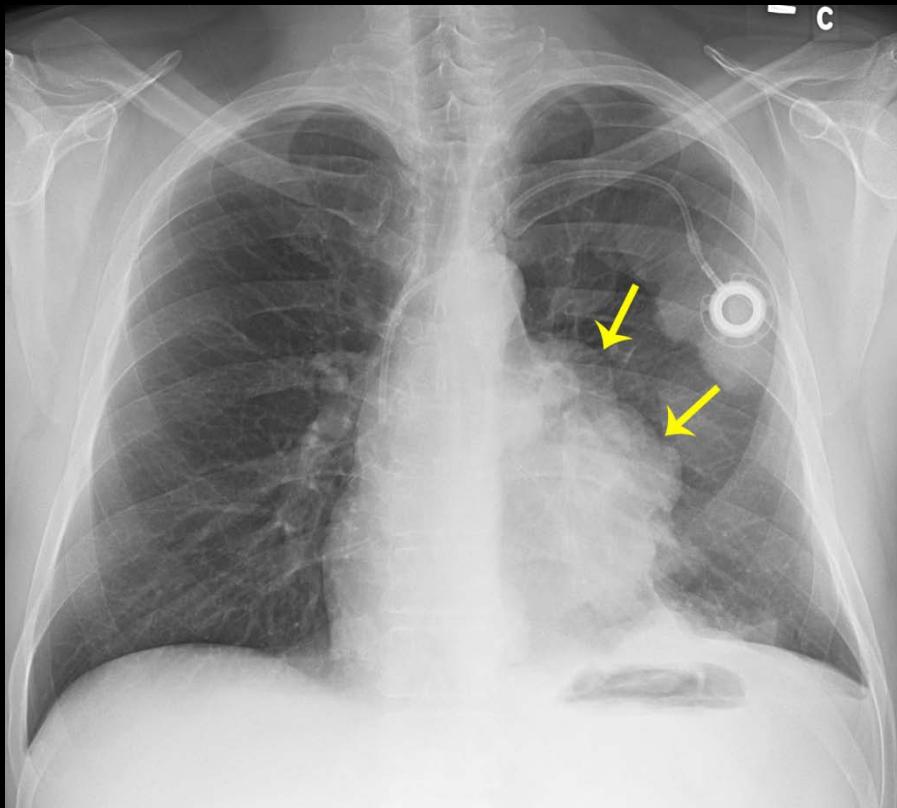


Stage IVa



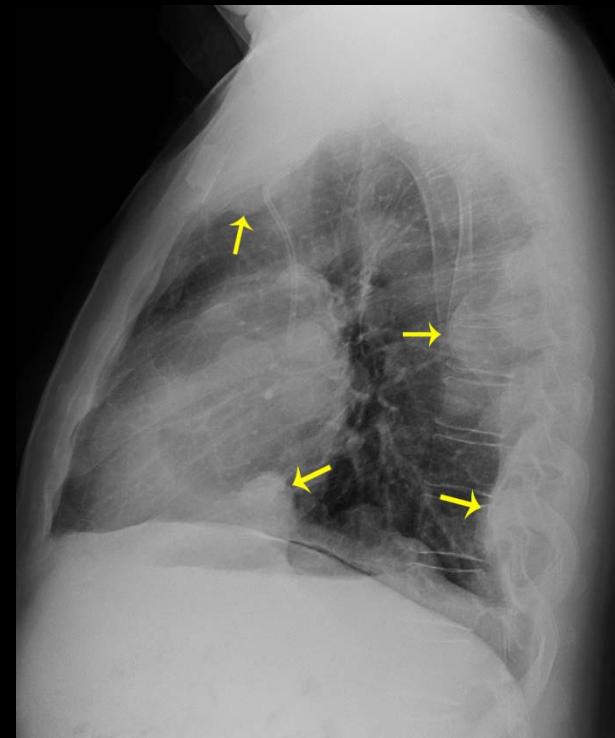
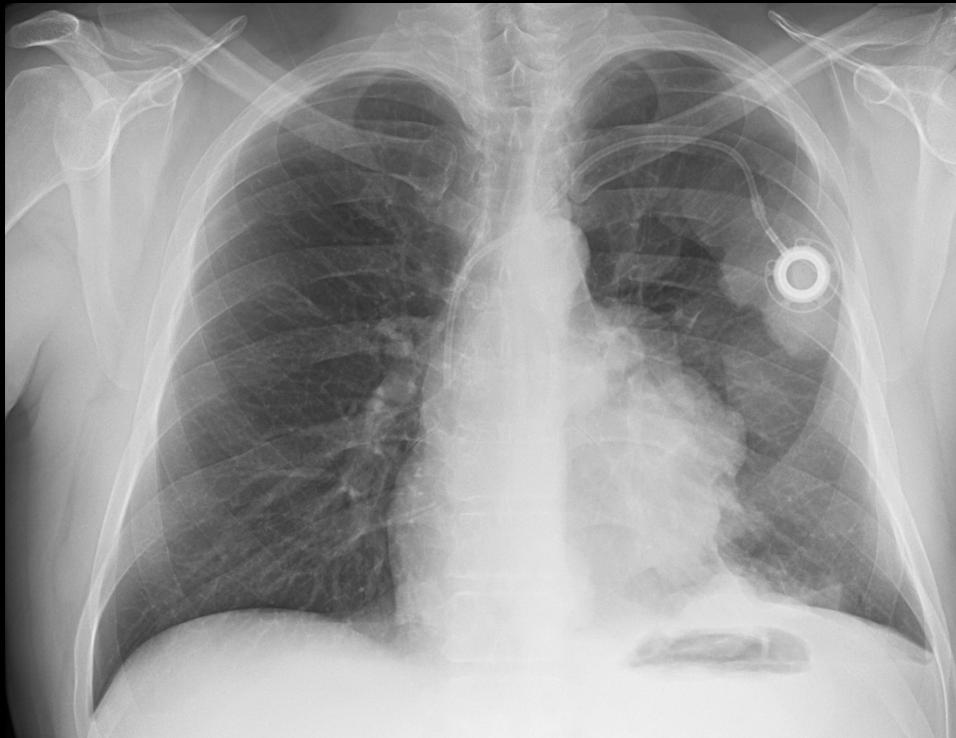
Posterior-anterior and lateral chest radiograph demonstrates a left anterior mediastinal mass without calcification or cavitation. The nodular left pleural thickening along the anterior, posterior and diaphragmatic pleural surfaces is suspicious for metastases rather than loculated pleural fluid collections. Note the well-circumscribed margins of the pleural lesions and the obtuse angles with the chest wall consistent with pleural/extrapleural location. In contrast, disease in the lungs may have either well-circumscribed or irregular margins, be surrounded by lung, and form acute angles with the chest wall. Due to involvement of the left pleura, the stage is IVa.

Stage IVa



Posterior-anterior and lateral chest radiograph demonstrates a **left anterior mediastinal mass** without calcification or cavitation. The nodular left pleural thickening along the anterior, posterior and diaphragmatic pleural surfaces is suspicious for metastases rather than loculated pleural fluid collections. Note the well-circumscribed margins of the pleural lesions and the obtuse angles with the chest wall consistent with pleural/extrapleural location. In contrast, disease in the lungs may have either well-circumscribed or irregular margins, be surrounded by lung, and form acute angles with the chest wall. Due to involvement of the left pleura, the stage is IVa.

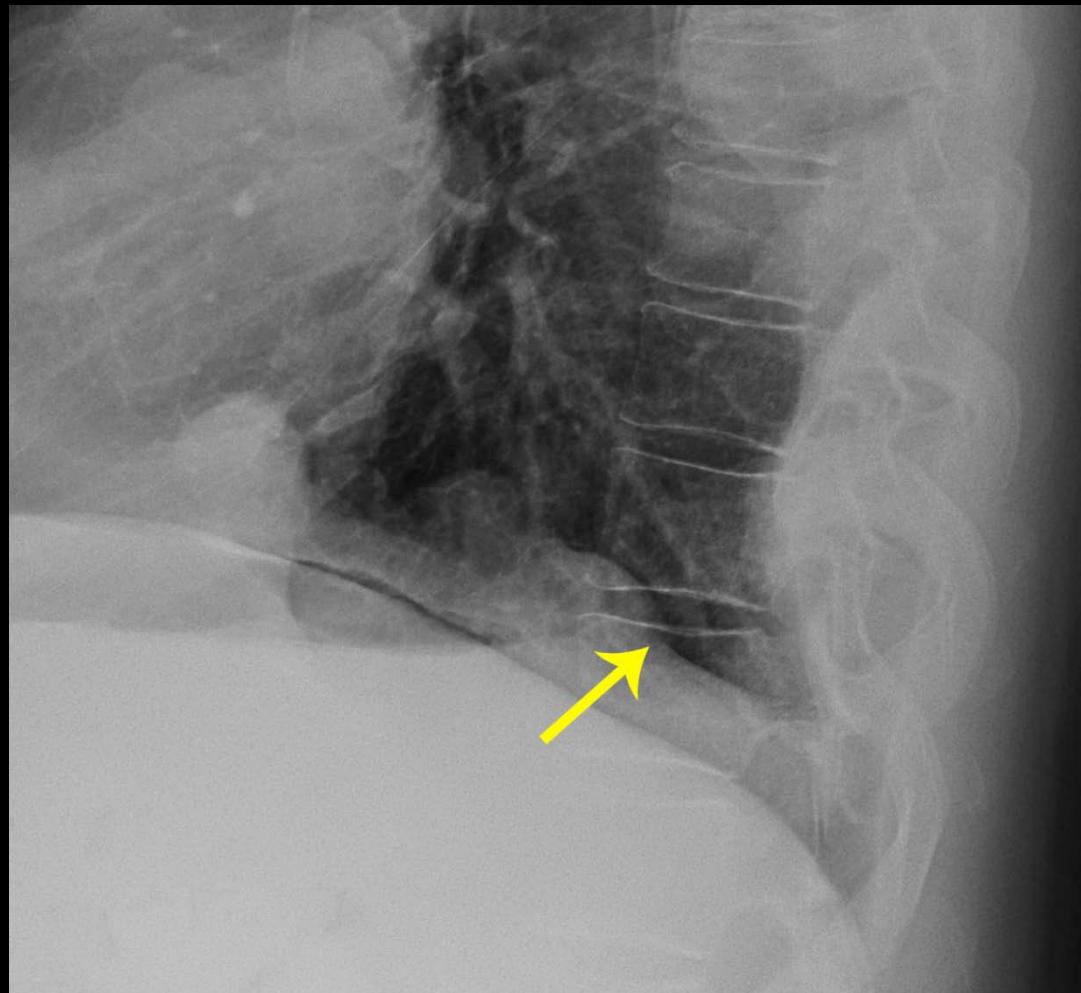
Stage IVa



Posterior-anterior and lateral chest radiograph demonstrates a left anterior mediastinal mass without calcification or cavitation. **The nodular left pleural thickening** along the anterior, posterior and diaphragmatic pleural surfaces is suspicious for metastases rather than loculated pleural fluid collections. Note the well-circumscribed margins of the pleural lesions and the obtuse angles with the chest wall consistent with pleural/extrapleural location. In contrast, disease in the lungs may have either well-circumscribed or irregular margins, be surrounded by lung, and form acute angles with the chest wall. Due to involvement of the left pleura, the stage is IVa.

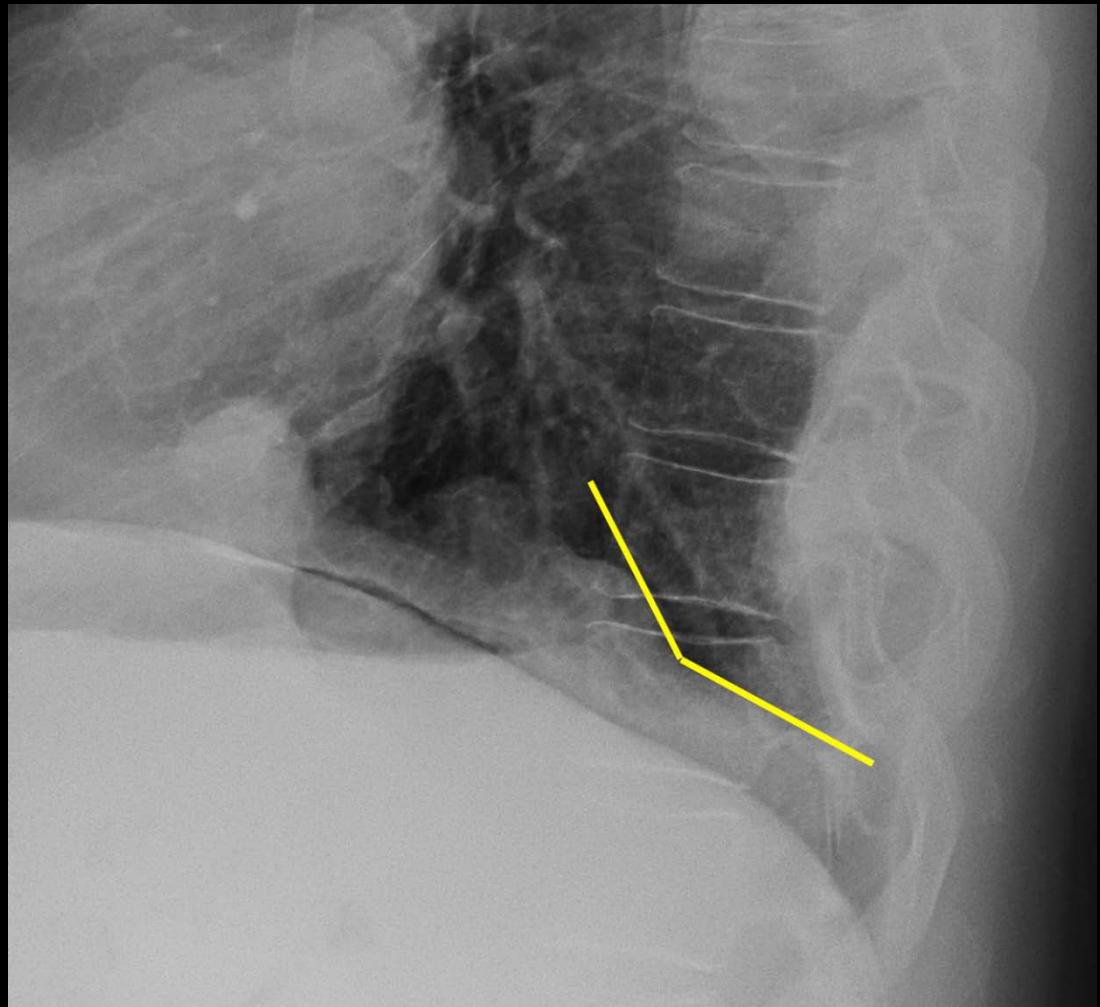
Stage IV

Note the well-circumscribed margins of the pleural lesions and the obtuse angles with the chest wall consistent with pleural/extrapleural location. In contrast, disease in the lungs may have either well-circumscribed or irregular margins, be surrounded by lung, and form acute angles with the chest wall. Due to involvement of the left pleura, the stage is IVa.

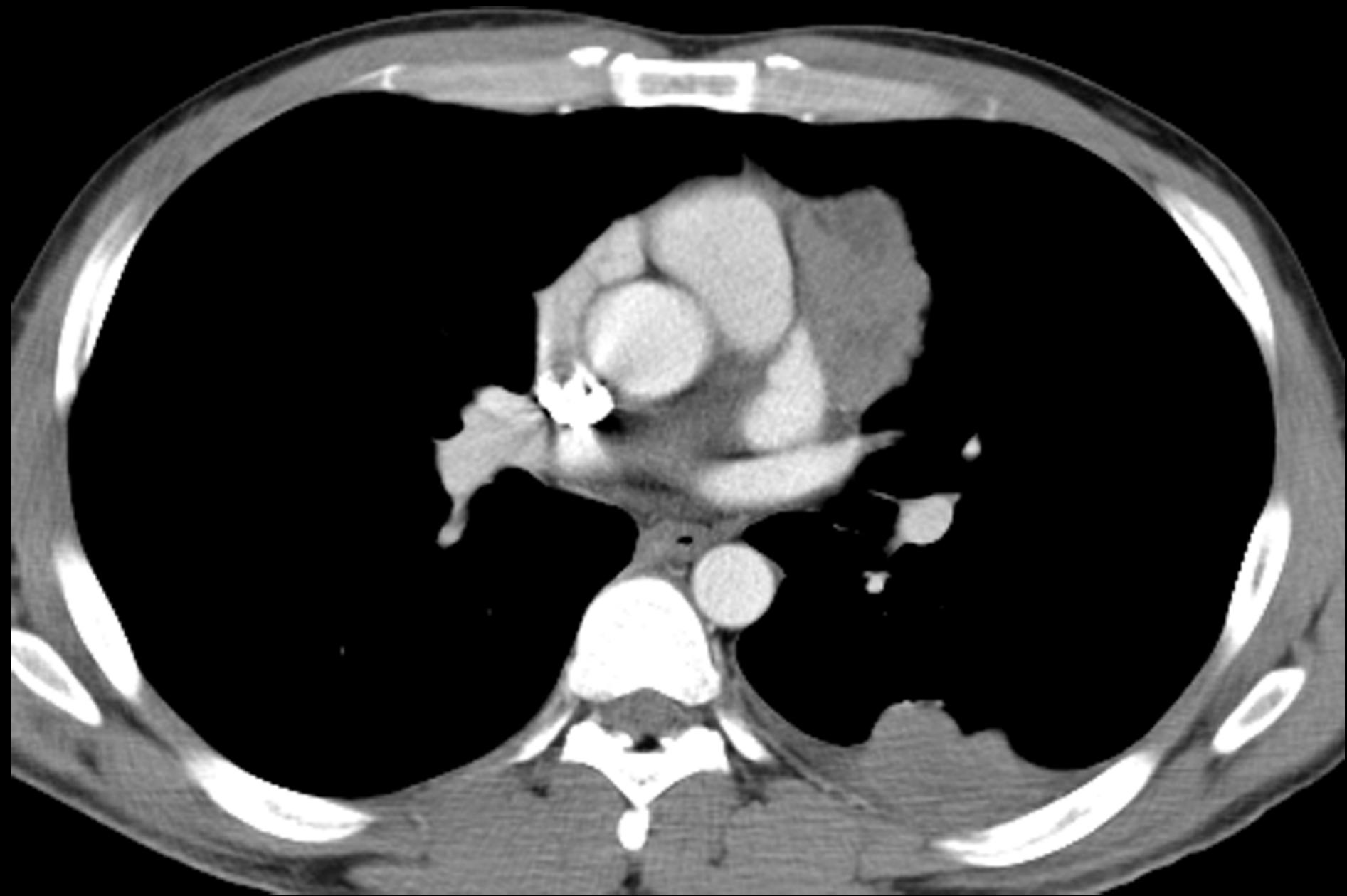


Stage IV

Note the well-circumscribed margins of the pleural lesions and the obtuse angles with the chest wall consistent with pleural/extrapleural location. In contrast, disease in the lungs may have either well-circumscribed or irregular margins, be surrounded by lung, and form acute angles with the chest wall. Due to involvement of the left pleura, the stage is IVa.



Stage IVa



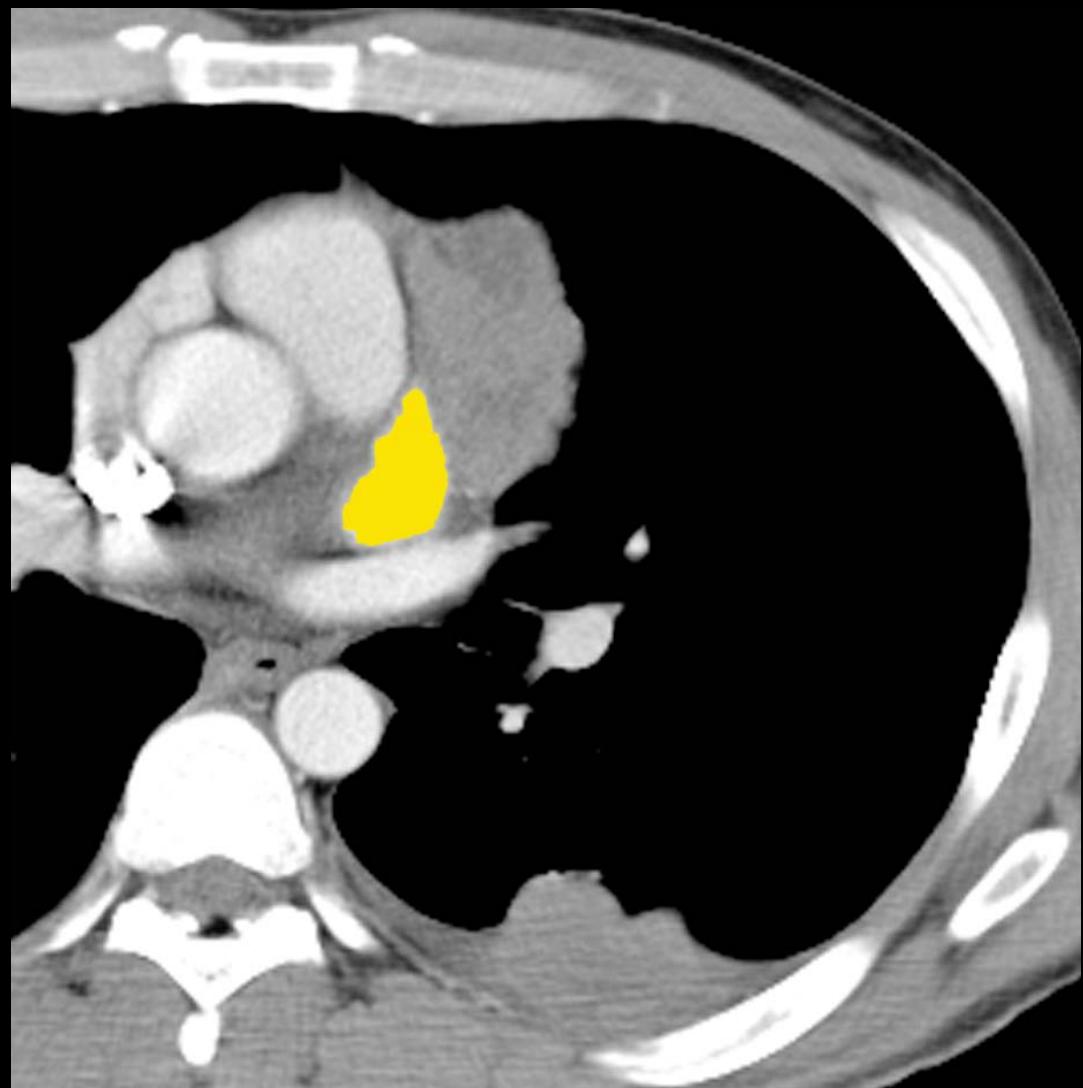
Stage IVa



Axial contrast enhanced CT at the level of left ventricular appendage demonstrates a 5cm anterior mediastinal mass. The mass enhances heterogeneously, abuts and is inseparable from the left ventricular appendage, with no fat plane separating between them. There is a pleural nodule associated with a tiny effusion. There is no lymphadenopathy. Because of the pleural nodule, this is most suggestive of a stage IVa thymoma, which was confirmed at surgery. However, despite the tumor abutting the left atrial appendage, no pericardial invasion was seen at surgery.

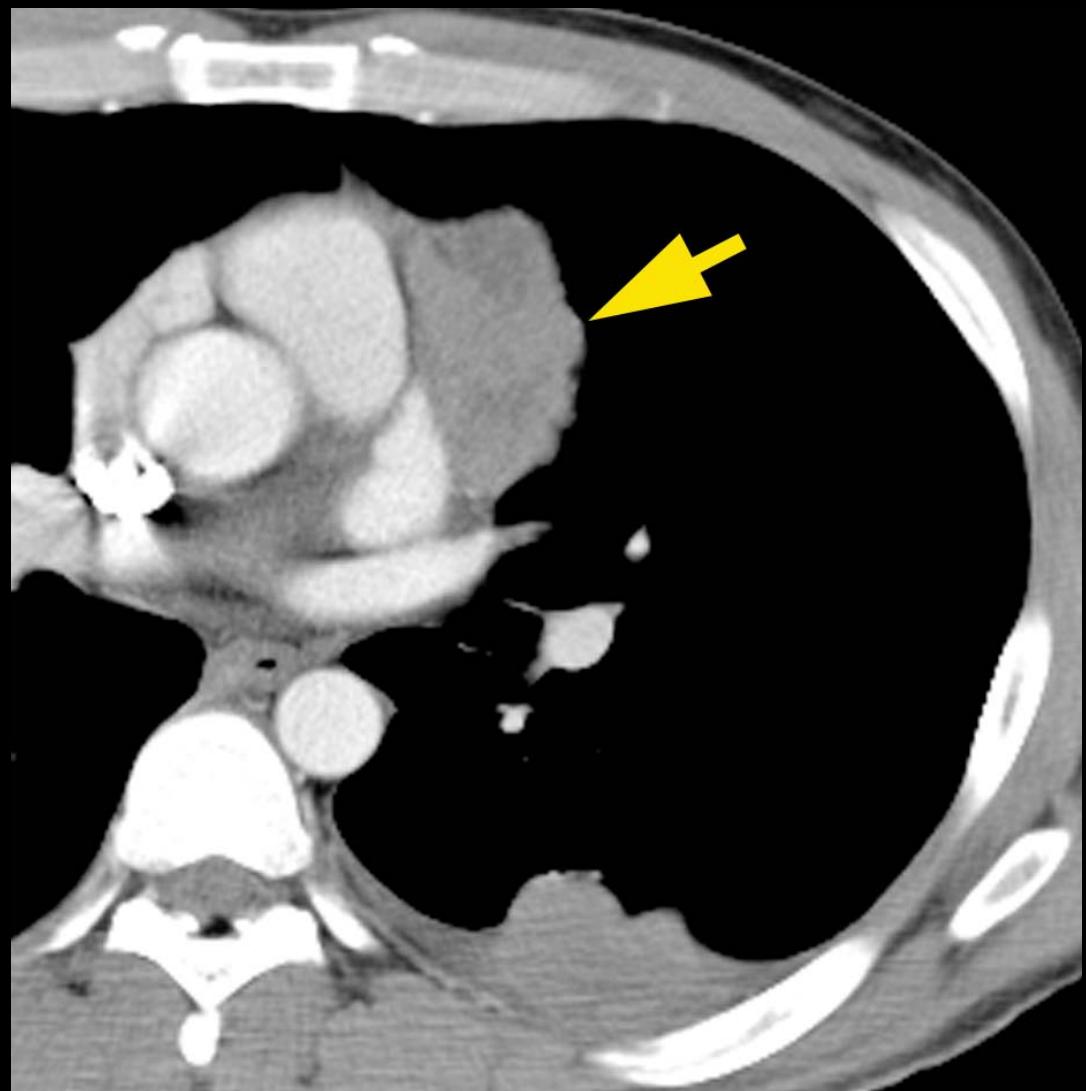
Stage IVa

Axial contrast enhanced CT at the level of **left ventricular appendage** demonstrates a 5cm anterior mediastinal mass. The mass enhances heterogeneously, abuts and is inseparable from the left ventricular appendage, with no fat plane separating between them. There is a pleural nodule associated with a tiny effusion. There is no lymphadenopathy. Because of the pleural nodule, this is most suggestive of a stage IVa thymoma, which was confirmed at surgery. However, despite the tumor abutting the left atrial appendage, no pericardial invasion was seen at surgery.



Stage IVa

Axial contrast enhanced CT at the level of left ventricular appendage demonstrates a 5cm anterior mediastinal mass (arrow). The mass enhances heterogeneously, abuts and is inseparable from the left ventricular appendage, with no fat plane separating between them. There is a pleural nodule associated with a tiny effusion. There is no lymphadenopathy. Because of the pleural nodule, this is most suggestive of a stage IVa thymoma, which was confirmed at surgery. However, despite the tumor abutting the left atrial appendage, no pericardial invasion was seen at surgery.



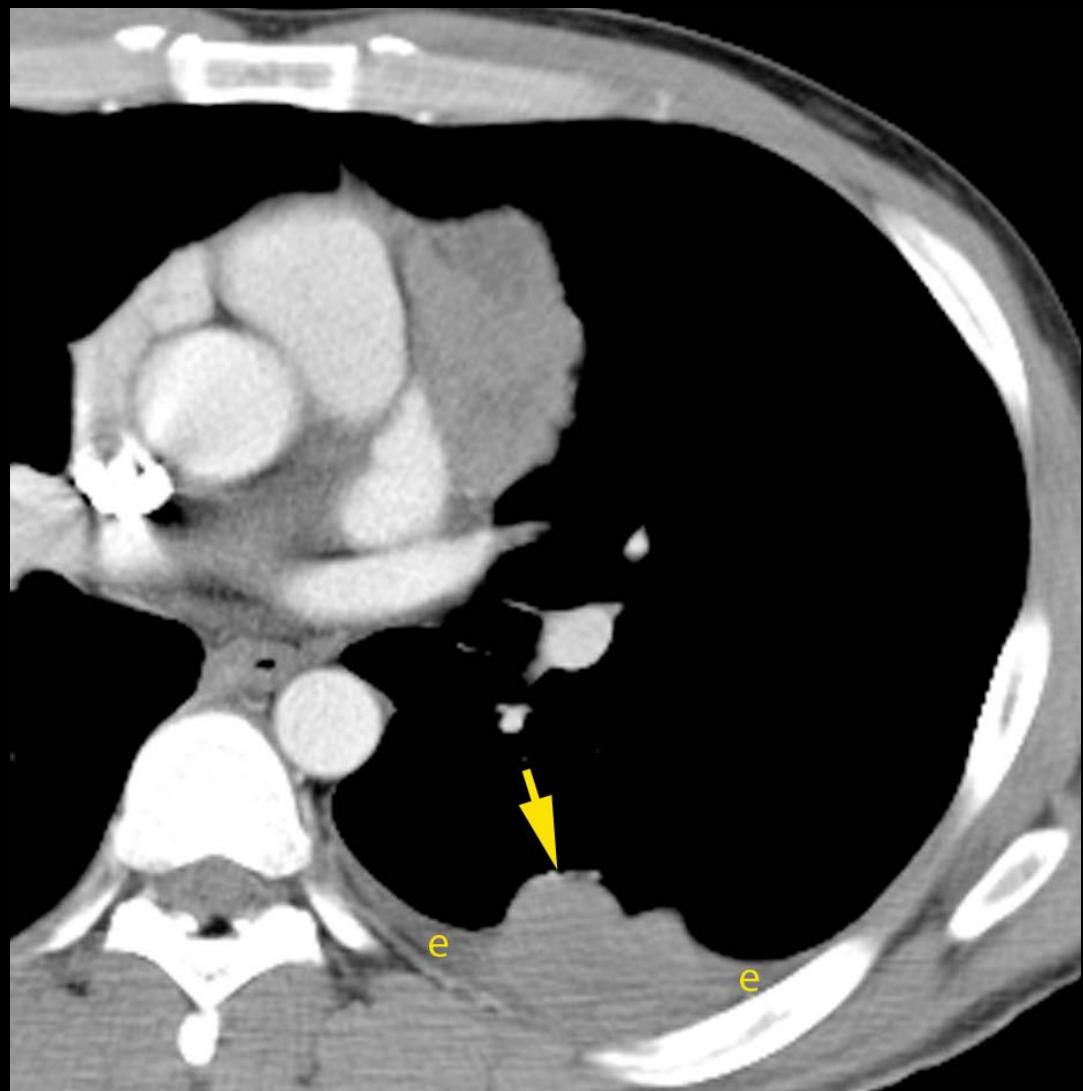
Stage IVa

Axial contrast enhanced CT at the level of left ventricular appendage demonstrates a 5cm anterior mediastinal mass (arrow). The mass enhances heterogeneously (arrows), abuts and is inseparable from the left ventricular appendage, with no fat plane separating between them. There is a pleural nodule associated with a tiny effusion. There is no lymphadenopathy. Because of the pleural nodule, this is most suggestive of a stage IVa thymoma, which was confirmed at surgery. However, despite the tumor abutting the left atrial appendage, no pericardial invasion was seen at surgery.

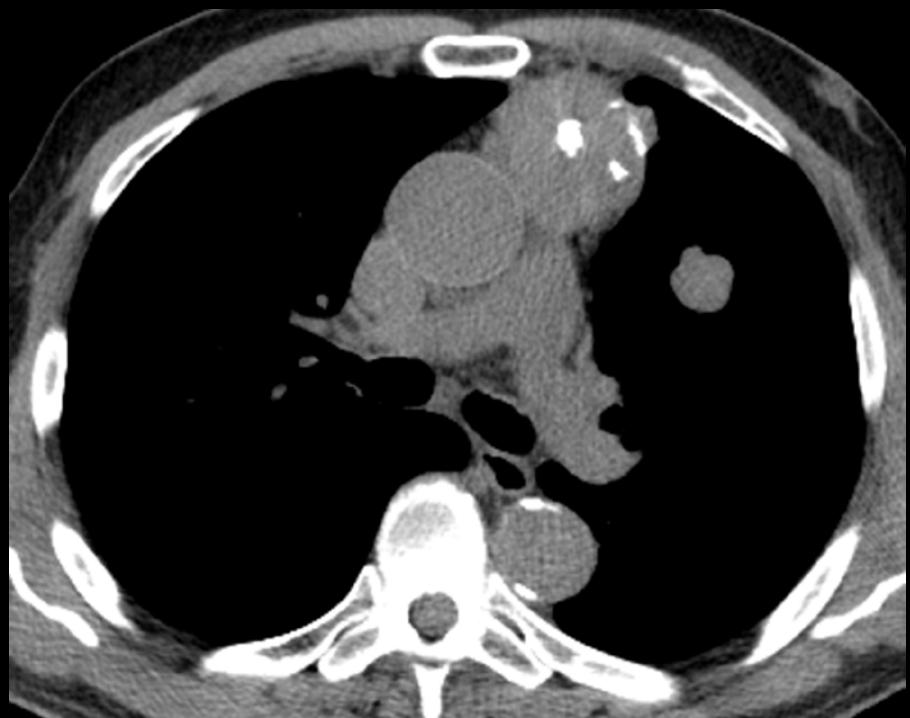


Stage IVa

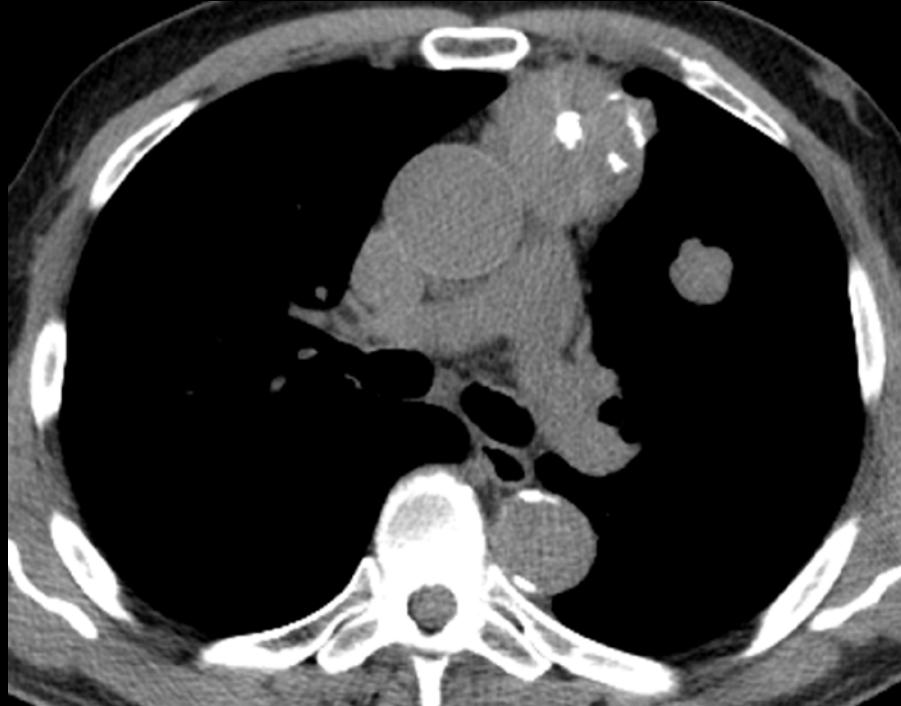
Axial contrast enhanced CT at the level of left ventricular appendage demonstrates a 5cm anterior mediastinal mass (arrow). The mass enhances heterogeneously (arrows), abuts and is inseparable from the left ventricular appendage, with no fat plane separating between them. There is a **pleural nodule (arrow)** associated with a tiny **effusion (e)**. There is no lymphadenopathy. Because of the pleural nodule, this is most suggestive of a stage IVa thymoma, which was confirmed at surgery. However, despite the tumor abutting the left atrial appendage, no pericardial invasion was seen at surgery.



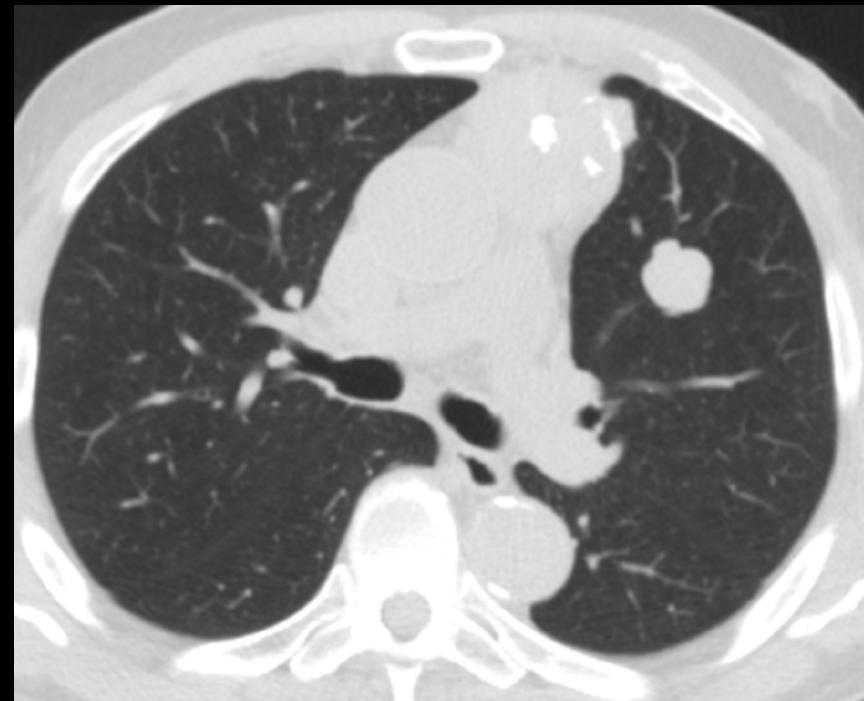
Stage IVb



Stage IVb



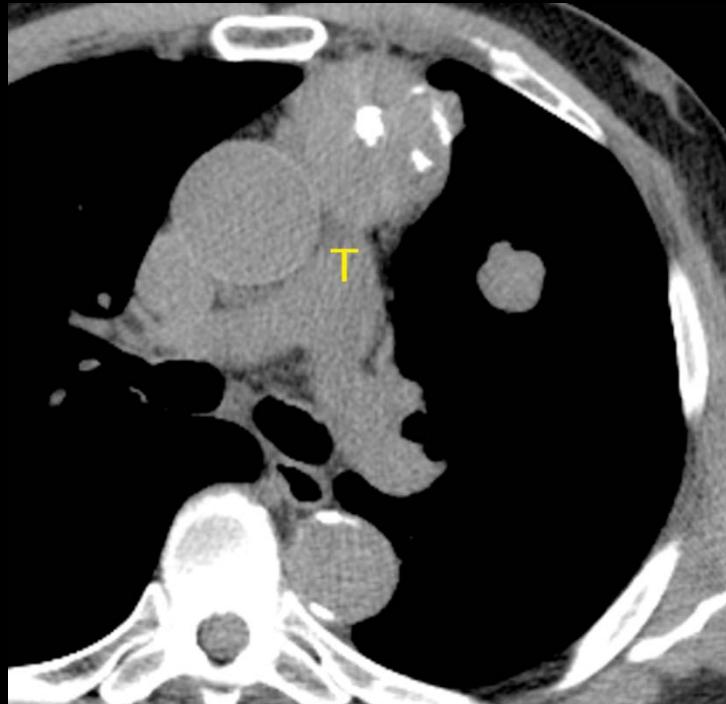
Soft tissue window



Lung window

Axial images from an unenhanced chest CT at the level of the pulmonary trunk demonstrate an anterior mediastinal mass with aggressive features suggested by the coarse calcifications within it and the irregular lobulated margin with the lung, suggestive of pulmonary invasion. In addition, there is a pulmonary nodule in the left upper lobe, confirmed by biopsy to represent a metastasis.

Stage IVb



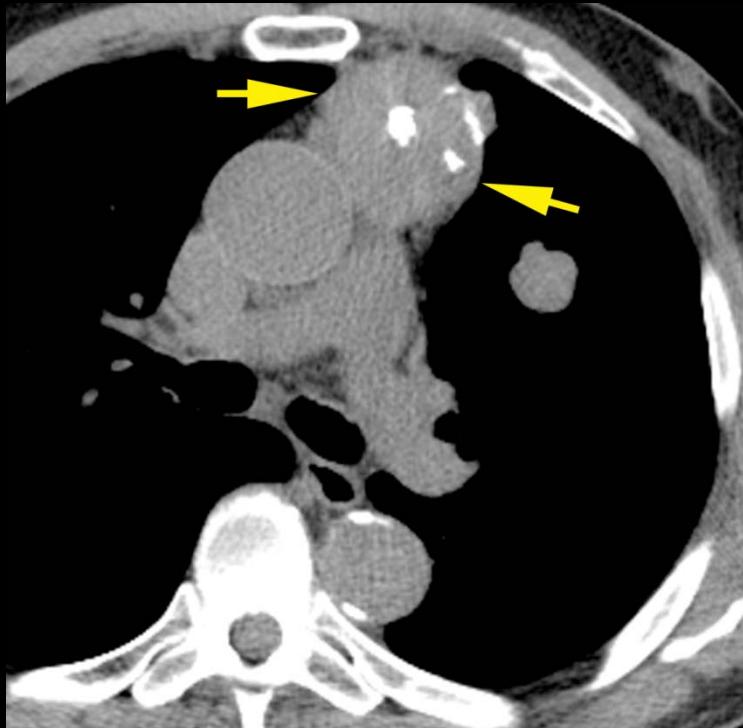
Soft tissue window



Lung window

Axial images from an unenhanced chest CT at the level of the **pulmonary trunk (T)** demonstrate an anterior mediastinal mass with aggressive features suggested by the coarse calcifications within it and the irregular lobulated margin with the lung, suggestive of pulmonary invasion. In addition, there is a pulmonary nodule in the left upper lobe, confirmed by biopsy to represent a metastasis.

Stage IVb



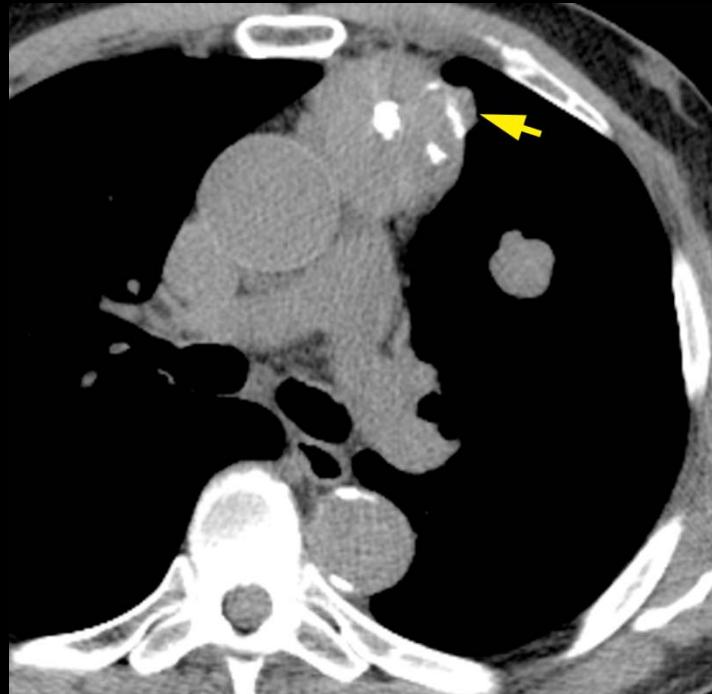
Soft tissue window



Lung window

Axial images from an unenhanced chest CT at the level of the pulmonary trunk demonstrate an anterior **mediastinal mass (arrows)** with aggressive features suggested by the coarse calcifications within it and the irregular lobulated margin with the lung, suggestive of pulmonary invasion. In addition, there is a pulmonary nodule in the left upper lobe, confirmed by biopsy to represent a metastasis.

Stage IVb



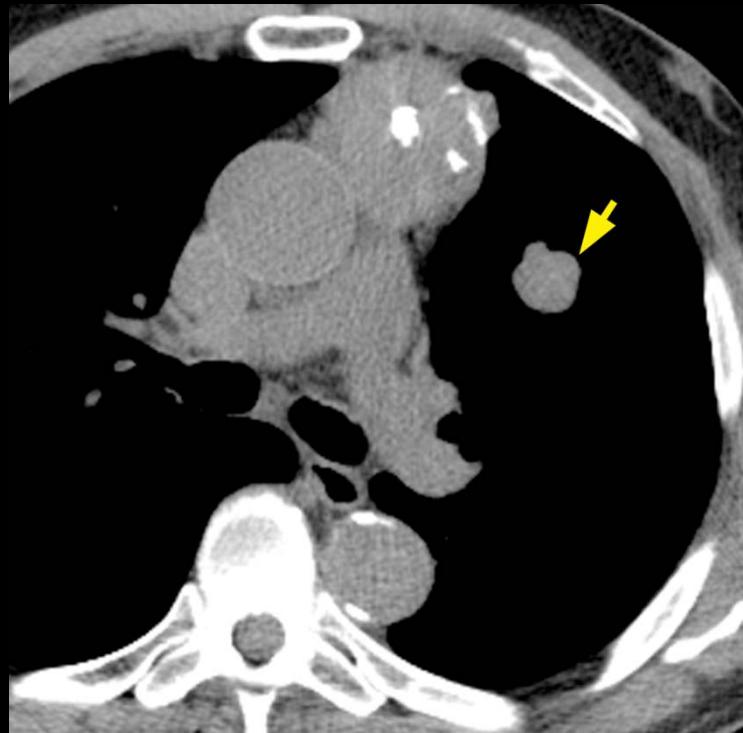
Soft tissue window



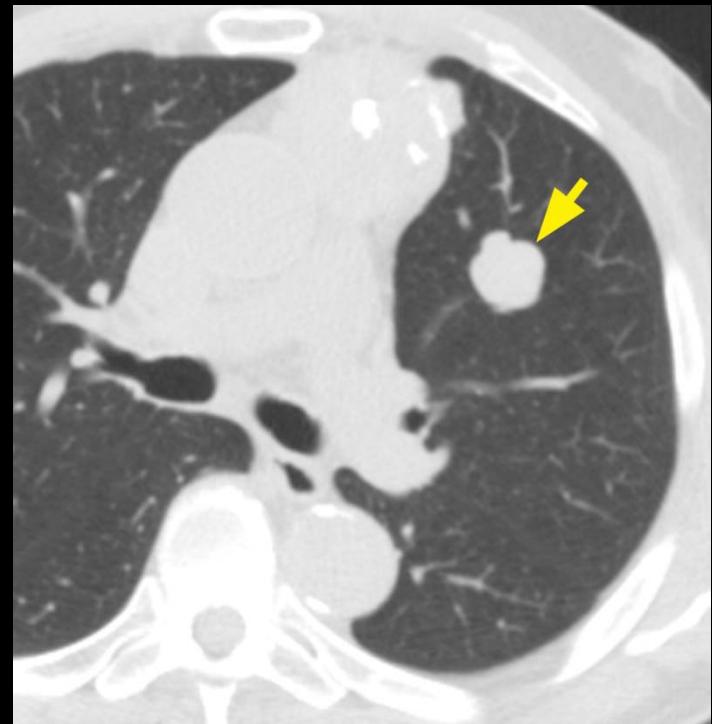
Lung window

Axial images from an unenhanced chest CT at the level of the pulmonary trunk demonstrate an anterior mediastinal mass with aggressive features suggested by the coarse calcifications within it and the irregular **lobulated margin (arrow)** with the lung, suggestive of pulmonary invasion. In addition, there is a pulmonary nodule in the left upper lobe, confirmed by biopsy to represent a metastasis.

Stage IVb



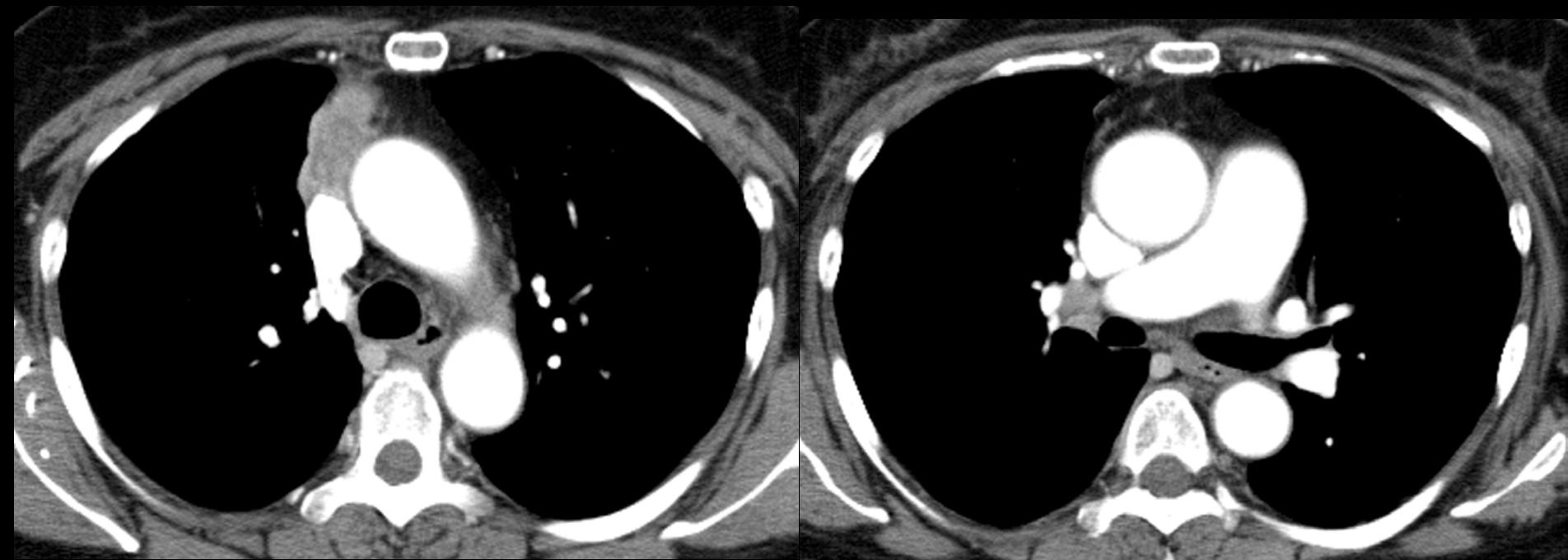
Soft tissue window



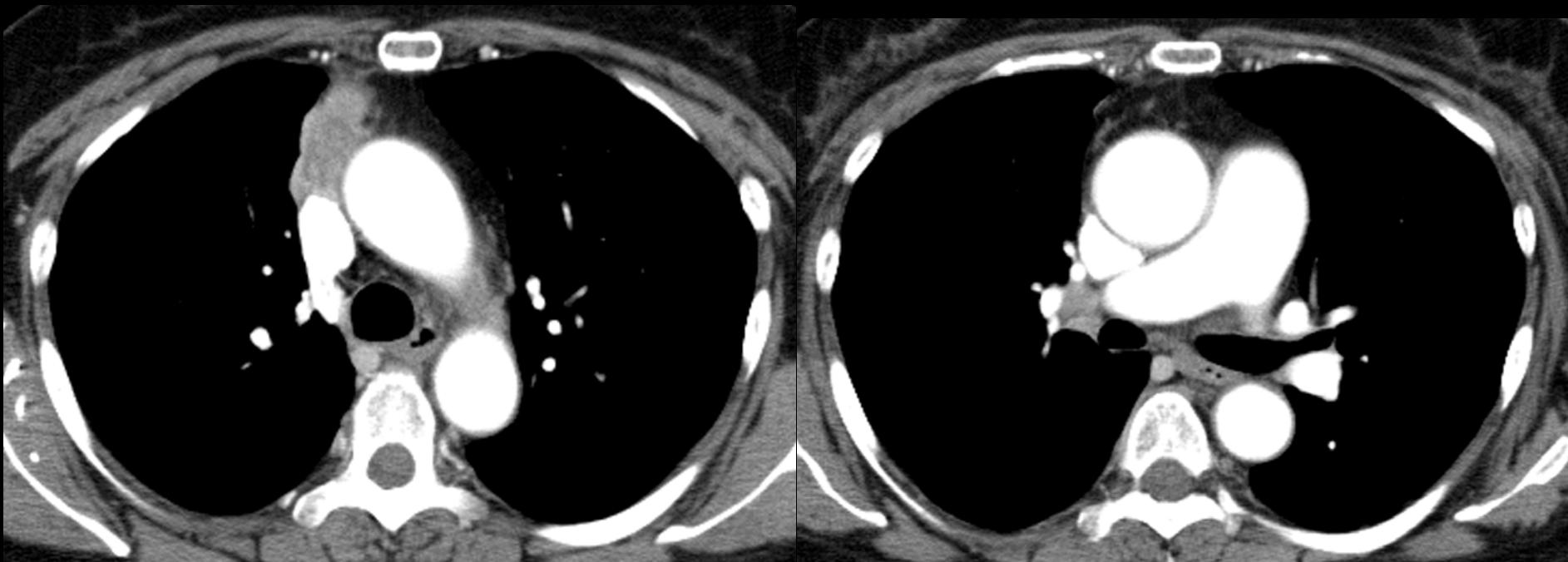
Lung window

Axial images from an unenhanced chest CT at the level of the pulmonary trunk demonstrate an anterior mediastinal mass with aggressive features suggested by the coarse calcifications within it and the irregular lobulated margin with the lung, suggestive of pulmonary invasion. In addition, there is a **pulmonary nodule (arrow)** in the left upper lobe, confirmed by biopsy to represent a metastasis.

Stage IVb



Stage IVb



Contrast enhanced chest CT at the junction of the azygos vein and superior vena cava demonstrates a 3.8cm lobular anterior mediastinal mass which was biopsied and found to represent thymoma. The mass enhances heterogeneously, and abuts less than 50% of the circumference of the superior vena cava and that of the ascending aorta. There is a smaller than 1cm in short axis diameter aorto-pulmonary lymph node. CT image at the level of the right pulmonary artery shows a mildly enlarged right hilar lymph node which was proven to be metastatic at biopsy, and thus stage IVb disease.

Stage IVb

Contrast enhanced chest CT at the junction of the **azygos vein** and **superior vena cava (S)** demonstrates a 3.8cm lobular anterior mediastinal mass which was biopsied and found to represent thymoma. The mass enhances heterogeneously, and abuts less than 50% of the circumference of the superior vena cava and that of the ascending aorta. There is a smaller than 1cm in short axis diameter aorto-pulmonary lymph node. CT image at the level of the right pulmonary artery shows a mildly enlarged right hilar lymph node which was proven to be metastatic at biopsy, and thus stage IVb disease.



Stage IVb

Contrast enhanced chest CT at the junction of the azygos vein and superior vena cava (S) demonstrates a 3.8cm lobular **anterior mediastinal mass (arrow)** which was biopsied and found to represent thymoma. The mass enhances heterogeneously, and abuts less than 50% of the circumference of the superior vena cava and that of the ascending aorta. There is a smaller than 1cm in short axis diameter aorto-pulmonary lymph node. CT image at the level of the right pulmonary artery shows a mildly enlarged right hilar lymph node which was proven to be metastatic at biopsy, and thus stage IVb disease.



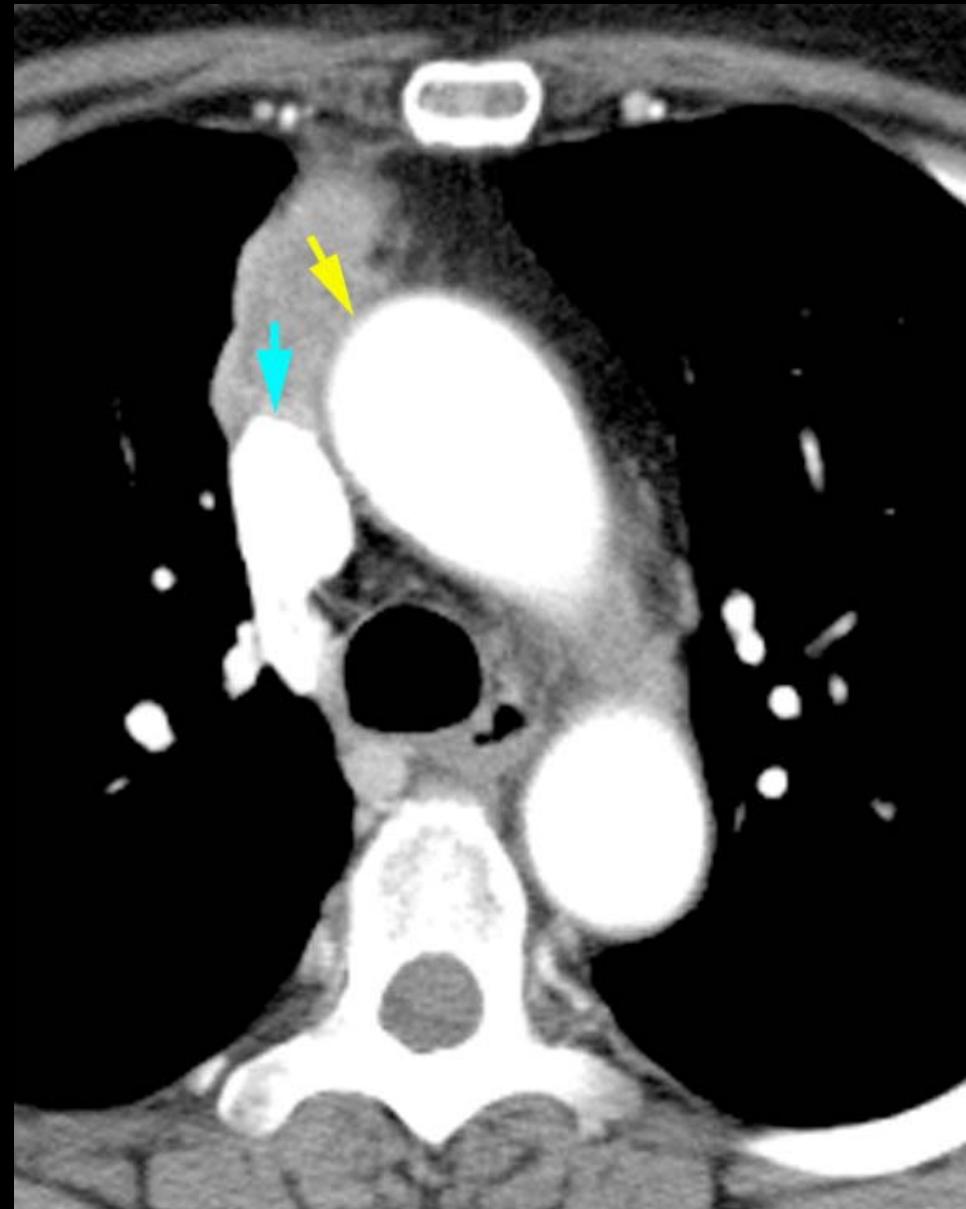
Stage IVb

Contrast enhanced chest CT at the junction of the azygos vein and superior vena cava (S) demonstrates a 3.8cm lobular anterior mediastinal mass which was biopsied and found to represent thymoma. The mass **enhances heterogeneously (arrow)**, and abuts less than 50% of the circumference of the superior vena cava and that of the ascending aorta. There is a smaller than 1cm in short axis diameter aorto-pulmonary lymph node. CT image at the level of the right pulmonary artery shows a mildly enlarged right hilar lymph node which was proven to be metastatic at biopsy, and thus stage IVb disease.



Stage IVb

Contrast enhanced chest CT at the junction of the azygos vein and superior vena cava (S) demonstrates a 3.8cm lobular anterior mediastinal mass which was biopsied and found to represent thymoma. The mass enhances heterogeneously, and abuts less than 50% of the circumference of the superior vena cava (**turquoise arrow**) and that of the ascending aorta (**yellow arrow**). There is a smaller than 1cm in short axis diameter aorto-pulmonary lymph node. CT image at the level of the right pulmonary artery shows a mildly enlarged right hilar lymph node which was proven to be metastatic at biopsy, and thus stage IVb disease.



Stage IVb

Contrast enhanced chest CT at the junction of the azygos vein and superior vena cava (S) demonstrates a 3.8cm lobular anterior mediastinal mass which was biopsied and found to represent thymoma. The mass enhances heterogeneously, and abuts less than 50% of the circumference of the superior vena cava (turquoise arrow) and that of the ascending aorta (yellow arrow). There is a smaller than 1cm in short axis diameter **aorto-pulmonary lymph node (arrow)**. CT image at the level of the right pulmonary artery shows a mildly enlarged right hilar lymph node which was proven to be metastatic at biopsy, and thus stage IVb disease.



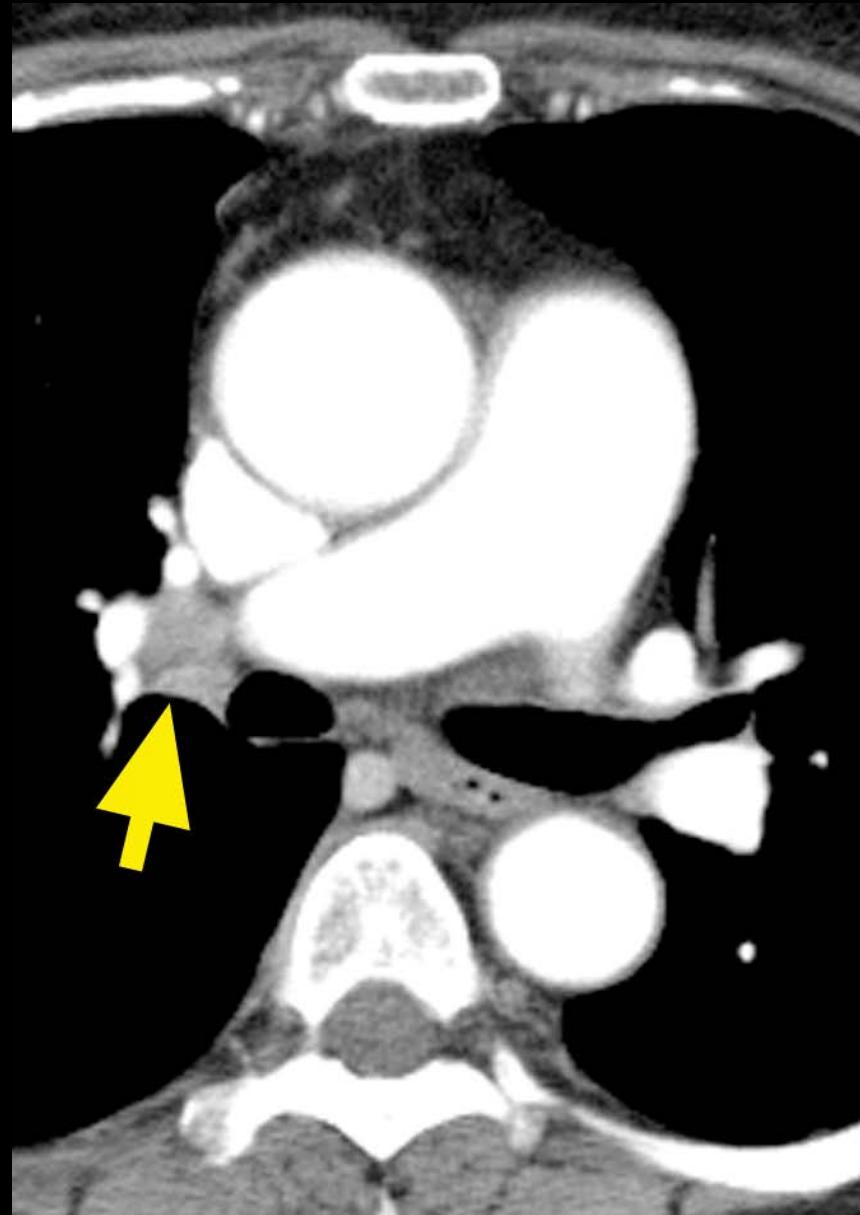
Stage IVb

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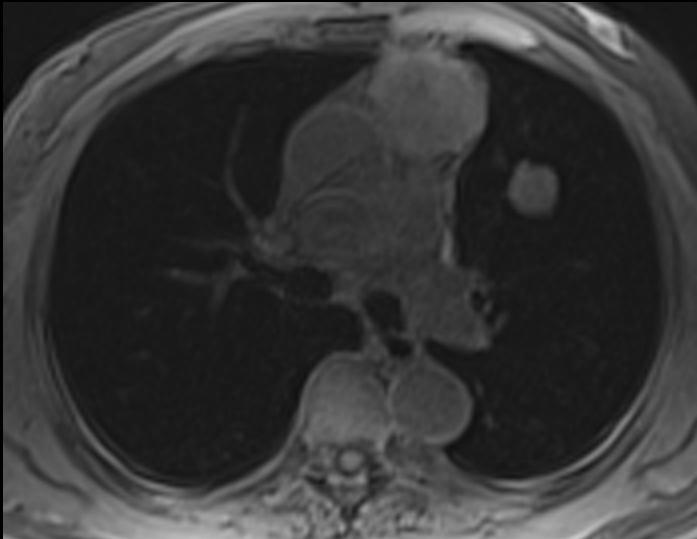


Stage IVb

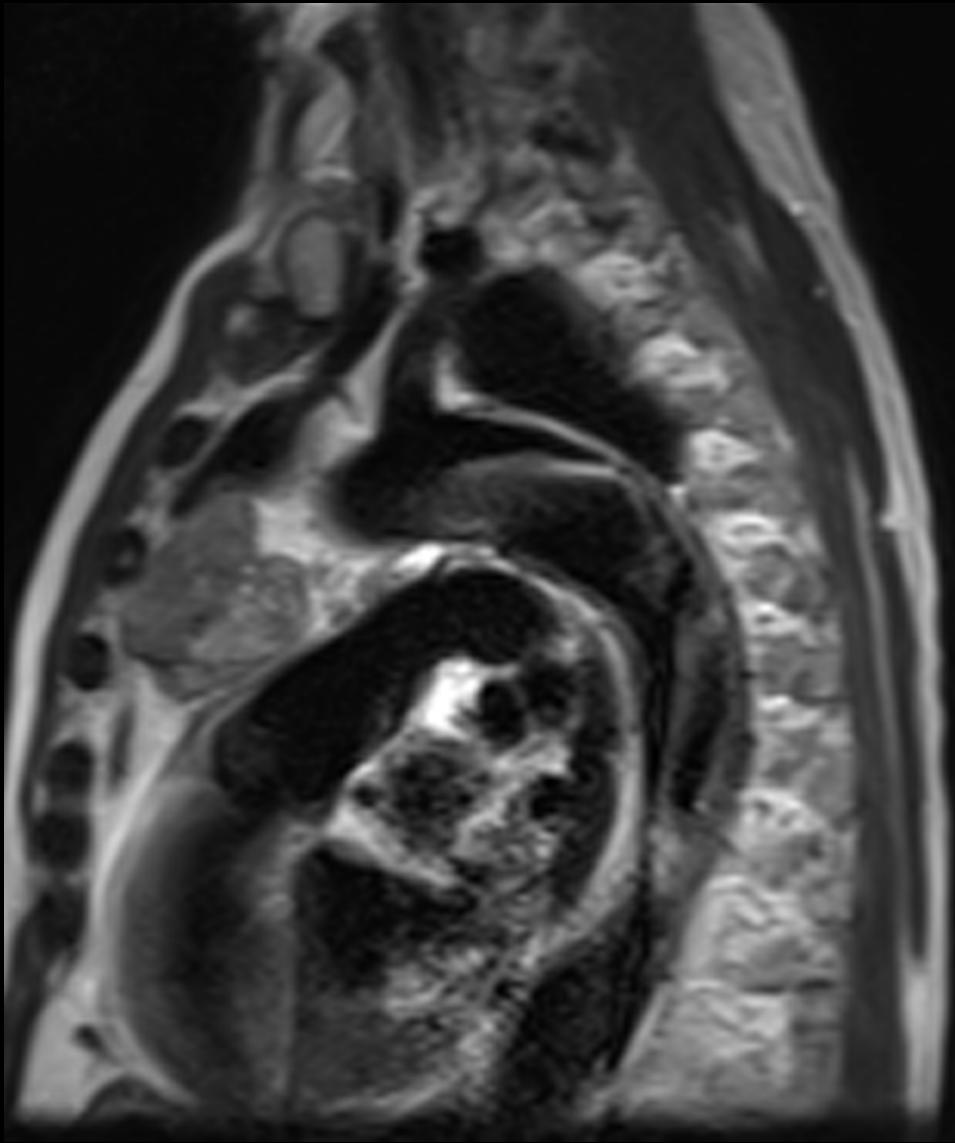
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Stage IVb



Axial MRI: unenhanced T1 gradient echo with fat saturation

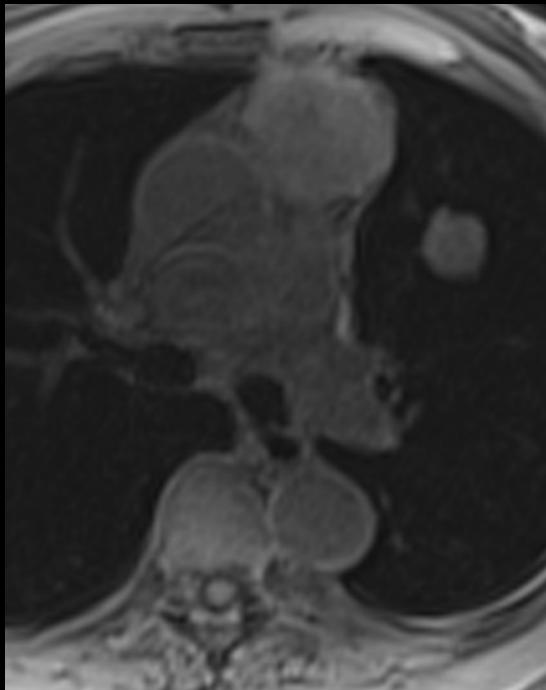


Sagittal MRI: T2 weighted fast spin echo

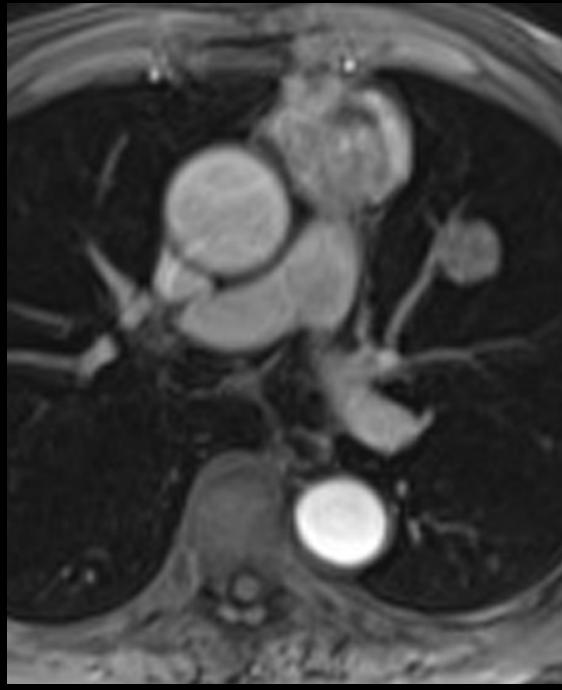
Axial MRI: T1 gradient echo with fat saturation following Gadolinium injection



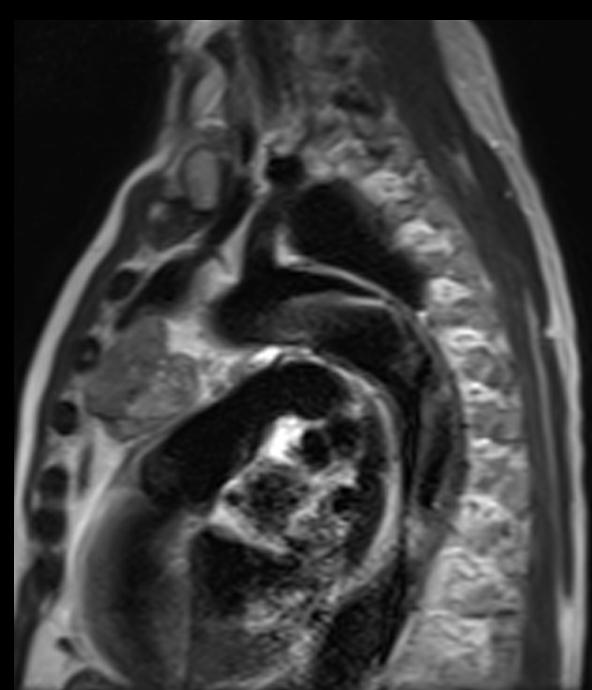
Stage IVb



Unenhanced T1W



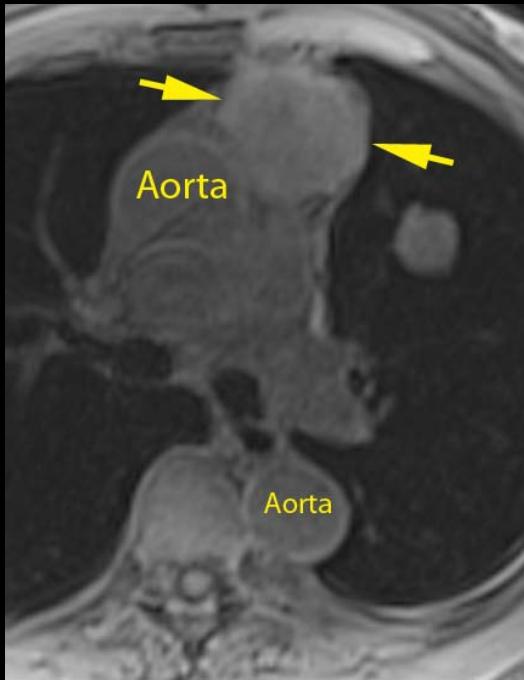
Contrast enhanced T1W



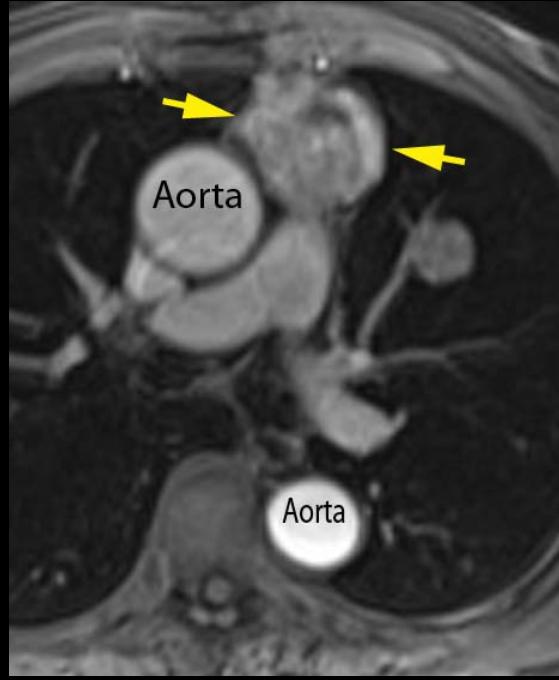
Sagittal T2W

The MRI shows a heterogeneous mass, similar to muscle intensity on the T1-weighted image and of high signal intensity compared to muscle on the T2-weighted image. There are small foci of high intensity on T2 weighted sequence, suggestive of foci of hemorrhage, while the signal void foci on both sequences represent calcifications. Following gadolinium administration, the mediastinal mass and the lung nodule enhance. The separate lung nodule shows the same MR characteristics as the mediastinal tumor, suggestive of a common origin. At surgery, the mediastinal lesion proved to be thymoma invading the left lung, with accompanying single lung metastasis.

Stage IVb



Unenhanced T1W



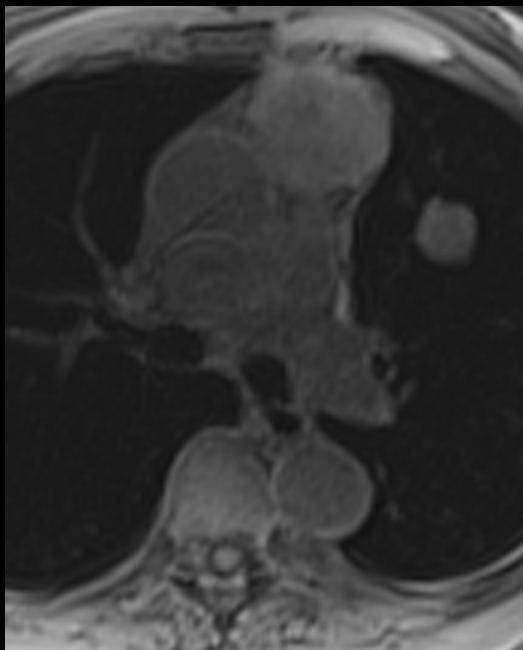
Contrast enhanced T1W



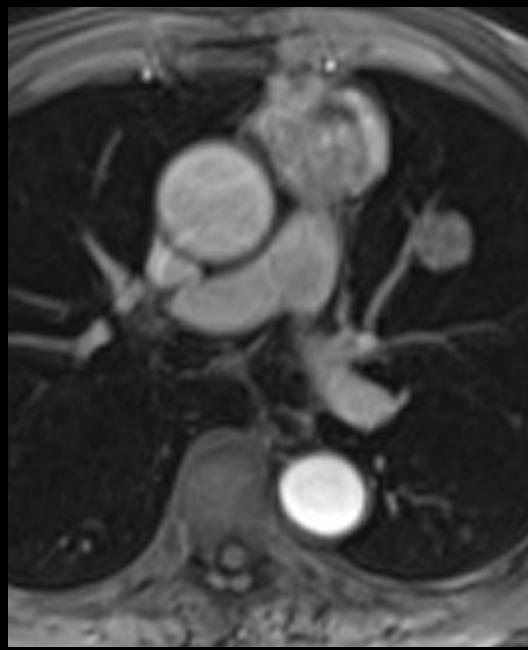
Sagittal T2W

The MRI shows a heterogeneous mass (**arrows**), similar to muscle intensity on the T1-weighted image and of high signal intensity compared to muscle on the T2-weighted image. There are small foci of high intensity on T2 weighted sequence, suggestive of foci of hemorrhage, while the signal void foci on both sequences represent calcifications. Following gadolinium administration, the mediastinal mass and the lung nodule enhance. The separate lung nodule shows the same MR characteristics as the mediastinal tumor, suggestive of a common origin. At surgery, the mediastinal lesion proved to be thymoma invading the left lung, with accompanying single lung metastasis.

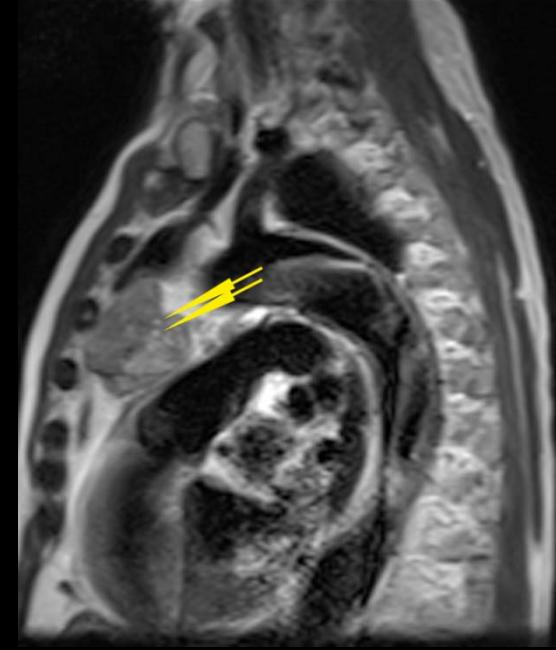
Stage IVb



Unenhanced T1W



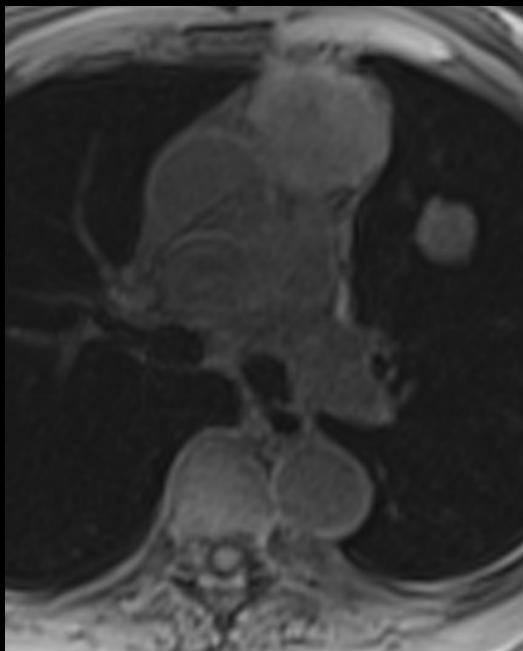
Contrast enhanced T1W



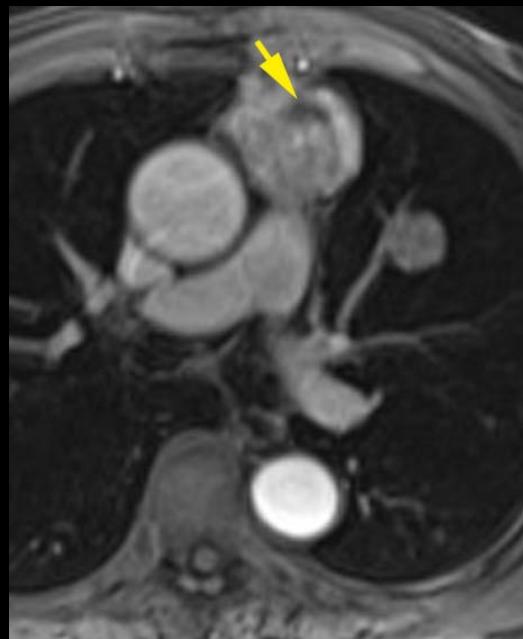
Sagittal T2W

The MRI shows a heterogeneous mass, similar to muscle intensity on the T1-weighted image and of high signal intensity compared to muscle on the T2-weighted image. There are **small foci of high intensity on T2 weighted sequence (arrows)**, suggestive of foci of hemorrhage, while the signal void foci on both sequences represent calcifications. Following gadolinium administration, the mediastinal mass and the lung nodule enhance. The separate lung nodule shows the same MR characteristics as the mediastinal tumor, suggestive of a common origin. At surgery, the mediastinal lesion proved to be thymoma invading the left lung, with accompanying single lung metastasis.

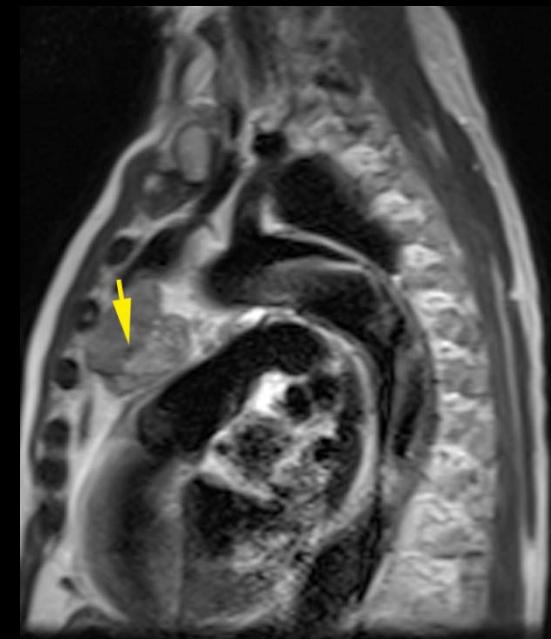
Stage IVb



Unenhanced T1W



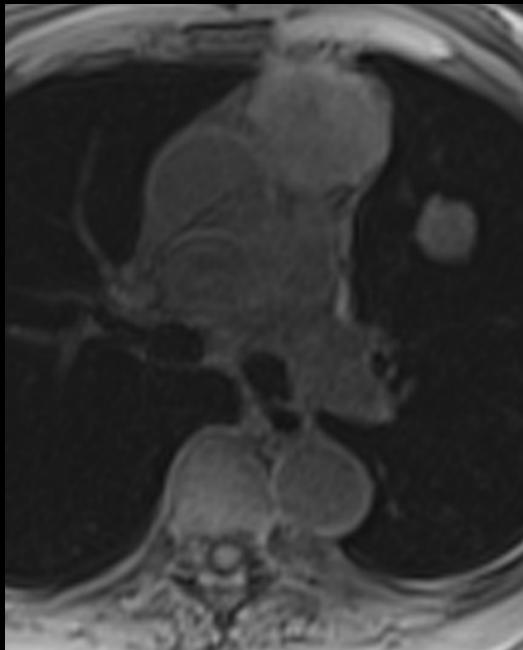
Contrast enhanced T1W



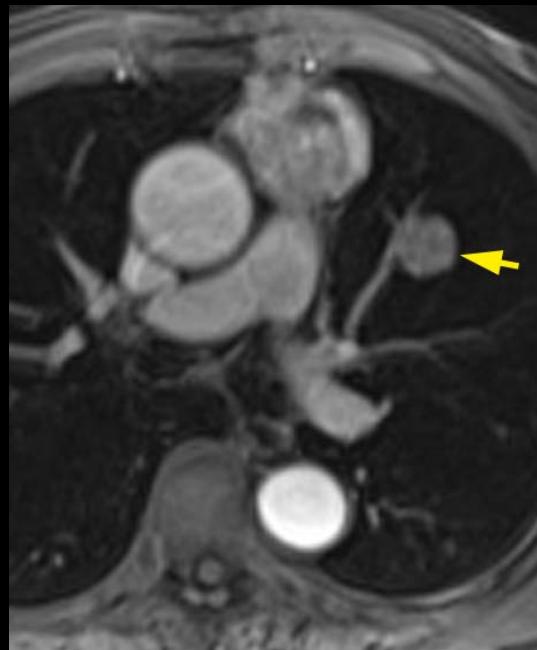
Sagittal T2W

The MRI shows a heterogeneous mass, similar to muscle intensity on the T1-weighted image and of high signal intensity compared to muscle on the T2-weighted image. There are small foci of high intensity on T2 weighted sequence, suggestive of foci of hemorrhage, while the **signal void foci (arrow)** on both sequences represent calcifications. Following gadolinium administration, the mediastinal mass and the lung nodule enhance. The separate lung nodule shows the same MR characteristics as the mediastinal tumor, suggestive of a common origin. At surgery, the mediastinal lesion proved to be thymoma invading the left lung, with accompanying single lung metastasis.

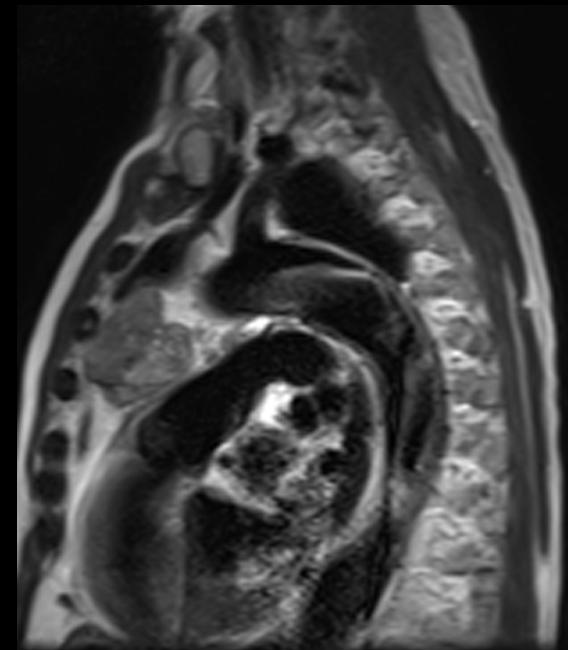
Stage IVb



Unenhanced T1W



Contrast enhanced T1W



Sagittal T2W

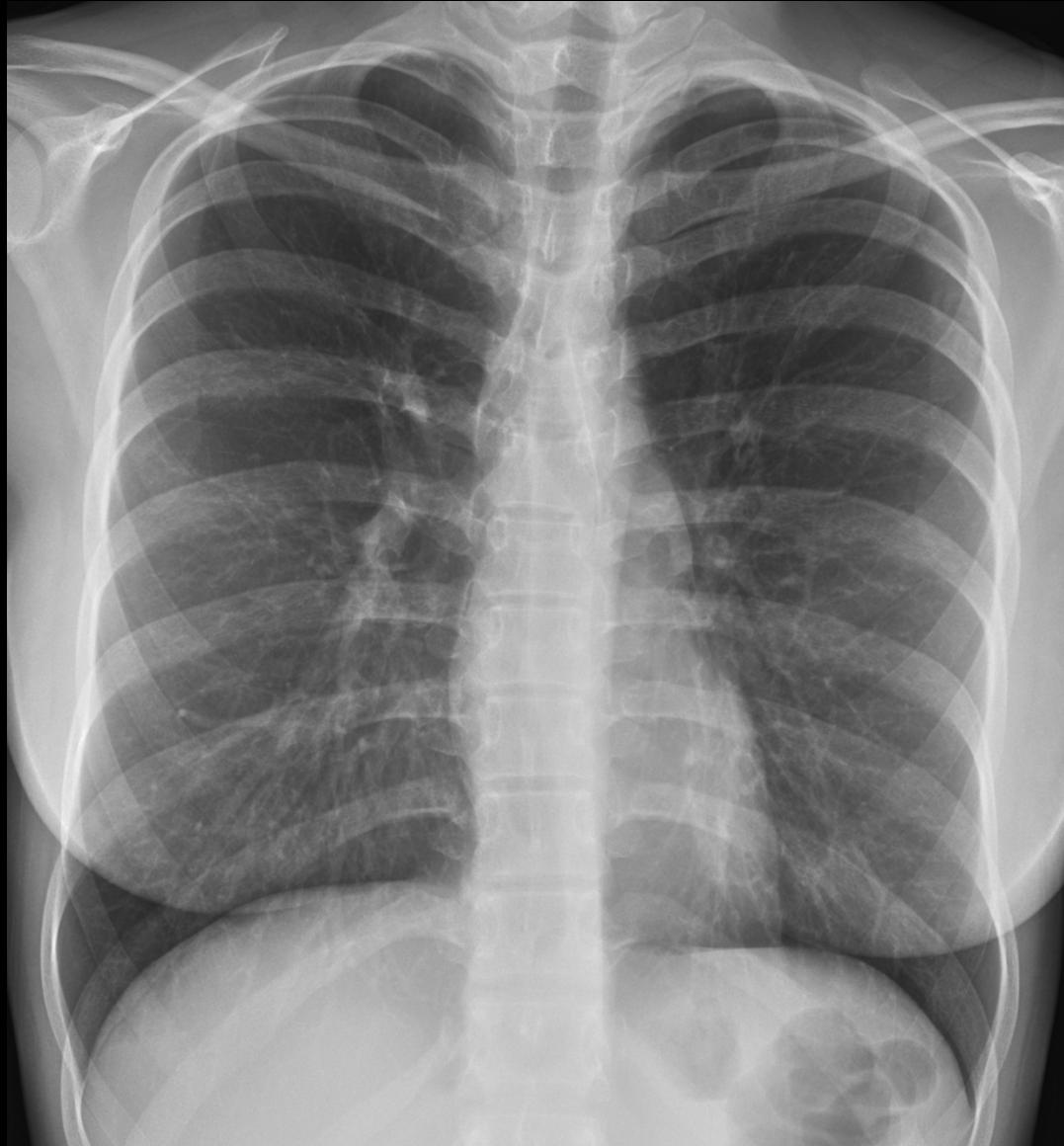
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Normal Anatomy



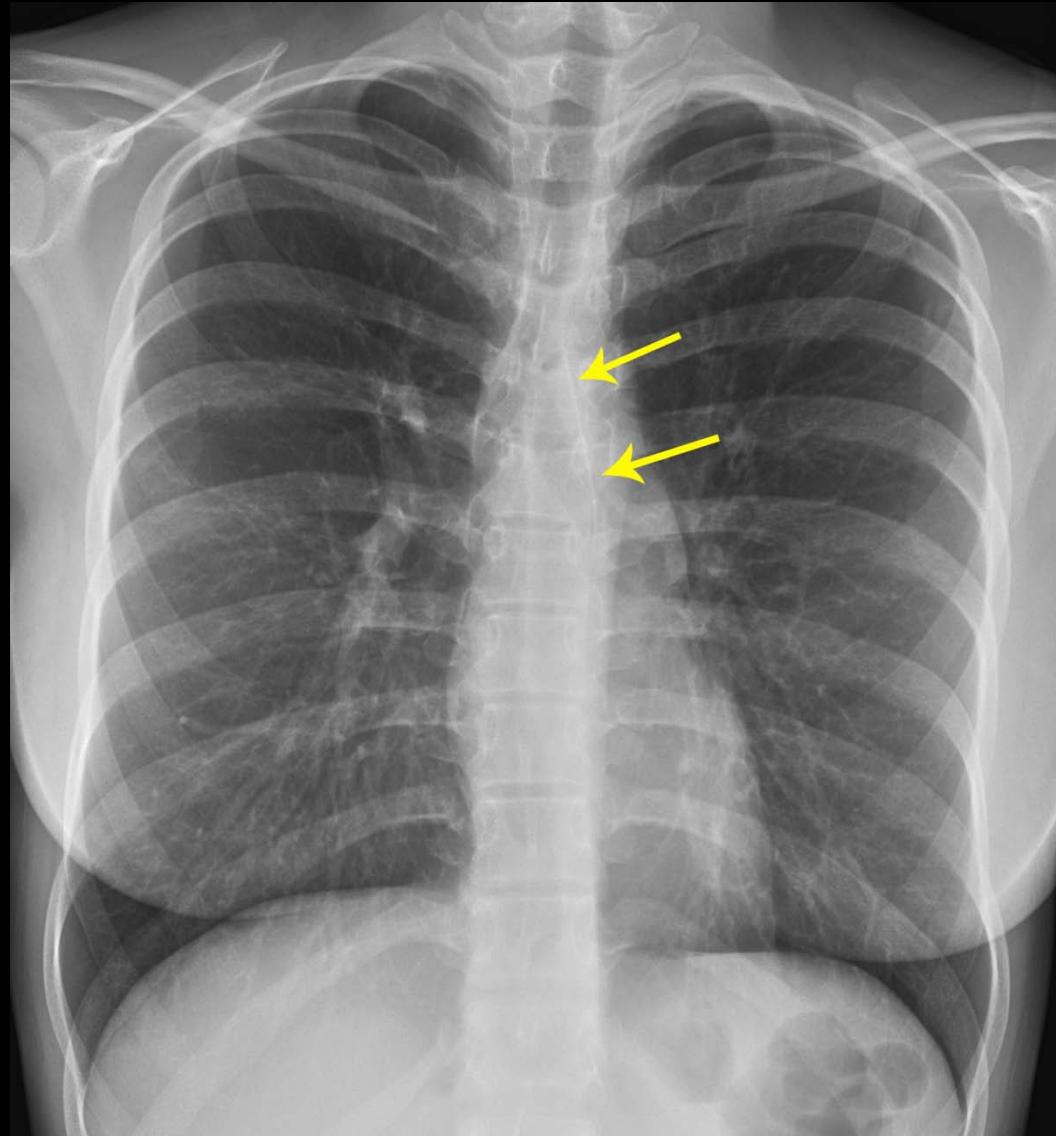
Normal chest radiograph

The frontal chest radiograph demonstrates a normal anterior junction line coursing obliquely from the upper right to the lower left over the superior two-thirds of the retrosternal region towards the heart.



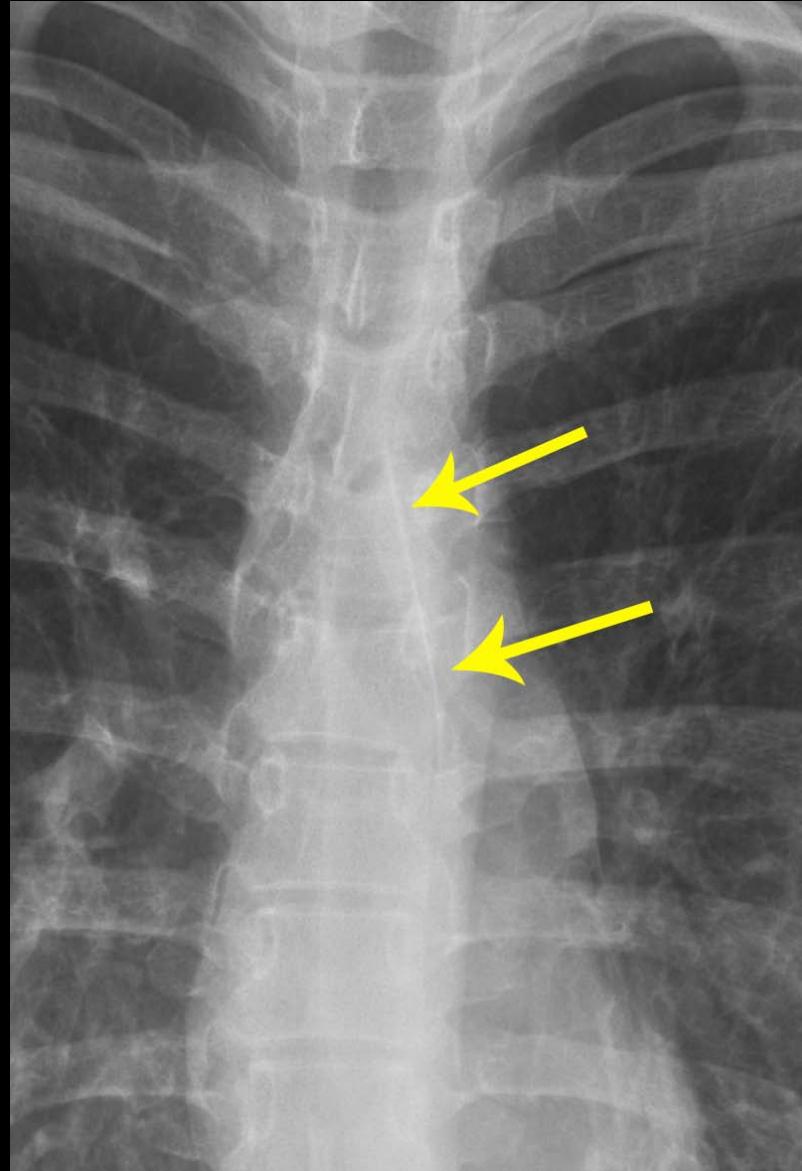
Normal chest radiograph

The frontal chest radiograph demonstrates a normal **anterior junction line** coursing obliquely from the upper right to the lower left over the superior two-thirds of the retrosternal region towards the heart.

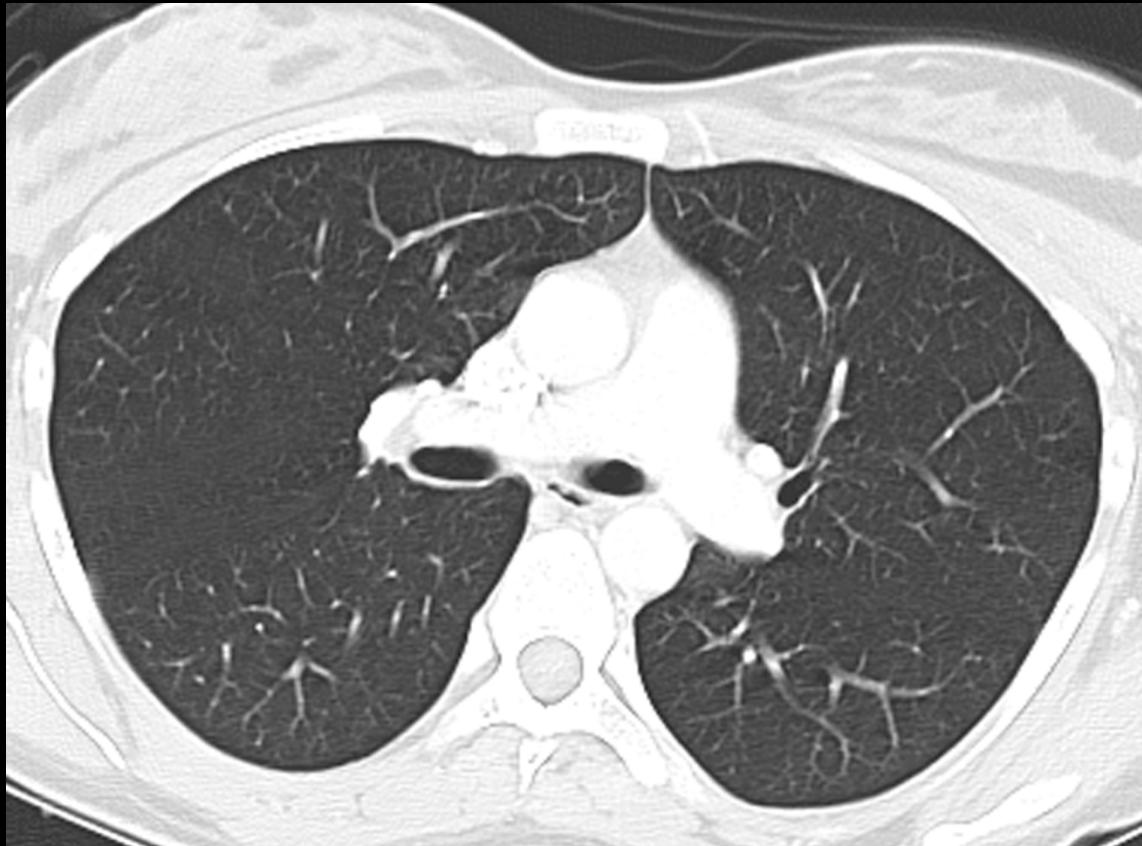


Normal chest radiograph

The frontal chest radiograph demonstrates a normal **anterior junction line** coursing obliquely from the upper right to the lower left over the superior two-thirds of the retrosternal region towards the heart.

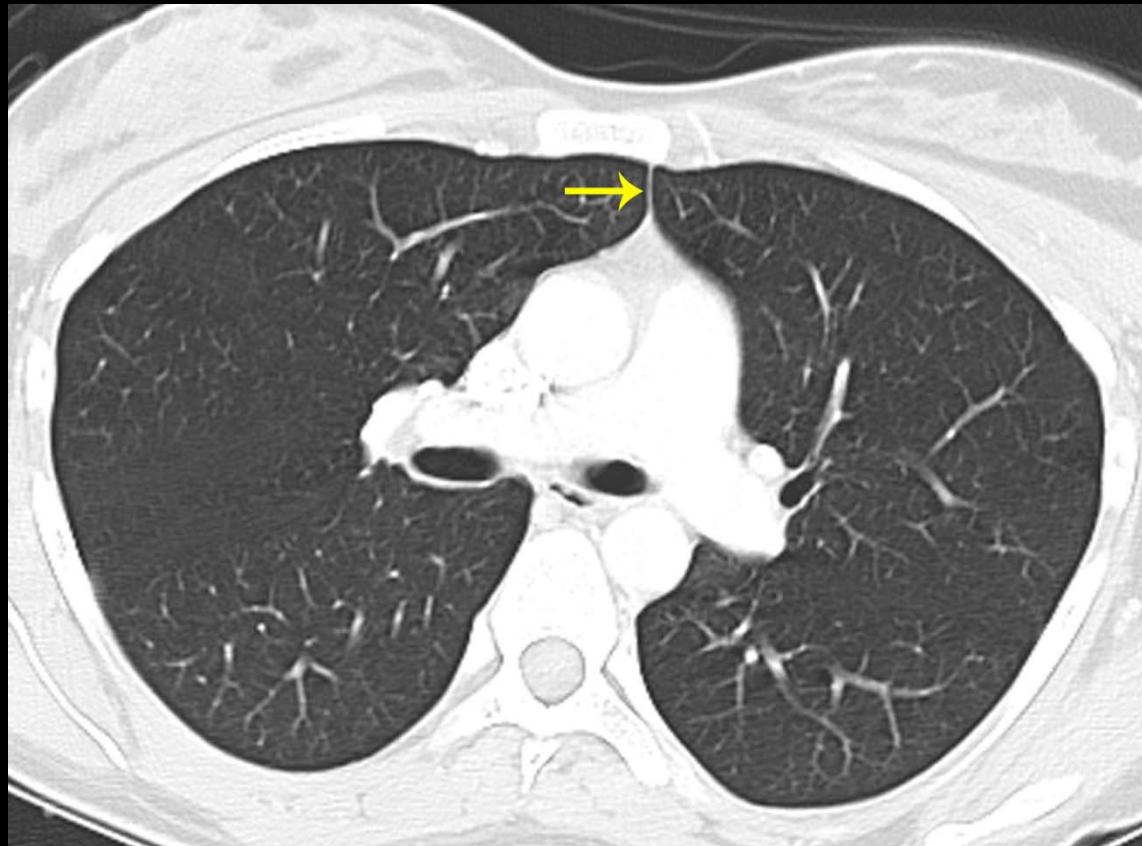


Normal chest CT



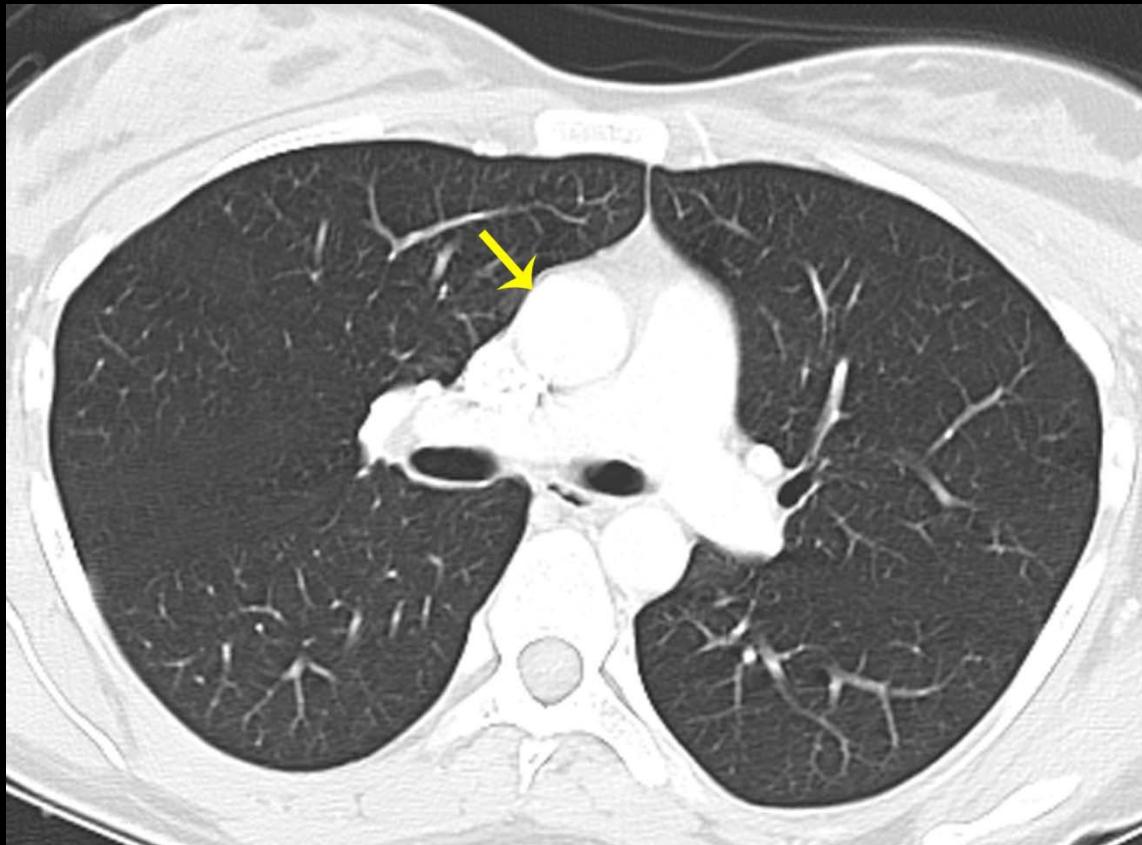
CT scan demonstrates a normal anterior junction line formed by the apposition of the visceral and parietal pleura of the lungs with intervening mediastinal fat located anterior to the ascending aorta and right ventricular outflow tract. The anterior junction line is a normal mediastinal structure that is not evident in all patients on chest radiographs. However, when present, this line can be helpful in excluding an anterior mediastinal abnormality.

Normal chest CT



CT scan demonstrates a **normal anterior junction line** formed by the apposition of the visceral and parietal pleura of the lungs with intervening mediastinal fat located anterior to the ascending aorta and right ventricular outflow tract. The anterior junction line is a normal mediastinal structure that is not evident in all patients on chest radiographs. However, when present, this line can be helpful in excluding an anterior mediastinal abnormality.

Normal chest CT



CT scan demonstrates a normal anterior junction line formed by the apposition of the visceral and parietal pleura of the lungs with intervening mediastinal fat located anterior to the ascending **aorta** and right ventricular outflow tract. The anterior junction line is a normal mediastinal structure that is not evident in all patients on chest radiographs. However, when present, this line can be helpful in excluding an anterior mediastinal abnormality.

Normal Anatomy



The normal lateral chest radiograph



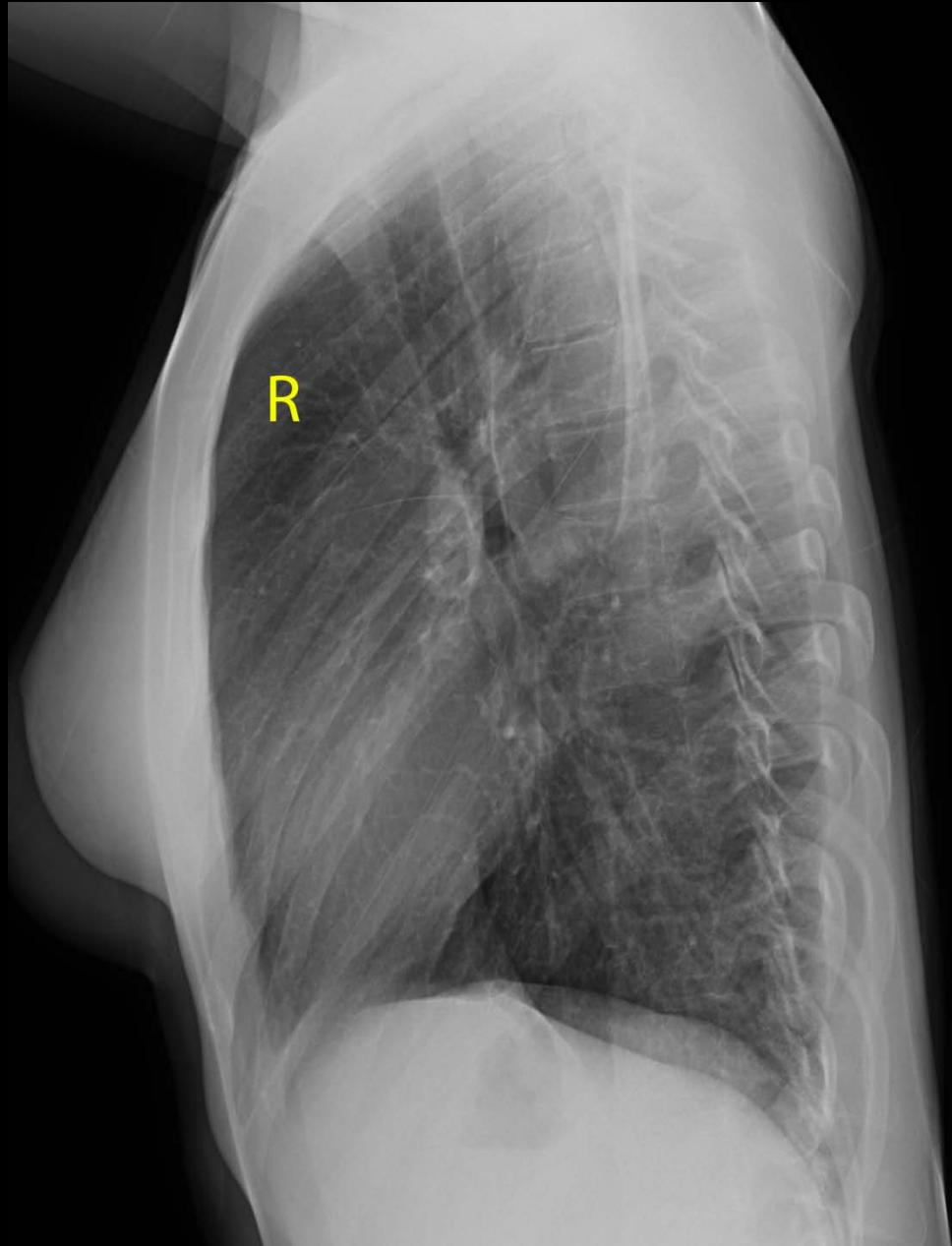
The normal lateral chest radiograph

The lateral chest radiograph demonstrates the normal retrosternal air space. This region is located posterior to the sternum and anterior to the ascending aorta and pulmonary trunk.



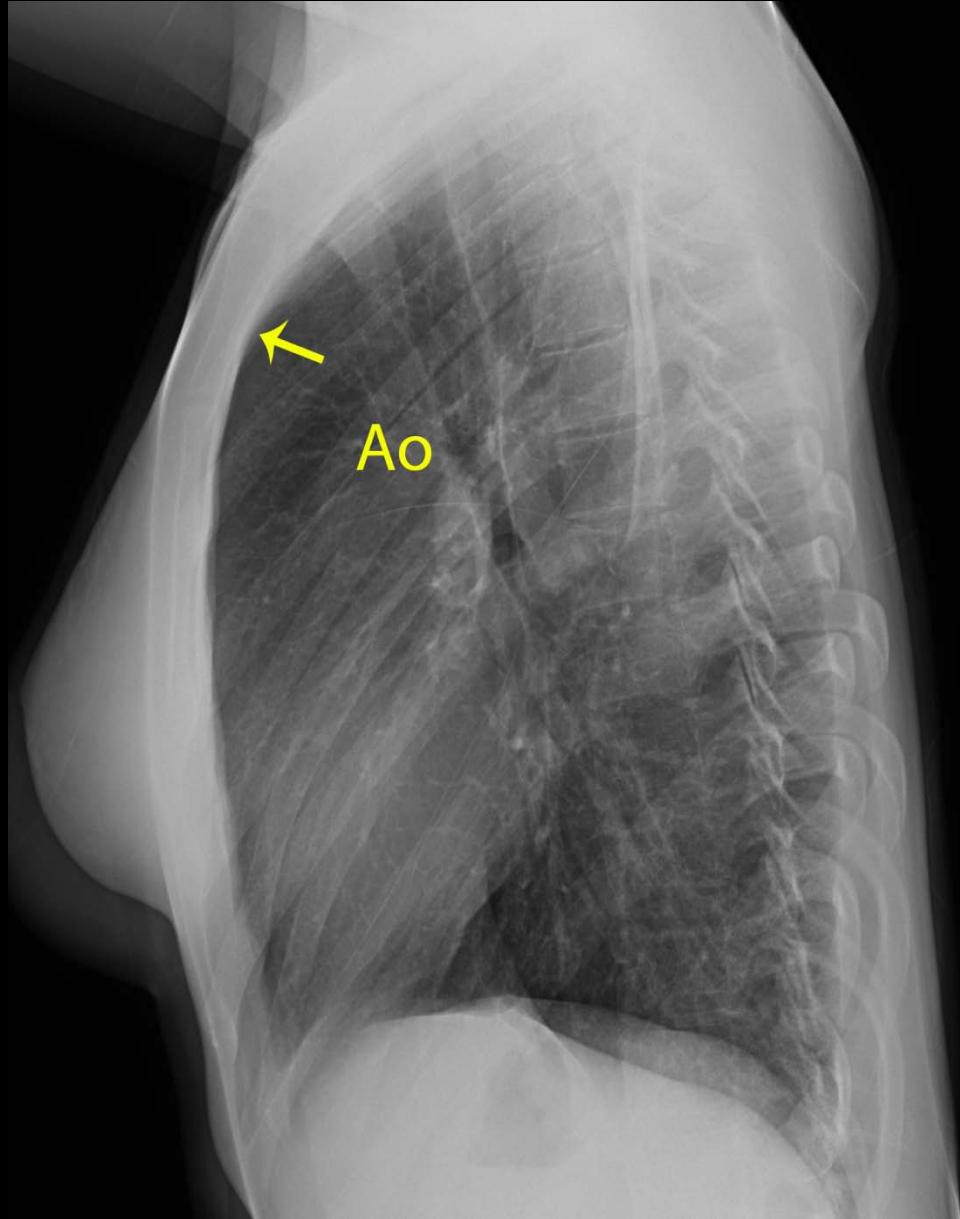
The normal lateral chest radiograph

The lateral chest radiograph demonstrates the normal retrosternal air space (R). This region is located posterior to the sternum and anterior to the ascending aorta and pulmonary trunk.



The normal and abnormal chest radiographs

The lateral chest radiograph demonstrates the normal retrosternal air space. This region is located posterior to the sternum (**arrow**) and anterior to the ascending aorta (**Ao**) and pulmonary trunk.



The normal and abnormal lateral chest radiograph



Normal

Note the air filled retrosternal space in the normal film as compared to the abnormal one. The abnormal lateral chest radiograph demonstrates soft tissue filling the retrosternal space in a thymoma patient.

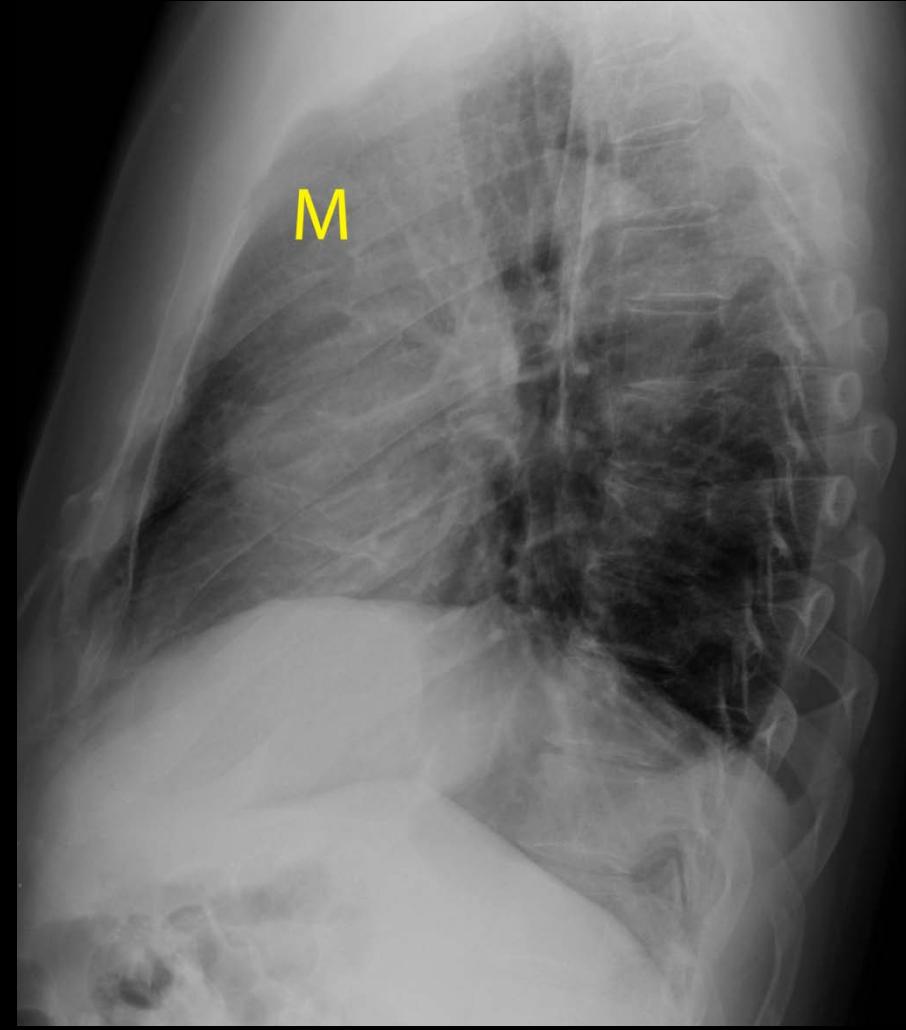


Abnormal

The normal and abnormal lateral chest radiograph



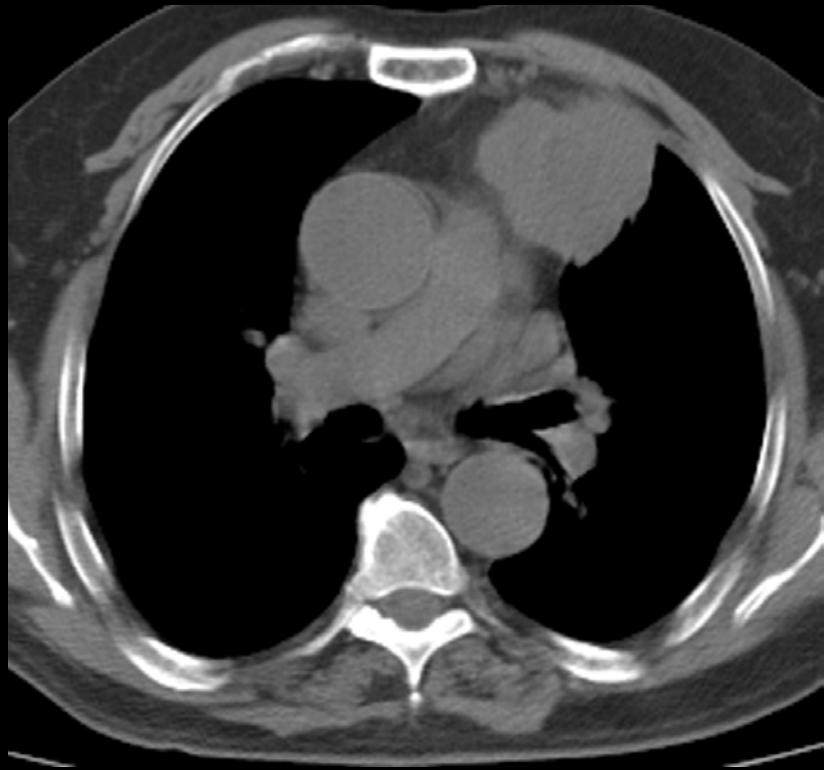
Normal



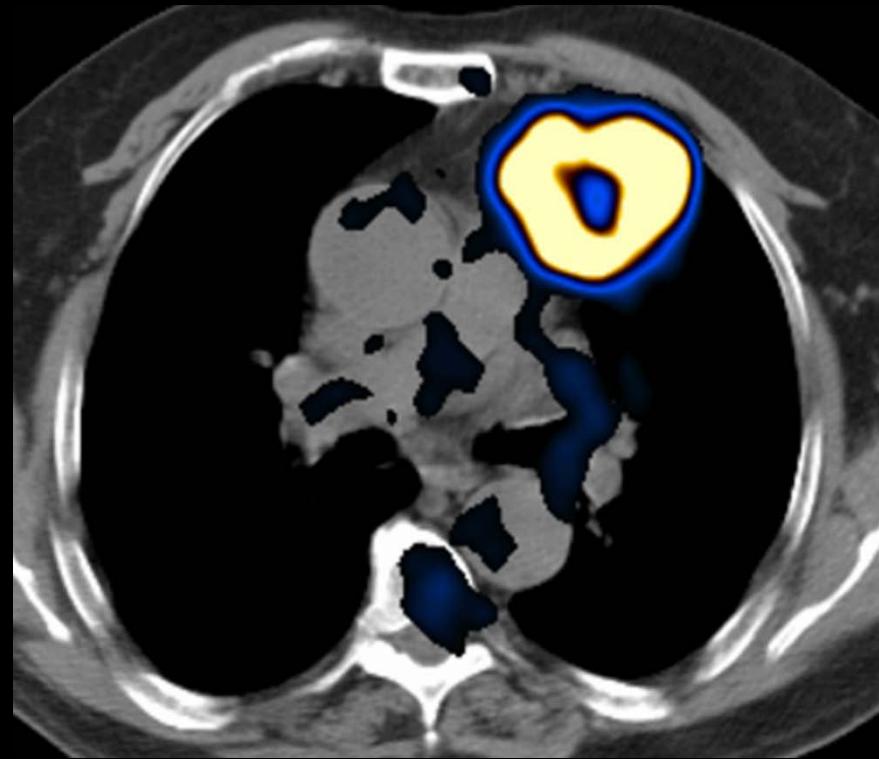
Abnormal

Note the air filled retrosternal space (**R**) in the normal film as compared to the abnormal one. The abnormal lateral chest radiograph demonstrates soft tissue filling the retrosternal space in a thymoma patient (**M**).

Thymic Carcinoma



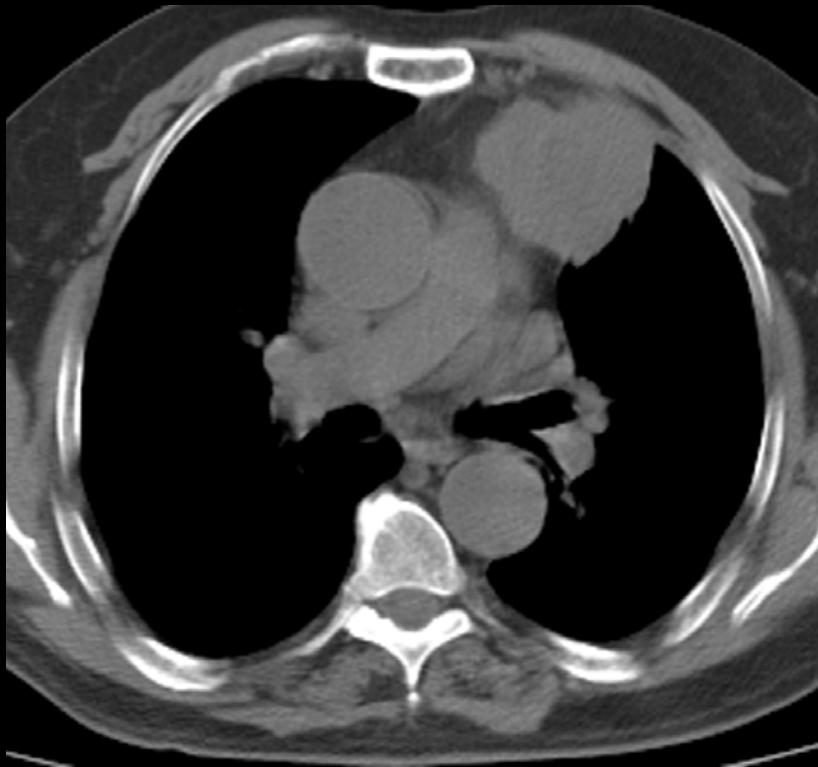
Unenhanced chest CT



Fused FDG PET-CT*

* FDG= Fluorine-18 fluorodeoxyglucose; PET-CT= positron emission tomography-computed tomography

Thymic Cancer



Unenhanced chest CT



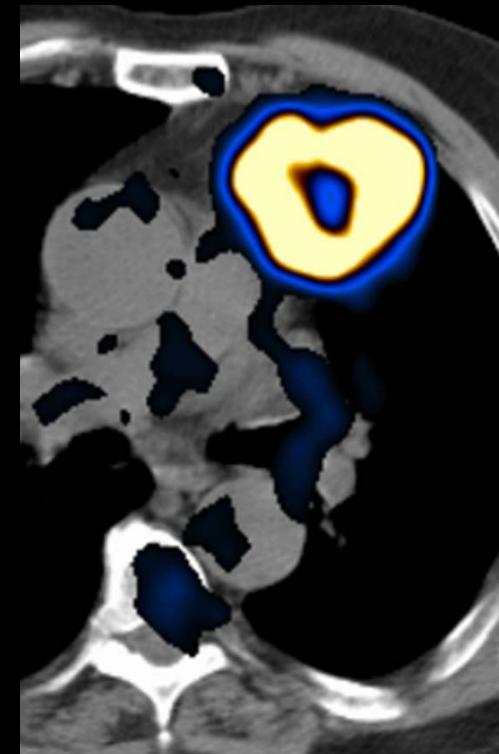
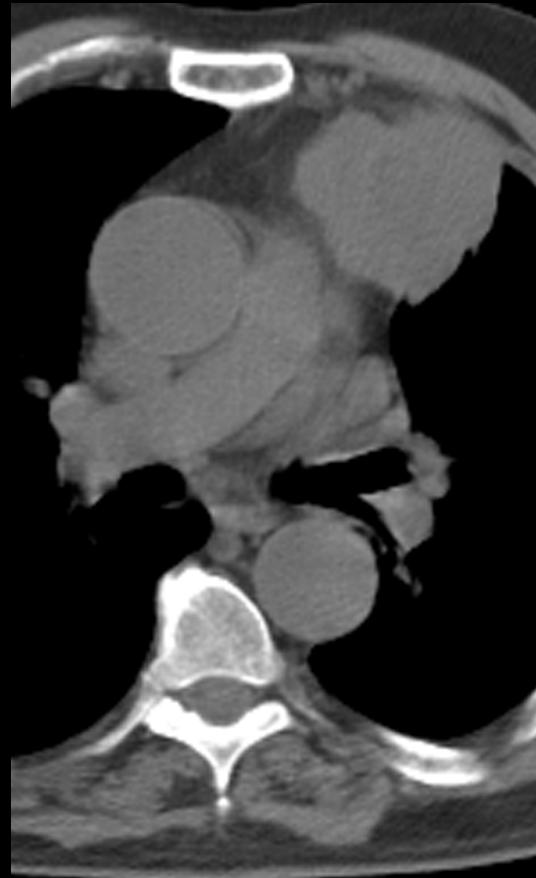
Fused FDG PET-CT*

* FDG= Fluorine-18 fluorodeoxyglucose; PET-CT= positron emission tomography-computed tomography

Thymic Cancer

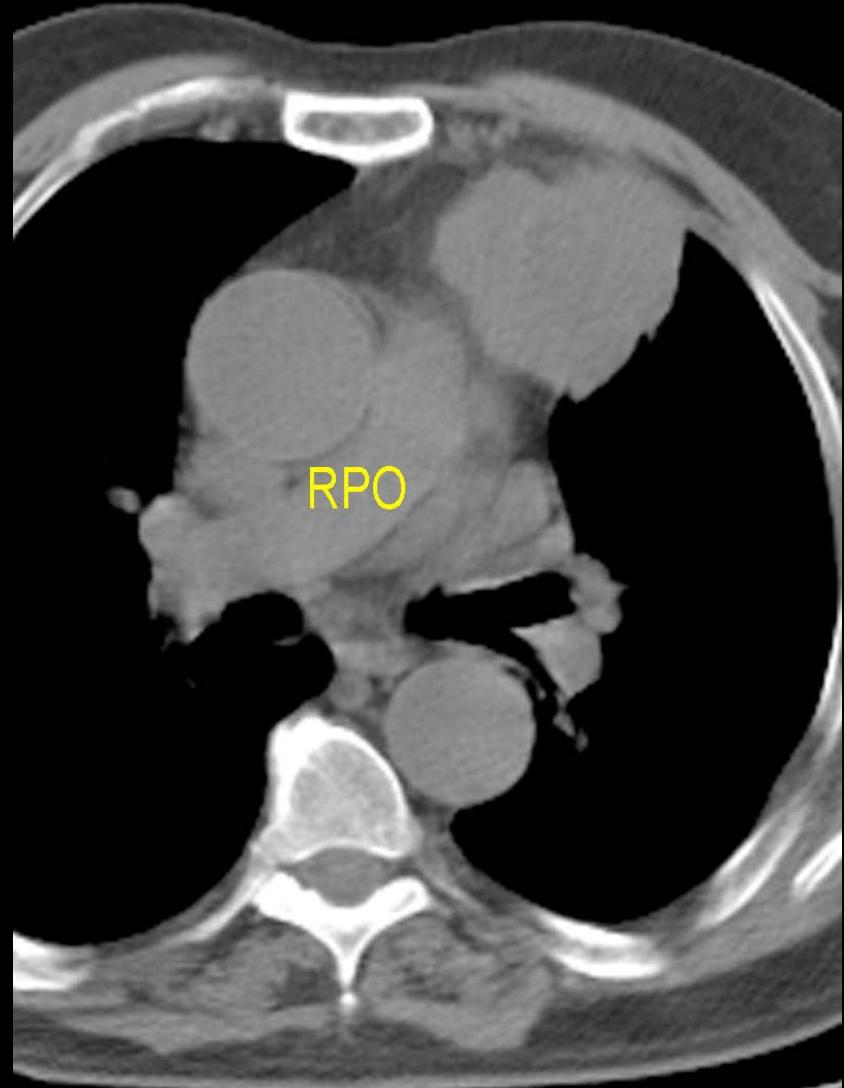
An axial image from a chest CT at the level of the right pulmonary artery demonstrates an anterior mediastinal mass. The lobulated mass involves the chest wall and infiltrates the fat peripheral to the parietal pleura as well as the mediastinal fat. Note the normal appearing fat in the right portion of the anterior mediastinum. Chest wall and mediastinal fat invasion from a thymic cancer were proven at surgery.

The mass demonstrates significant FDG uptake. While thymomas may or may not show some FDG uptake, the FDG uptake from thymic cancer is significantly higher.



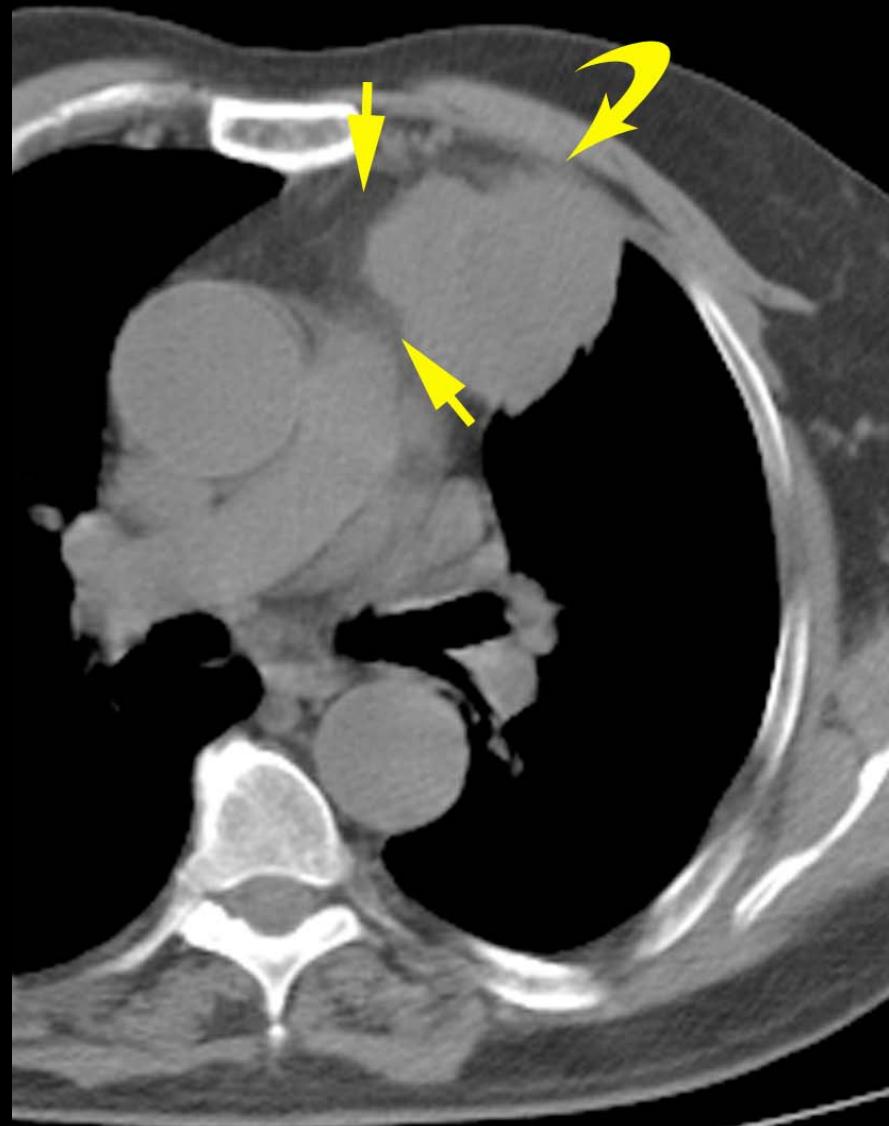
Thymic Cancer

An axial image from a chest CT at the level of the **right pulmonary artery (RPO)** demonstrates an anterior mediastinal mass. The lobulated mass involves the chest wall and infiltrates the fat peripheral to the parietal pleura as well as the mediastinal fat. Note the normal appearing fat in the right portion of the anterior mediastinum. Chest wall and mediastinal fat invasion from a thymic cancer were proven at surgery.



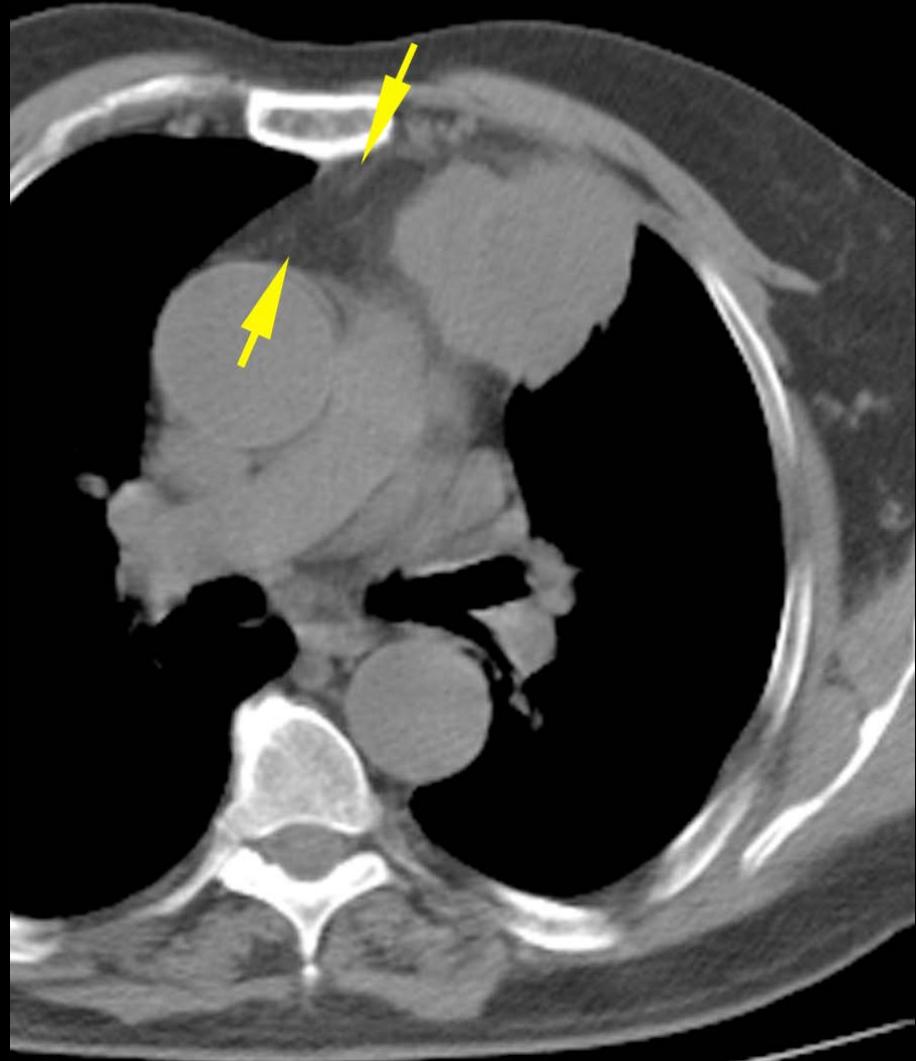
Thymic Cancer

An axial image from a chest CT at the level of the right pulmonary artery demonstrates an anterior mediastinal mass. The lobulated mass involves the chest wall (**curved arrow**) and infiltrates the fat peripheral to the parietal pleura as well as the mediastinal fat (**straight arrows**). Note the normal appearing fat in the right portion of the anterior mediastinum. Chest wall and mediastinal fat invasion from a thymic cancer were proven at surgery.



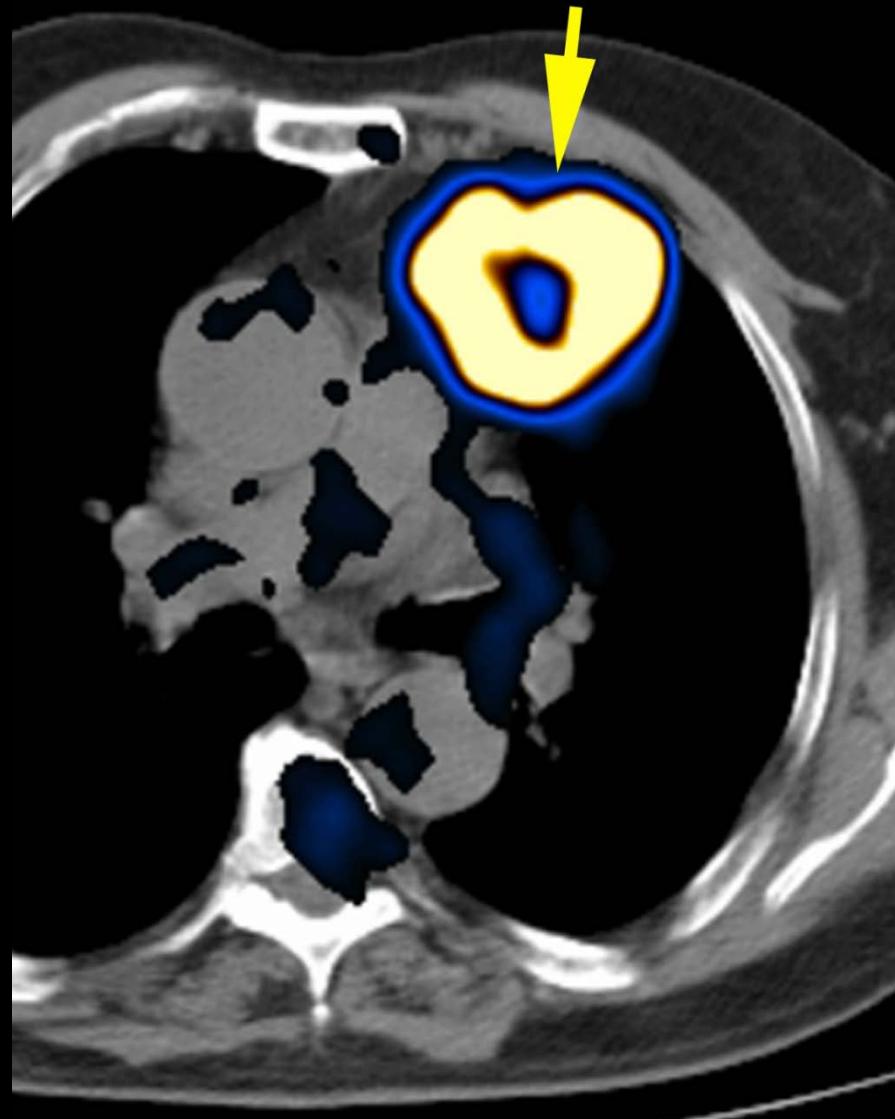
Thymic Cancer

An axial image from a chest CT at the level of the right pulmonary artery demonstrates an anterior mediastinal mass. The lobulated mass involves the chest wall and infiltrates the fat peripheral to the parietal pleura as well as the mediastinal fat. Note the **normal appearing fat (straight arrows)** in the right portion of the anterior mediastinum. Chest wall and mediastinal fat invasion from a thymic cancer were proven at surgery.



Thymic Cancer

The mass demonstrates **significant FDG uptake**. While thymomas may or may not show some FDG uptake, the FDG uptake from thymic cancer is significantly higher.



Thymic cancer: Stage III

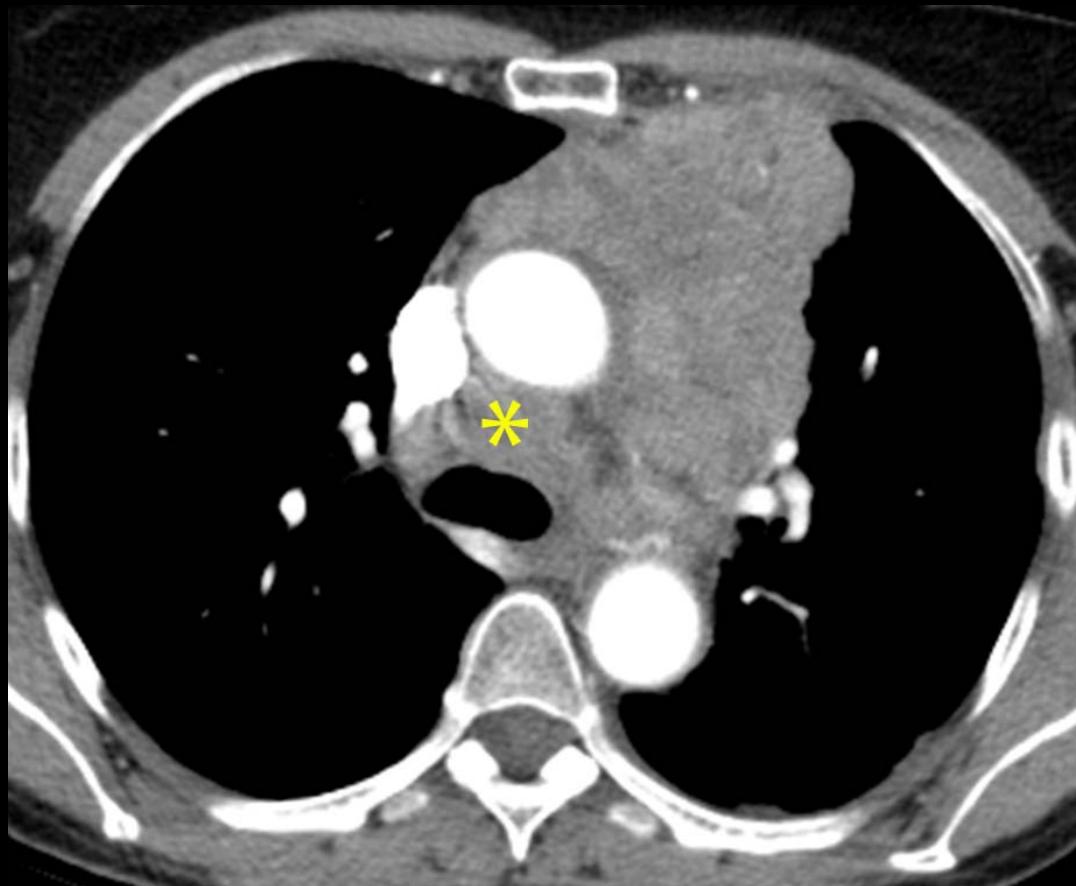


Stage III



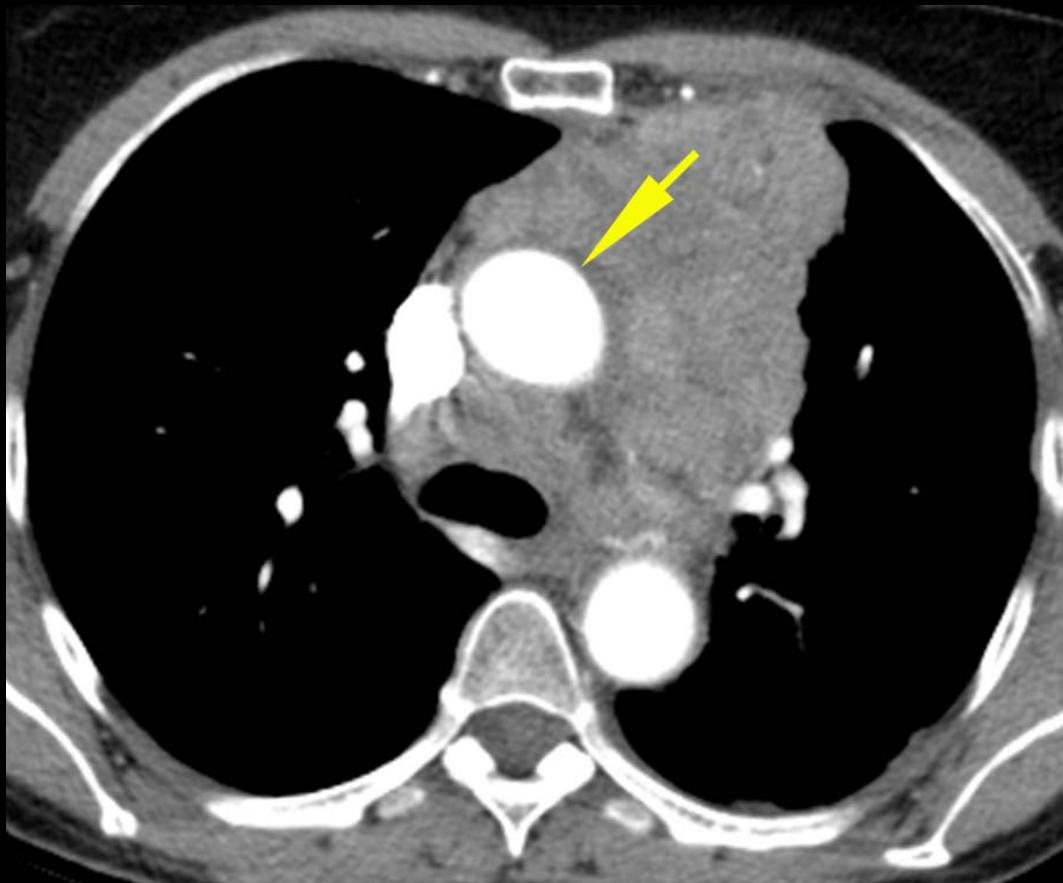
Contrast-enhanced chest CT at the level of the aorto-pulmonary window shows a heterogeneous lobulated mass growing along the pericardium, involving the superior pericardial recess so that it surrounds the circumference of the ascending aorta, fills the majority of the aorto-pulmonary window, and abuts about a third of the circumference of the descending aorta. At surgical exploration the tumor was found to be a thymic cancer invading the aortic wall.

Stage III



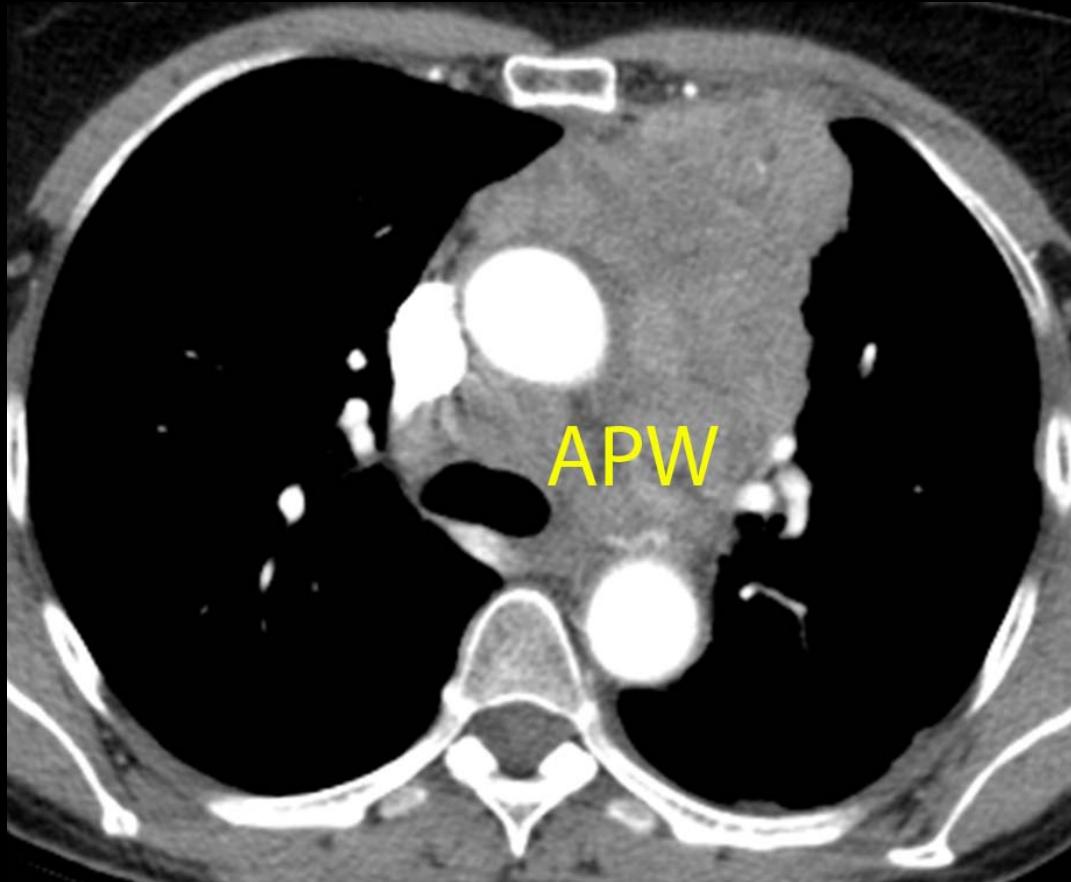
Contrast-enhanced chest CT at the level of the aorto-pulmonary window shows a heterogeneous lobulated mass growing along the pericardium, involving the **superior pericardial recess (asterisk)** so that it surrounds the circumference of the ascending aorta, fills the majority of the aorto-pulmonary window, and abuts about a third of the circumference of the descending aorta. At surgical exploration the tumor was found to be a thymic cancer invading the aortic wall.

Stage III



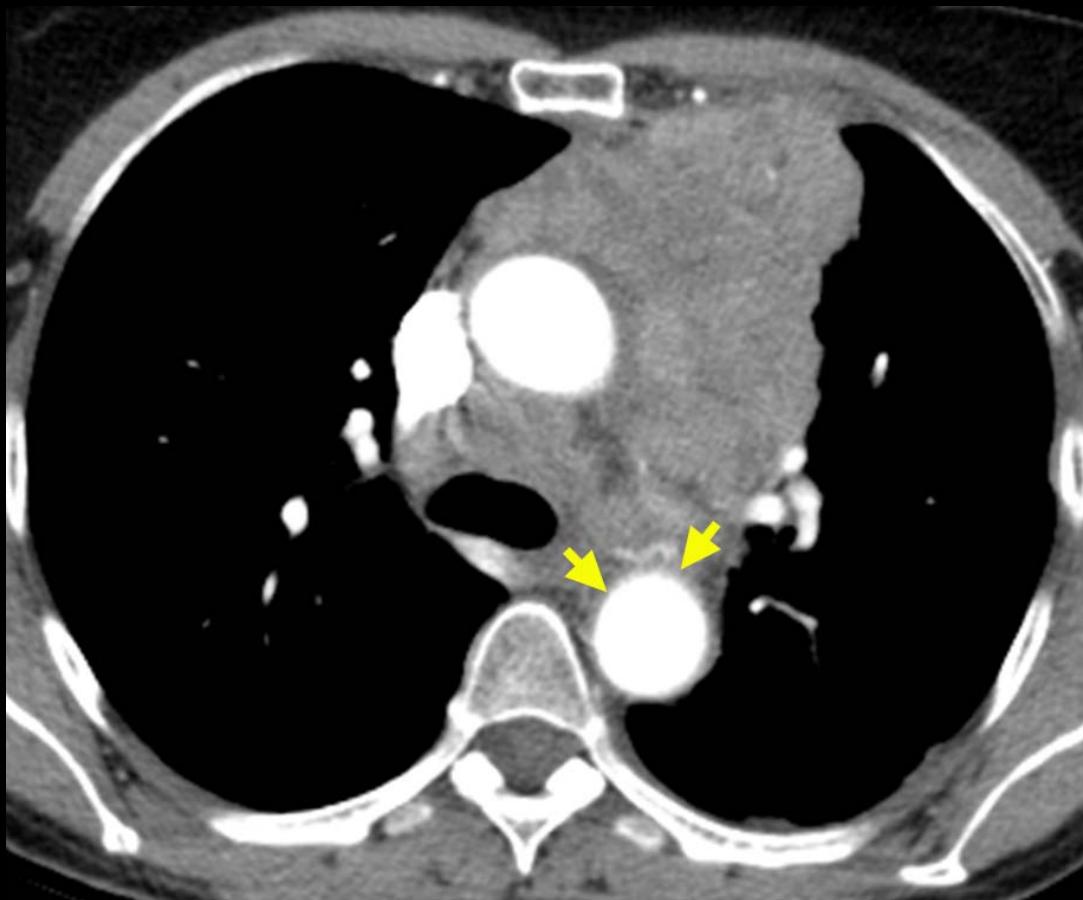
Contrast-enhanced chest CT at the level of the aorto-pulmonary window shows a heterogeneous lobulated mass growing along the pericardium, involving the superior pericardial recess so that it surrounds the circumference of the **ascending aorta** (arrow), fills the majority of the aorto-pulmonary window, and abuts about a third of the circumference of the descending aorta. At surgical exploration the tumor was found to be a thymic cancer invading the aortic wall.

Stage III



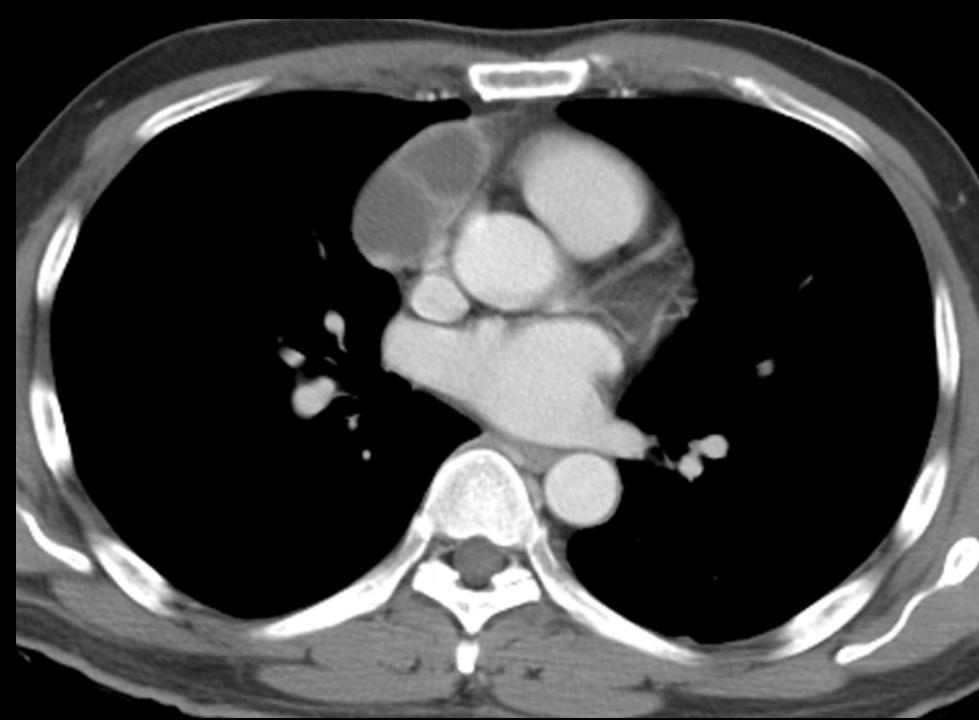
Contrast-enhanced chest CT at the level of the aorto-pulmonary window shows a heterogeneous lobulated mass growing along the pericardium, involving the superior pericardial recess so that it surrounds the circumference of the ascending aorta (arrow), fills the majority of the **aorto-pulmonary window (APW)**, and abuts about a third of the circumference of the descending aorta (arrows). At surgical exploration the tumor was found to be a thymic cancer invading the aortic wall.

Stage III

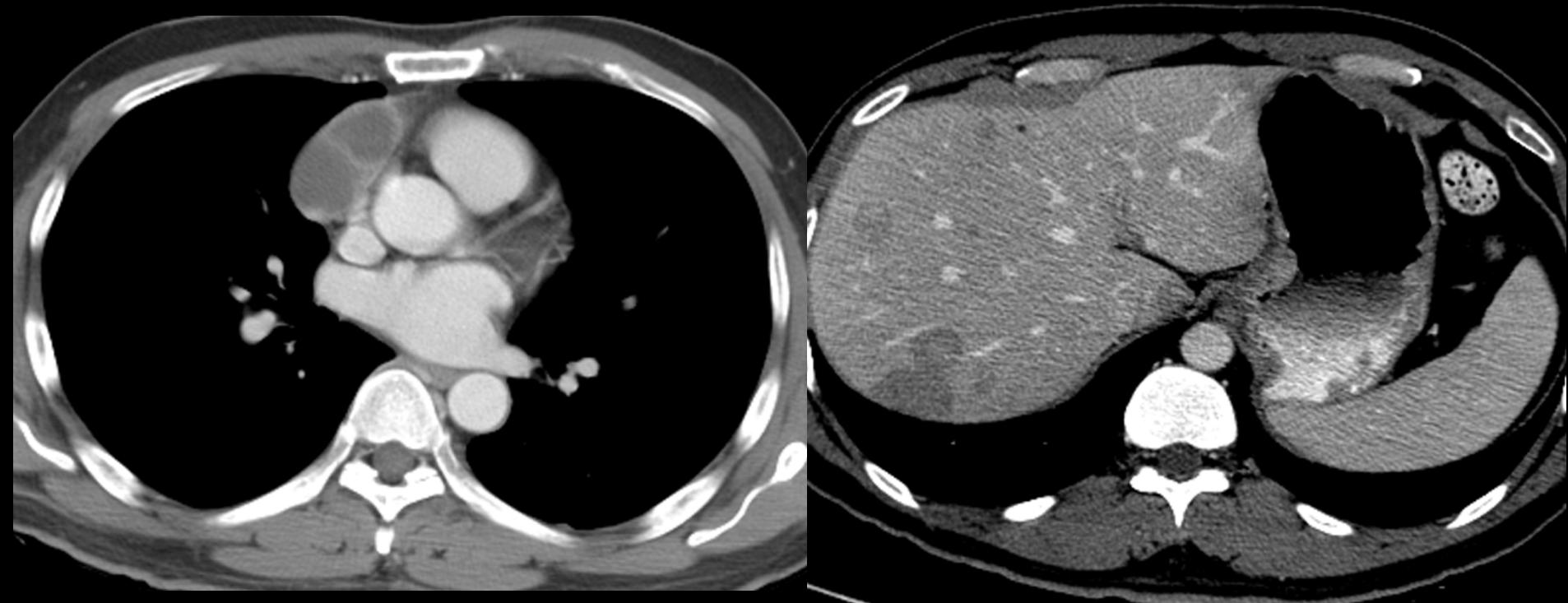


Contrast-enhanced chest CT at the level of the aorto-pulmonary window shows a heterogeneous lobulated mass growing along the pericardium, involving the superior pericardial recess (asterisk) so that it surrounds the circumference of the ascending aorta (arrow), fills the majority of the aorto-pulmonary window, and abuts about a third of the circumference of the descending aorta (arrows). At surgical exploration the tumor was found to be a thymic cancer invading the aortic wall.

Thymic cancer: Stage IVb



Thymic Cancer: Stage IVb



Contrast-enhanced CT at the level of the left atrium shows an anterior mediastinal mass. The mass is cystic, identified by its homogenous low attenuation center while its walls are solid and enhancing. Contrast-enhanced CT of the upper abdomen at the level of the spleen shows multiple ill-defined low-density lesions within the liver. Transcutaneous biopsy of a liver lesion and the mediastinal mass demonstrated thymic cancer.

Thymic Cancer: Stage IVb

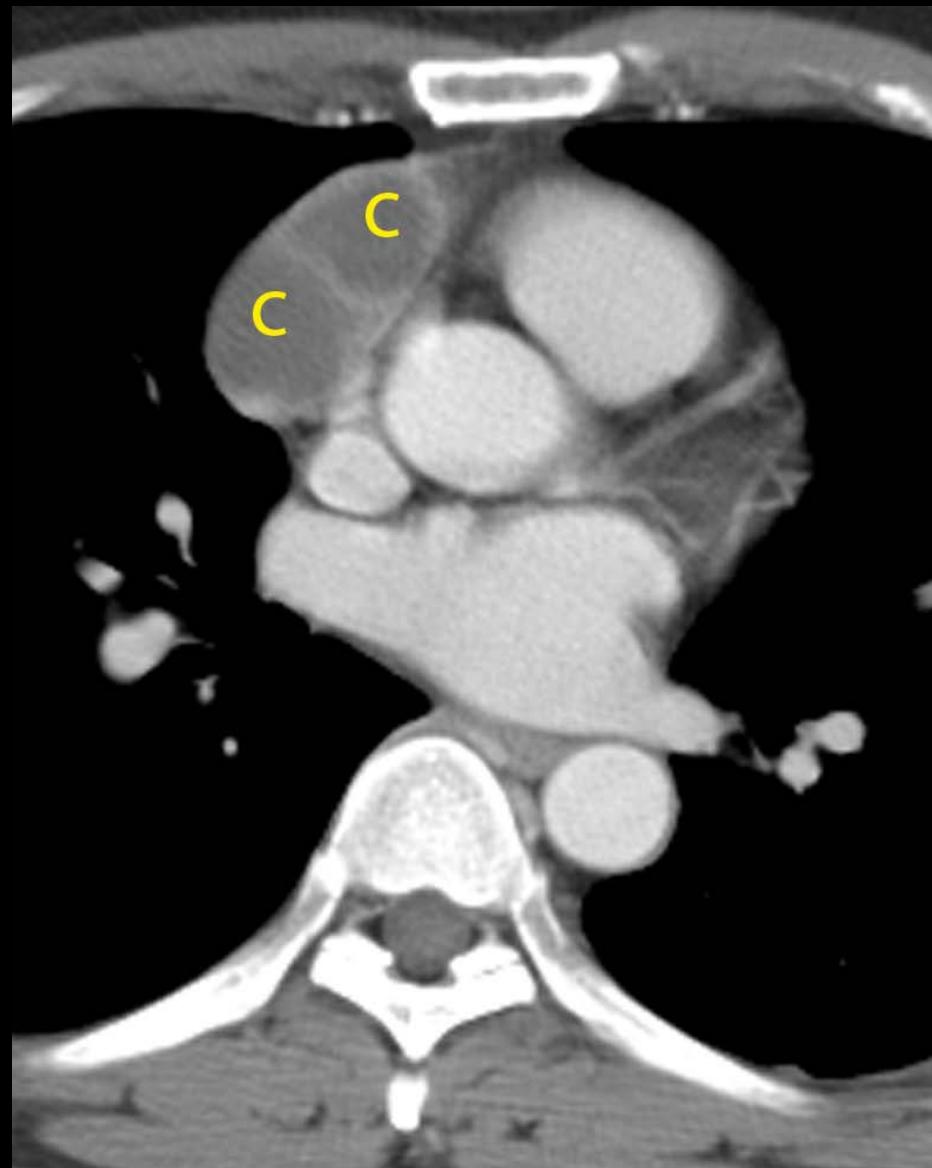
Contrast-enhanced CT at the level of the **left atrium** shows an anterior mediastinal mass. The mass is cystic, identified by its homogenous low attenuation center while its walls are solid and enhancing.

Contrast-enhanced CT of the upper abdomen at the level of the spleen shows multiple ill-defined low-density lesions within the liver. Transcutaneous biopsy of a liver lesion and the mediastinal mass demonstrated thymic cancer.



Thymic Cancer: Stage IVb

Contrast-enhanced CT at the level of the left atrium shows an anterior mediastinal mass (arrow). The mass is **cystic (C)**, identified by its homogenous low attenuation center while its walls are solid and enhancing. Contrast-enhanced CT of the upper abdomen at the level of the spleen shows multiple ill-defined low-density lesions within the liver. Transcutaneous biopsy of a liver lesion and the mediastinal mass demonstrated thymic cancer.



Thymic Cancer: Stage IVb

Contrast-enhanced CT at the level of the left atrium shows an anterior mediastinal mass (arrow). The mass is cystic (C), identified by its homogenous low attenuation center while its walls are solid and **enhancing (arrow)**. Contrast-enhanced CT of the upper abdomen at the level of the spleen shows multiple ill-defined low-density lesions within the liver. Transcutaneous biopsy of a liver lesion and the mediastinal mass demonstrated thymic cancer.



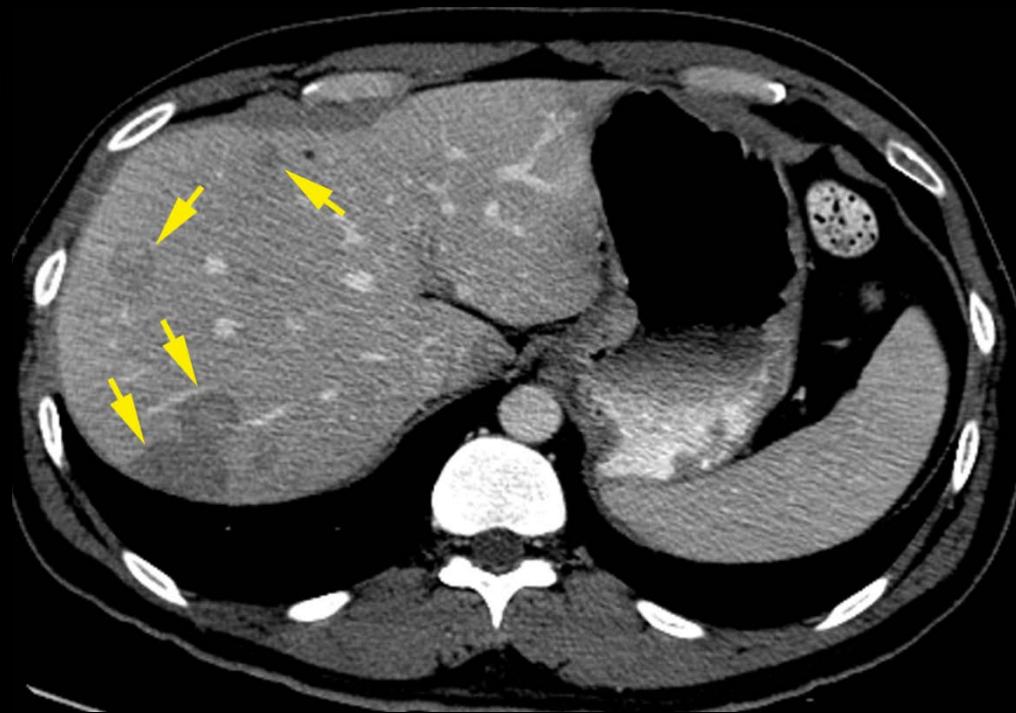
Thymic Cancer: Stage IVb

Contrast-enhanced CT at the level of the left atrium shows an anterior mediastinal mass (arrow). The mass is cystic (C), identified by its homogenous low attenuation center while its walls are solid and enhancing (arrow). Contrast-enhanced CT of the upper abdomen at the level of the **spleen** shows multiple ill-defined low-density lesions within the liver. Transcutaneous biopsy of a liver lesion and the mediastinal mass demonstrated thymic cancer.



Thymic Cancer: Stage IVb

Contrast-enhanced CT at the level of the left atrium shows an anterior mediastinal mass (arrow). The mass is cystic (C), identified by its homogenous low attenuation center while its walls are solid and enhancing (arrow). Contrast-enhanced CT of the upper abdomen at the level of the spleen shows multiple ill-defined low-density lesions within the liver. Transcutaneous biopsy of a liver lesion and the mediastinal mass demonstrated thymic cancer.



Thymic Cancer: Stage IVb

Contrast-enhanced CT at the level of the left atrium shows an **anterior mediastinal mass (arrow)**. The mass is cystic, identified by its homogenous low attenuation center while its walls are solid and enhancing. Contrast-enhanced CT of the upper abdomen at the level of the spleen shows multiple ill-defined low-density lesions within the liver. Transcutaneous biopsy of a liver lesion and the mediastinal mass demonstrated thymic cancer.

