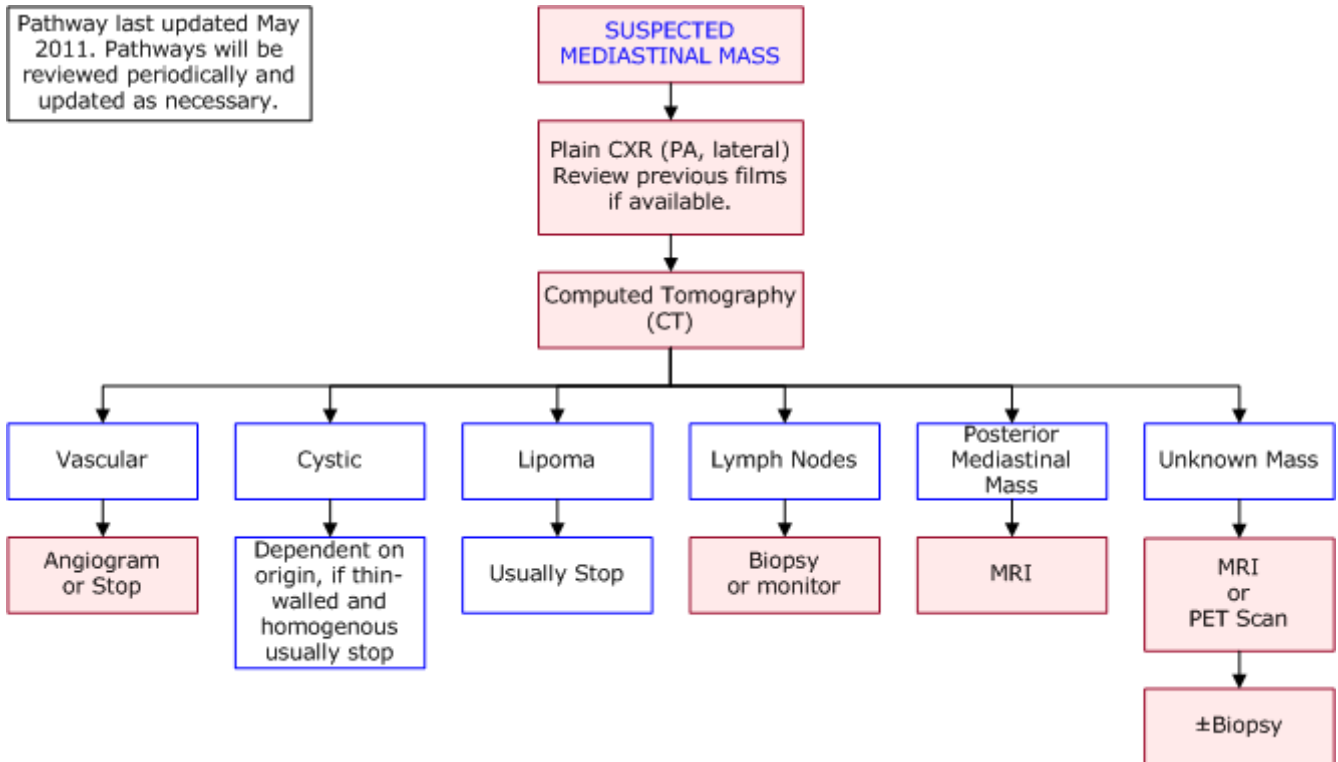




SUSPECTED MEDIASTINAL MASS

Pathway last updated May 2011. Pathways will be reviewed periodically and updated as necessary.



PLAIN CHEST RADIOGRAPHY (CXR)

- Erect postero-anterior and lateral chest radiographs, taken after a good inspiratory effort, are required to assess the presence and location of a mediastinal mass. [1](#)
- If possible, compare with old chest films, as it can help determine if the abnormality is new. [1](#)

COMPUTED TOMOGRAPHY

- Imaging modality of choice for evaluation of a suspected mediastinal mass. [1,2](#)
- Provides useful information in regards to: [1,3](#)
 1. Location of the mass (anterior, posterior, middle mediastinum).
 2. CT characteristics of the mass (fat, fluid, solid).
 3. Likely origin (neural, oesophagus, airways, nodes etc.).
 4. Mode of extension or spread.
- Measurement of CT density increases the specificity of differential diagnosis of mediastinal masses. [1,3](#)
 - Lesions that may contain fluid-density areas include goitres, thymic cysts, thymomas, teratomas, lymphomas, necrotic nodes from inflammatory or malignant

causes, pericardial cysts, bronchogenic and oesophageal duplication cysts. Low-density appearance may also be produced by lesions that contain fat, such as thymolipomas and teratomas.

- Lesions containing calcifications include goitres, thymomas, lymphomas (usually treated), carcinoid tumours, inflammatory masses (tuberculosis, histoplasmosis, rarely sarcoid), aneurysms, occasional neurogenic tumours of the ganglion series, and oesophageal leiomyomas.
- Contrast enhancement on CT scan helps narrow the radiographic differential diagnosis and provides clinically significant information on compression, encasement or obstruction of mediastinal vessels. Lesions showing significant enhancement after contrast injection include goitres, parathyroid adenomas, Castleman's disease, vascular lesions, paragangliomas, and some metastases. [1](#)
- Further investigation/management will depend on the above CT findings. [1](#)
- Advantages of CT (compared to MRI): [4,5](#)
 - Spatial resolution.
 - Detection of calcification and bone destruction.
 - Screening of lung, liver and adrenal metastases in a single study.
 - Useful in guiding needle aspiration biopsy of masses.
 - Wider availability.
- Disadvantages:
 - Exposure to ionising radiation.
 - Involves use of an iodinated contrast agent.

MAGNETIC RESONANCE IMAGING

- MRI is largely used as an adjunct to CT scanning in the evaluation of mediastinal abnormalities. [6](#)
- Often provides additional information about the nature, location, and extent of disease. [7](#)
- Useful in confirming the cystic nature of mediastinal lesions that appear solid on CT, and by revealing small amounts of intralesional fat, can suggest the diagnosis of haemangioma, teratoma, or extramedullary haematopoiesis. [6](#)
- Preferred modality for imaging neurogenic tumours which account for 75% of posterior mediastinal masses. [6,10,11](#)
- Advantages: [6](#)
 - Multiplanar imaging.
 - High contrast resolution.
 - Does not involve use of an iodinated contrast agent.
- Disadvantages
 - Limited availability.
 - Higher expense.

POSITRON EMISSION TOMOGRAPHY (PET)

- In general malignant tumours have a higher rate of metabolism compared to normal tissue and benign tumours which is reflected in the amount of FDG uptake. [8](#)
- Largely used as an adjunct to CT scanning in the evaluation of mediastinal abnormalities and provides additional information about the metabolism and extent of disease.
- Sensitivity and specificity for differentiating benign from malignant lesions ranges from 90% to 95%. [8](#)
- In patients with lymphoma, FDG PET was able to diagnose hilar/mediastinal involvement with a sensitivity of 96% and specificity of 94%. [9](#)
- Disadvantages: limited availability and relatively high expense.

ANGIOGRAPHY

- Largely rendered unnecessary by contrast CT and MRI. [1](#)
- Useful in the evaluation of vascular lesions (aneurysm, haemangioma, and arteriovenous malformation) and to clarify vascular invasion by tumour masses. [1](#)
- May be used to determine the blood supply in large masses of questionable origin prior to surgery. [1](#)
- Has a role in the embolisation of highly vascular lesions prior to surgery. [1](#)

BIOPSY

- As mediastinal masses may represent metastatic disease, biopsy can be vital for making a definitive diagnosis and guiding further management. The best method for biopsy depends on the location of the mass and adjacent structures. [12](#)
- The vast majority of transthoracic image-guided biopsies are performed percutaneously using CT guidance. Complications may include bleeding and pneumothorax. Up to 10% of patients require the placement of a catheter post-biopsy for evacuation of a pneumothorax. [13](#)
- Endoscopic ultrasonography (EUS) is a relatively recent method of imaging the mediastinum, and is performed during endoscopy. In particular, it can accurately image the aortopulmonary window, subcarinal nodes, inferior and posterior mediastinum, which on CT, may not be clearly seen or may miss small lymph nodes. [13,14](#)
- EUS may be used to guide fine needle aspiration of mediastinal masses. This procedure involves the use of ultrasound guidance to acquire mediastinal lymph node samples through the oesophagus during endoscopy. It can be performed under local anaesthetic, and has a very low complication rate (0.5-2.3%), with negligible risk of infection or bleeding. [14](#)
- In a recent meta-analysis of 76 studies (9310 patients), the sensitivity and specificity of EUS alone was 84.7% & 84.6%, respectively. When combined with FNA, the sensitivity and specificity of EUS-FNA was improved to 88.0% & 96.4%, respectively. [14](#)
- Hirdes et al. found that even in low volume EUS centres, EUS-FNA of mediastinal lymphadenopathy changed management in 84% of cases and reduced total diagnostic costs. [15](#)
- Another recent development is endobronchial ultrasound (EBUS) and EBUS transbronchial needle aspiration (EBUS-TBNA). This technique utilises a specialised bronchoscope with an integrated convex ultrasound transducer at its distal end. The ultrasound can be used to

evaluate masses within and adjacent to the airway, and allow for real-time guided biopsy. [13,16](#)

- Yasufuku et al. used EBUS-TBNA to investigate patients with mediastinal masses of unknown aetiology. They found that EBUS-TBNA was diagnostic in 131/140 patients (93.6%), and altered management for 112/140 patients (80%). It was also well tolerated, with no recorded complications. [17](#)
- With further development of these techniques, EUS-FNA and EBUS-TBNA may allow for complete access to all mediastinal lymph nodes. [13](#)

REFERENCES

1. Moore EH. Radiologic evaluation of mediastinal masses. *Chest Surgery Clinics of North America* 1992;2(1):1-22.
2. Wright CD, Mathisen DJ. Mediastinal tumors: diagnosis and treatment. *World J Surg* 2001;25:204-9.
3. Feigin DS, Padua EM. Mediastinal masses: a system for diagnosis based on computed tomography. *CT* 1986;10:11-21.
4. Gamsu G, Stark DD, Webb WR, et al. Magnetic resonance imaging of benign mediastinal masses. *Radiology* 1984;151:709-13. (Level IV evidence)
5. Levitt RG, Glazer HS, Roper CL, et al. Magnetic resonance imaging of mediastinal and hilar masses: comparison with CT. *AJR* 1985;145:9-14. (Level III evidence)
6. Erasmus JJ, McAdams HP, Donnelly LF, et al. MR imaging of mediastinal masses. *MRI Clin North America* 2000;8(1):59-89.
7. Von Schulthess GK, McMurdo K, Tscholakoff D, et al. Mediastinal masses: MR imaging. *Radiology* 1986;158:289-96. (Level III evidence)
8. Gupta N, Gill H, Graeber G, Bishop H, Hurst J, Stephens T. Dynamic Positron Emission Tomography With F-18 Fluorodeoxyglucose Imaging in Differentiation of Benign From Malignant Lung/Mediastinal Lesions. *Chest* 1998;114:1105-11. (Level III evidence)
9. Bangerter M, Kotzerke J, Griesshammer M, Elsner K, Reske SN, Bergmann L. Positron Emission Tomography with 18-Fluorodeoxyglucose in the Staging and Follow-up of Lymphoma in the Chest. *Acta Oncologica* 1999;38:799-804. (Level III evidence)
10. Strollo DC, Rosado-de-Christenson ML, Jett JR. Primary mediastinal tumours: part II. Tumours of the middle and posterior mediastinum. *Chest* 1997;112:1344-57.
11. Laurent F, Latrabe V, Lecesne R, Zennaro H, Airaud JY, Rauturier JF, Drouillard J. Mediastinal masses: diagnostic approach. *European Radiology* 1998;8:1148-59.
12. American College of Radiology. ACR Appropriateness Criteria: Biopsies of Thoracic Nodules and Masses [document on the Internet]. 1996 [updated 2011]. (Review). Available from: http://www.acr.org/SecondaryMainMenuCategories/quality_safety/app_criteria/pdf/ExpertPanelonInterventionalRadiology/NeedleBiopsyintheThoraxUpdateinProgressDoc3.aspx
13. Detterbeck FC, Jantz MA, Wallace M, Vansteenkiste J, Silvestri GA; American College of Chest Physicians. Invasive mediastinal staging of lung cancer: ACCP evidence-based clinical practice guidelines (2nd edition). *Chest*. 2007 Sep;132(3 Suppl):202S-220S. (Guidelines).
14. Puli SR, Batapati Krishna Reddy J, Bechtold ML, Ibdah JA, Antillon D, Singh S, Olyae M, Antillon MR. Endoscopic ultrasound: it's accuracy in evaluating mediastinal lymphadenopathy? A meta-analysis and systematic review. *World J Gastroenterol*. 2008 May 21;14(19):3028-37. (Level II evidence).
15. Hirdes MM, Schwartz MP, Tytgat KM, Schlösser NJ, Sie-Go DM, Brink MA, et al. Performance of EUS-FNA for mediastinal lymphadenopathy: impact on patient management and costs in low-volume EUS centers. *Surg Endosc*. 2010 Sep;24(9):2260-7. (Level III evidence).

16. Sheski FD, Mathur PN. Endobronchial ultrasound. Chest. 2008 Jan;133(1):264-70. (Review).
17. Yasufuku K, Nakajima T, Fujiwara T, Yoshino I, Keshavjee S. Utility of endobronchial ultrasound-guided transbronchial needle aspiration in the diagnosis of mediastinal masses of unknown etiology. Ann Thorac Surg. 2011 Mar;91(3):831-6. (Level III evidence).

FURTHER READING

1. Whitten CR, Khan S, Munneke GJ, Grubnic S. A diagnostic approach to mediastinal abnormalities. Radiographics. 2007 May-Jun;27(3):657-71

Website

For more information go to www.imagingpathways.health.wa.gov.au

Copyright

© Copyright 2007, Department of Health Western Australia. All Rights Reserved.

This web site and its content has been prepared by The Department of Health, Western Australia. The information contained on this web site is protected by copyright.

Legal Notice

Please remember that this leaflet is intended as general information only. It is not definitive and The Department of Health, Western Australia can not accept any legal liability arising from its use. The information is kept as up to date and accurate as possible, but please be warned that it is always subject to change.

