

Common Lines and Tubes: Purpose, Radiographic Appearances and Complications

The following poster is a guide to assessing some common tubes and lines that radiographers may come across on chest radiographs. It is crucial when evaluating a chest radiograph that attention is paid to the positions of various lines and tubes with regards to line type, insertion site, termination point and any possible complications.

Nasogastric Tube (NGT)

Purpose: Administering medication, feeding and suction of gastric contents.¹

Position: The NG tube should remain in the midline down to the level of the diaphragm and bisect the carina. The tip of the NG tube should be clearly visible below the diaphragm and should lie 10cm beyond the gastro-oesophageal junction² as seen in figure 1.

Complications: Tube malposition such as coiling in the oesophagus (figure 2), incomplete insertion and insertion into the lungs³ (figure 3).

Figure 1 :
Correct positioning NG.

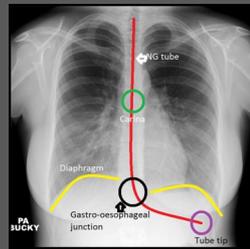


Figure 2 :
NG tube coiled in the oesophagus.

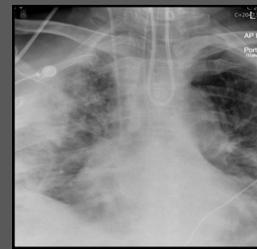


Figure 3 :
NG tube in left lung.



Endotracheal Tube (ETT)

Purpose: Assisted ventilation.⁴

Position: Tip should be 5-7cm above the carina (level of the medial ends of clavicles) as seen in figure 4.¹ If the patients head is in flexion the tip should be 3cm above the carina, if in extension 7cm above the carina.²

Complications: Insertion into the right main bronchus can obstruct resulting in collapse of the left lung and right upper lobe (figure 5).¹ Other complications include oesophageal intubation and tracheal laceration which can result in pneumothorax/pneumomediastinum (figure 6).⁵

Figure 4 :
Correct positioning ETT.

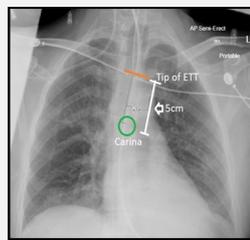


Figure 5 :
ETT in right main bronchus causing lobar collapse.



Figure 6 :
Air tracking around mediastinum/soft tissue of neck due to ETT.



Pleural Drainage Tube

Purpose: Drainage of pleural effusions and pneumothoraces.⁴

Position: To treat a pneumothorax the pleural drainage tube is positioned superiorly toward the apex. To drain a pleural effusion the tube tip should be positioned toward the lower part of the pleural cavity.^{1,6}

Complications: Iatrogenic pneumothorax due to traumatic placement of a chest drain. Surgical emphysema resulting from malposition of the tip or side holes within the soft tissues of the chest wall. Damage to local structures: heart, vessels, lungs, bronchi, oesophagus, upper abdominal organs and intercostal nerves and vessels.⁷

Figure 7 :
Correct apical placement of pleural tube to treat pneumothorax

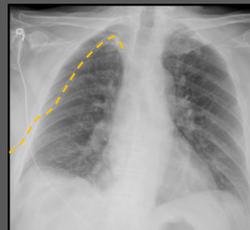


Figure 8 :
Correct basal placement of pleural drainage tube in treatment of pleural effusion.

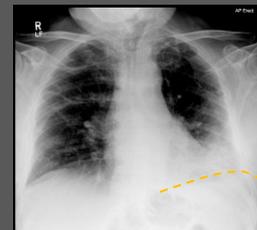


Figure 9 :
Iatrogenic pneumothorax and subcutaneous emphysema due to pleural tube placement.



Central Venous Catheters

Purpose: Administering medication, fluids and monitoring central venous pressures.⁴

Position: Short term use – tip position within the superior vena cava (SVC) is acceptable.³ Longer term use—a more inferior position at the cavo atrial junction is preferred. A right sided approach allows vertical orientation of the catheter tip. A left sided approach enters the SVC at a much shallower angle and may need to be inserted further to allow a more vertical orientation.²

Complications: Malposition of the tip, pneumothorax, pneumomediastinum, tracheal injury and chylothorax. Infection and thrombosis are associated with catheter tips positioned too proximally within the brachiocephalic vein.^{1,2,8}

Figure 10 :
Anatomy of upper central venous system

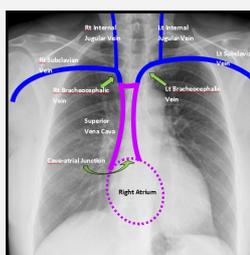
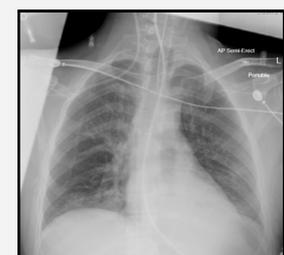


Figure 11:
Correctly sited Lt and Rt CVC lines projected over the SVC



Figure 12:
Incorrectly places Rt sided CVC line projected over the Rt subclavian vein.



Conclusion

The assessment of lines and tubes requires a well positioned CXR as part of the post procedural plan. Checking the correct position of lines and tubes prior to their use ensures patient safety and effective treatment is achieved, helping to reduce post procedural complications. It is essential that in evaluating the CXR post line/tube insertion that the reader also looks for signs of complication, relaying any abnormality immediately to the referring team.

References

- Collins, J. and Stern, E.J. (2008) Chest Radiology: The Essentials. 2nd edition. Philadelphia: Lippincott Williams & Wilkins.
- Jain, S.N. (2011) A pictorial essay: Radiology of lines and tubes in the intensive care unit. Chest Radiology 21(3), 182-190.
- Godoy, M.C.B., Leitman, B.S., de Groot, P.M., Vlahos, I. and Naidich, D.P. (2012) Chest Radiography in the ICU: Part 1, Evaluation of Airway, Enteric, and Pleural Tubes. American Journal of Roentgenology 198(3), 563-571.
- De Lacey, G., Morley, S. and Berman, L. (2008) The chest x-ray a survival guide. Philadelphia: Elsevier.
- Eisenhuber, E., Schaefer-Prokop, C.M., Prosch, H. and Schima, W. (2012) Beside Chest Radiography. Respiratory Care 57(3), 427-443.
- Corne, J. Kumaran, M. (2016) Chest X-ray Made Easy, 4th Edition, Edinburgh: Elsevier.
- Radiology Key (2016) Chest drains. Available at: <https://radiologykey.com/chest-drains/> (Accessed: 22 March 2020).
- Kornbau, C. Lee, K.C. Hughes, G.D. Firstenberg, M.S. (2015) 'Central line complications'. International journal of critical illness and injury science. 5(3):170. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4613416/> (Accessed: 6 March 2020).