

Pathophysiology respiratory disorders

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A young male was stabbed with a 5-inch knife. The entire length of the knife penetrated his 3rd intercostal space on the right side and he was bleeding profusely. An ambulance rushed him to the hospital and the paramedics stopped the bleeding. However, the patient was having difficulty in breathing.

What is the diagnosis? Be specific and list any subtypes within the diagnosis.

The diagnosis would be open pneumothorax originating from a penetrating injury with right-side damage to the chest wall. There are likely pulmonary lacerations from the stab event.

What has happened to his right lung and left lung?

As his right lung has been punctured, there is likely damage to the visceral pleura. This damage will have allowed gas to build up in the pleural space. This separates the lung from the chest wall, reducing the amount of space in which the lung can expand, creating difficulty breathing. As the chest wall has been penetrated, similar effects may be seen in the left lung without pulmonary lacerations due to the build-up of gas in the pleural space.

How are the patient's ventilation, blood oxygen levels, heart rate, and blood pressure?

The patient's ventilation is severely reduced. Blood oxygen levels are low, perhaps even to the extent of cyanosis. The heart rate is increased. Blood pressure may be within normal range but is likely to be low.

What would you find if you perform auscultation on the right lung?

Gas in the pleural space provides a boundary across which sound must cross which means that auscultation sounds may be diminished or absent from pneumothorax patients. Their percussion is often hyperresonant (American
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Academy of Orthopedic Surgeons, 2010).

Would you find any abnormalities in his ECG?

ECG abnormalities are usually associated with left-side pneumothorax. However, there is evidence that right-side pneumothorax causes ECG abnormalities. These include ST segment elevation (as seen in an old myocardial infarction), diminution of R wave amplitude in the precordial leads and inversion of precordial T waves (Tsilakis, Kranidis, Koulouris & Manolis, 2009).

What are some possible treatments?

An intercostal drain (chest tube) can be inserted under the axilla in the safe triangle. These tubes work by having a one-way valve which allows air to leave the system but not to re-enter, effectively draining the pleural space of the excess gas and allowing the lung to re-inflate spontaneously. In extreme cases, pleurodesis can be used. This is a surgical procedure which permanently removes the pleural cavity by attaching the lung to the chest wall. This is only to be used when pneumothorax and related breathing difficulties have not shown improvement in 2-4 days (Davenport & Tai, 2011).

If there is evidence of a pulmonary laceration this needs to heal to ensure effective treatment of the pneumothorax.

References

Davenport, R., Tai, N., 2011. Assessment and early treatment of patients with trauma. *Fundamentals of Surgical Practice: A Preparation Guide for the Intercollegiate MRCS Examination* 253.

Surgeons, A. A. of O., 2010. *Emergency Care and Transportation of the Sick and Injured*. Jones & Bartlett Learning.

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Tsilakis, D., Kranidis, A., Koulouris, S., Manolis, A. S., 2009. ECG Changes Associated With Right-Sided Pneumothorax. *Hospital Chronicles* 2, 108-110.