

Central Line Induced Pneumothorax: A Case Report

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Abstract

Central venous catheter insertion is a commonly performed procedure. We report a case of central venous catheterization induced pneumothorax in a 45 years old male patient who underwent a surgery for sub-arachnoid hemorrhage and post-surgery, developed tension pneumothorax during internal jugular vein catheterization.

Key words: Central venous catheterization, Intercoastal chest drain, Pneumothorax

INTRODUCTION

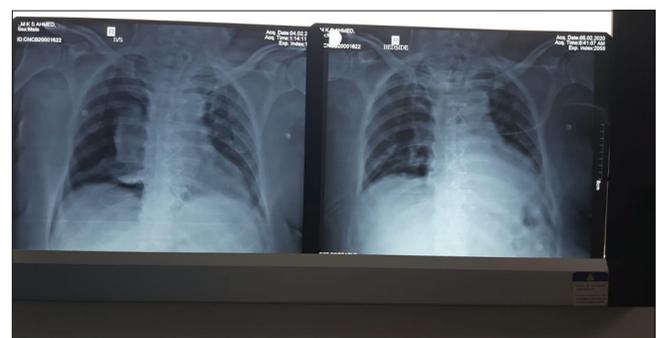
Pneumothorax is a minor mechanical complication of central venous catheterization. It is usually unilateral and occurs commonly on the side of the central line placement.

Central venous catheterization carries the second highest risk of iatrogenic pneumothorax. Subclavian catheterization carries a higher risk than internal jugular catheterization. Below is a case of the right-sided pneumothorax that occurred as a complication of internal jugular vein catheterization.

CASE REPORT

This is a case of a 45-year-old male patient, smoker, with post-coronary artery bypass graft status and morbidly obese, who underwent a surgery for subarachnoid hemorrhage. The patient had no prior history of any pulmonary or pleural disease. On post-operative day 1, a decision to insert a central line was taken in view of the need of parental nutrition. A central venous line was placed in the right internal jugular vein (IJV). The patient was stable throughout the procedure, but immediately post-procedure, the patient developed breathlessness, sudden onset, and gradually progressive in nature. His saturations begin to fall and failed to maintain

even with high flow oxygen, pulse rate was 140 bpm and blood pressure 140/70 mmHg, and respiratory rate of 33 cpm. A post-procedure chest X-ray showed right-sided pneumothorax. An emergency intercostal drainage tube was placed in the 5th intercostal space in the right side in the safe triangle. Post chest tube insertion, the patient's symptoms resolved and the patient was clinically better, oxygen saturation normalized. A post chest tube insertion, X-ray was taken and the X-ray picture showed tube in position with pneumothorax being resolved and lung expanded. The chest tube was placed for 2 days after which it was clamped for an observation period of 8 h and the patient had no complaints of dyspnea or chest pain during the observation period. A repeat X-ray was done after 8 h which was normal and hence the chest tube was removed.



DISCUSSION

The central venous catheter (CVC) is a catheter placed into the IJV, subclavian vein, axillary vein, or the femoral vein. Pneumothorax is one of the most common CVC insertion complications, reportedly representing up to

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30% of all mechanical adverse events of CVC insertion.^[1] There has been an increase in the use of CVCs over the past decade due to the increase in disease severity, age, and severe comorbidity of patients, especially in the intensive care unit setting. The increasing use of real-time ultrasound guidance for central venous catheterization has significantly decreased this risk for both internal jugular and subclavian approaches.^[2,3] The incidence of pneumothorax varies between 1% and 6.6%, with higher incidences being reported in the following situations: Emergencies, large catheters size, catheters used for dialysis, and with the increased number of needle passes.^[4] Subclavian vein insertion has been reported to have a higher incidence of pneumothorax than IJV insertion.^[5,6] While it is standard practice to obtain a chest X-ray after catheterization to confirm placement and to exclude complication, initial films may fail to show a pneumothorax, a delayed pneumothorax may occur from 8 h to 4 days after insertion.

Furthermore, the experience of the physician inserting the catheter is very important. A beginner has more chances of causing pneumothorax than an experienced person. The number of needle insertions also determines the chances of pneumothorax being directly proportional in relation.

The chances of pneumothorax occurring during CVC also depend on the condition of the patient and his comorbidities, more chances being in emphysema patients, patients who are on mechanical ventilation, and in uncooperative patients. The vein chosen for CVC insertion also determines the chances of pneumothorax, a higher incidence of being when the subclavian vein is cannulated, as compared with the IJV (0.5–2% vs. 0.2–0.5%).^[6-8]

During tension pneumothorax, progressive increase in the intrathoracic pressure in the pleural space pushes the mediastinum to the opposite hemithorax and obstructs venous return to the heart. This leads to circulatory instability and may result in cardiorespiratory arrest. To prevent life-threatening situations caused by tension pneumothorax, it is important to detect these occurrences early and decompress them quickly.

CONCLUSION

Can a pneumothorax during central venous catheterization insertion be avoided?

Inserting a central line has become a common practice nowadays for various reasons and hence the risks associated

with the procedure also increased and have become common. Need to a central line cannot be avoided but taking precautionary measures can prevent the occurrence of such complications. It is advisable to keep in mind the complication of pneumothorax during central line cannulation and ensures the availability of a pulmonologist for such emergencies. A routine practice of taking a post-procedure X-ray immediately after cannulation and monitoring the patient for any symptoms of dyspnea or chest pain should be made mandatory. Furthermore, there are evidence of delayed development of pneumothorax post central line insertion,^[9] hence, repeat chest X-ray in symptomatic cases should be done even after an initial negative chest X-ray. The use of ultrasound while inserting a central line has reduced the risks of pneumothorax. There is increasing evidence for the same showing decrease pneumothoraces (from 2.4% to 0%) and hemothoraces (from 1.7% to 0%), at least for IJV insertion.^[2] About 93% of infraclavicular axillary veins can be identified with ultrasonography and literature shows that 96% have been catheterized successfully.^[10] This technique could avoid completely or reduce the complication of pneumothorax to a great extent.

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