Case Report

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Haemothorax Following Right Internal Jugular Vein Cannulation

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Abstract

Right Internal Jugular Vein (IJV) is the commonest approach for central venous cannulation in patients undergoing major abdominal surgeries. Though highly useful in managing these high risk patients, it can be associated with vascular, pulmonary and cardiac complications, along with catheter misplacement and guide wire related problems. Though anatomical variations and use of blind technique can contribute to these, operator skill and routine use of ultrasound guided approach can prevent many of these catastrophes. We report a case of unexpected haemothorax following an unsuccessful attempt of right IJV cannulation using landmark technique, which was detected and managed in time, which saved the life of the patient.

Keywords*:* Haemothorax; Right Internal Jugular Vein Cannulation.

Introduction

Central venous cannulation (CVC) is commonly performed during major surgical procedures and care of critically-ill patients. The common approaches used are the internal jugular, subclavian and the femoral veins. Antecubital veins are often selected for peripheral access to the central vein. Complications associated with CVC depend on the site of puncture, patient condition, operator skill and the technique used. Early detection and management of these complications is essential to reduce the patient morbidity and mortality.

Case Report

A 70 year old lady weighing 40 kg, diagnosed with gastroesophageal tumour was posted for esophagogastrectomy. She was diabetic controlled on insulin and hypertensive on amlodipine. Preoperative investigations including chest radiograph were within normal limits.

She was premedicated and baseline vital parameters recorded were normal. General anaesthesia was induced and after orotracheal intubation, bilateral equal air entry was confirmed and was ventilated using anaesthesia ventilator.

Right IJV cannulation was done by landmark approach using seldinger technique with 14g triple lumen catheter. As there was no free flow of blood through the catheter, the procedure was abandoned and the catheter removed. Local compression was applied for ten minutes, and there was no local swelling or bleeding.

About 30 minutes after, there was tachycardia (110 / min) with fall in blood pressure (80 / 60 mm Hg) and SpO_2 dropped to 86% and end tidal CO_2 fell to 18mm Hg. Air entry was diminished bilaterally with wheeze and there was increase in airway pressure. Immediately she was ventilated with 100% oxygen and salbutamol nebulization was given. Phenylephrine and hydrocortisone were also given intravenously, following which the condition improved, but tachycardia was persisting.

Laparotomy showed an inoperable tumor occupying the stomach with multiple liver metastases. Abdomen was closed in layers and surgical bleeding was negligible. Local infiltration of 10ml of 0.25% bupivacaine was given for postoperative analgesia.

A provisional diagnosis of acute pneumothorax was considered, which would worsen with positive pressure ventilation, and the patient showed signs of respiratory efforts, residual

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neuromuscular blockade was reversed and was extubated on obeying verbal commands. Marked decrease in air entry predominantly over the right side was noted and tachycardia was persisting. However, the respiratory efforts were satisfactory with acceptable BP and SpO_2 values.

She was shifted to Intensive Care Unit (ICU) with oxygen by mask in propped up position. In the ICU, her condition deteriorated and became restless. Severe pallor was noted and hemodynamic status worsened with pulse 140/min and BP 80/60 mm Hg. Air entry was diminished bilaterally more markedly over the right hemithorax, with SpO_2 falling below 80%. Hemodynamic support was initiated with noradrenaline infusion and packed cell transfusion was given.

A chest radiograph taken showed extensive opacity over the lung fields bilaterally, more over the right side, suggestive of massive fluid collection (Figure 1). Ultrasonography also confirmed the same with no features of pneumothorax. A needle aspiration revealed blood and a diagnosis of hemothorax was confirmed, most probably due to the trauma of the attempted right IJV cannulation.

Intercostal chest tube drain with underwater seal was inserted into the right pleural space, which drained about 750 ml of blood, following which the patient improved. Intravascular volume replacement was done and antibiotics were started. Chest radiograph showed drainage of blood with lung re-expansion, especially over the right side (Figure 2). Repeat chest radiograph after one week showed bilateral expansion of the lungs, but showed diffuse haziness of the recovering lung insult (Figure 3). CT scan of the chest showed parenchymal opacities bilaterally predominantly in the perihilar areas due to hemothorax with mild to moderate fluid collection. On the 8th day, the patient was shifted to the postoperative ward, from where the chest tube was removed and the patient was discharged.

Fig. 1: Chest radiograph showing Hemothorax, more in the right side

Fig. 2: Chest radiograph after insertion of chest tube in the right side

Fig. 3: Chest radiograph after 1 week showing lung expansion with diffuse haziness

Discussion

Insertion of central venous catheter in human was first reported by Werner Forssman in 1929, by cannulating his own right atrium via cephalic vein, for which he was awarded Nobel Prize in 1956 [1]. Sven-Ivar Seldinger in 1953 introduced the Seldinger technique to obtain access to the central venous system, which is the commonly used method now [2]. The common sites used are internal jugular, subclavian and the femoral veins. Antecubital veins (cephalic or basilic) are often selected for peripheral access of the central vein.

A good knowledge of the surface anatomy and practical skill is required for the safe placement of central venous catheter. Immediate complications

include vascular, pulmonary, cardiac, and catheter misplacement. Incidence of complications depend upon patient factors (anatomical variations, medical conditions), site of cannulation and operator skill. Early diagnosis and prompt management is important as many of them are life-threatening.

Catheter misplacement is more common when there is anatomical variation or difficulty due to injury or past surgery [3]. It can be misplaced in the carotid or vertebral artery during insertion in the neck veins. Detection of arterial placement can be identified by special transducer which shows higher pressure in the catheter. Blood gas show higher pH / pO2, lower pCO2 with arterial samples, compared to that of venous samples, which show lower pH / pO2, higher pCO2 [4].

Carotid artery puncture is the most common complication (6% - 25%) associated with landmark guided IJV catheterization [5]. IJV frequently overlaps the carotid artery, which increase the risk of arterial injury. Perforation of subclavian artery occurs in 0.1% – 1% of cases, leading to hemothorax. Perforation of the aorta and cardiac tamponade can occur if the perforation is within the pericardial reflection with mortality of 90% [6]. Pseudoaneurysms, arteriovenous fistulas and vertebral artery injuries are rare complications.

Removal of accidentally placed arterial catheter can result in uncontrolled hemorrhage, pseudoaneurysm, and arteriovenous fistula formation especially in those on anticoagulatants or antiplatelet agents [7]. Hence, it is advised to retain it in till surgical repair before its removal.

Lacerations of the vena cava, mediastinal vessels, and right atrium have been reported due to the guide wire trapped against the vessel wall, and subsequent insertion of dilator or catheter causing injury. Kinking of the guide wire, resulting in misdirection of the dilator, and insertion of the guide wire outside the vein also has been reported [5].

The incidence of pneumothorax is higher (1.5-3%) with subclavian vein catheterization compared to that of internal jugular. The risk can be minimized by the use of ultrasound guidance. Air embolism is an infrequent complication which can be managed by aspiration of the air in Tredenburg position through the catheter [8].

Hemorrhage and haematoma is more common with jugular venous cannulations than other sites [9]. Hematoma formation has been reported in up to 4.7% of all CVC placements [10]. Oozing can occur in patients with coagulopathies, and can often be controlled with pressure at the insertion site. Compressible access sites such as the internal jugular or femoral vein cannulation are favored in such cases. The pleural space and mediastinum are potential spaces where accumulation of blood results in hemothorax and hemomediastinum which may require surgical intervention for drainage. This can become source of infection and may progress to abscess formation.

The number of unsuccessful CVC insertion attempts is the biggest predictor of complications associated with [11]. Use of ultrasonography has significantly reduced the complications from 11.8 to 4-7% [12]. The guide wire can get sometimes entrapped, which may necessitate surgical removal [13].

Conclusion

Central venous cannulation is associated with potential complications, which can be even life-threatening. Thorough knowledge of anatomical landmarks and familiarity with the technique are essential for reducing the complications. However, anatomical variations and patient factors can also contribute to such catastrophies. Regular use of ultrasonography can minimise these complications by correct placement of the cannula under vision. A high index of suspicion with early recognition and appropriate management is required to reduce the patient morbidity and even mortality of this invasive procedure.

References

1. Heiss, H. W.; Hurst, J. Willis. "Werner forssmann: A german problem with the nobel prize". Clinical Cardiology. 1992; 15(7):547–9.
2. Seldinger SI. "Catheter replacement of the needle in percutaneous arteriography; a new technique". Acta radiologica. 1953; 39(5):368–76.
3. Polderman, Kees H.; Girbes, Armand R. "Central venous catheter use". Intensive Care Medicine. 2001 Dec 4; 28(1):1–17.
4. McKean, Sylvia; Ross, John; Dressler, Daniel; Brotman, Daniel; Ginsburg, Jeffrey. Principles and practice of hospital medicine. New York: McGraw-Hill. 2012.
5. Schummer W, Schummer C, Fröber R. Internal jugular vein and anatomic relationship at the root of the neck [letter]. Anesth Analg 2003;9 6:1540; author

reply 1540-1.

6. Fangio P, Mourgeon E, Romelaer A, et al. Aortic injury and cardiac tamponade as a complication of subclavian venous catheterization. Anesthesiology 2002; 96:1520-2.
7. Bowdle A. Vascular complications of central venous catheter placement: Evidence-based methods for prevention and treatment. J Cardiothorac Vasc Anesth. 2014; 28:358–68.
8. Bartolini, Luca. "Pearls & Oy-sters: Cerebral venous air embolism after central catheter removal". Neurology. 2015; 84:e94–e96.
9. Parienti JJ; Thirion M; Mégarbane B; et al. "Femoral vs jugular venous catheterization and risk of nosocomial events in adults requiring acute renal replacement therapy: a randomized controlled trial". JAMA. 2008 May; 299(20): 413–22.
10. Vats HS. Complications of catheters: Tunneled and nontunneled. Adv Chronic Kidney Dis. 2012; 19: 188–94.
11. Kusminsky RE. Complications of central venous catheterization. J Am Coll Surg. 2007; 204:681–96.
12. Bhutta ST, Culp WC. Evaluation and management of central venous access complications. Tech Vasc Interv Radiol. 2011 Dec; 14(4):217-24.
13. Song Y, Messerlian AK, Matevosian R J. A potentially hazardous complication during central venous catheterization: lost guidewire retained in the patient. Clin Anesth. 2012 May; 24(3):221-6.