January 1998

Ectopic placement of central venous catheter, importance of x-ray chest

Nadeem A. Zaidi
Aga Khan University

Fazal Hameed Khan
Aga Khan University, fazal.hkhan@aku.edu

Follow this and additional works at: http://ecommons.aku.edu/pakistan_fhs_mc_anaesth

Part of the Anesthesiology Commons

Recommended Citation
Available at: http://ecommons.aku.edu/pakistan_fhs_mc_anaesth/92
ECTOPIC PLACEMENT OF CENTRAL VENOUS CATHETER, IMPORTANCE OF X-RAY CHEST

Nadeem A Zaidi and Fazal H Khan

ABSTRACT: A case of malpositioning of central venous catheter which was judged to be correctly placed on clinical criteria is being presented. Abberant positioning was picked up on X-ray chest.

KEY WORDS: Catheterization, Central Venous X-ray chest Placement

INTRODUCTION
Most of the critically ill patients and some surgical procedures require invasive monitoring of cardiovascular system. Placement of central venous catheter via the internal jugular vein is a useful and commonly performed procedure which facilitates invasive haemodynamic monitoring. Complications associated with the procedure are related to malpositioning of central venous catheter and injuries to the surrounding structures. There have been incidents of severe and even fatal complications such as air embolism1, Pneumothorax2, cervical haematoma3, thoracic duct injury4, Homer’s syndrome5, stroke arrhythmias and even complete heart block resulting from guide wire6 insertion during central venous cannulation.

The tip of the central venous catheter inserted should lie in a large intrathoracic vein. The preferred position is in the upper part of superior vena cava above the pericardial reflection. Irrespective of the route of insertion the catheter tip may settle in an unsatisfactory site. X-ray chest is the only certain method of identifying the position of the tip and should be done as soon as possible after placement of central venous catheter.

We report a case of malpositioning of central venous catheter in an abberant vein which was identified radiologically.

CASE REPORT
A 47 year old male admitted to the intensive care unit for elective postoperative ventilation, a known patient of chronic liver disease underwent laparotomy for bleeding esophageal varices. Gastric devascularization and splenectomy was done. During the surgery a central venous catheter was placed through the right internal jugular vein and its position confirmed through a chest X-ray in the ICU.

In view of line sepsis, on the 6th day of the patient’s ICU stay it was decided to change the site of the central venous catheter. So the left internal jugular vein was cannulated with 16 G (Secalon - Universal - 65cm) central venous catheter about 20 cm in length and the procedure was done without any difficulty. There was free flow of blood through the catheter on aspiration. X-ray chest was done to confirm the position of the catheter which showed a coiling tip on the left side of the mediastinum (Fig 1). Radiopaque dye (urograffin) was injected through it which showed spillage in the mediastinum (Fig. 2) so the catheter was immediately pulled out and re-inserted through the right subclavian vein.

DISCUSSION
Central venous catheter inserted either through the internal jugular, subclavian or more peripheral vein in the upper extremity must be located within the true central venous system i.e. beyond all the venous valves which interfere with direct transmission of right atrial pressure to the catheter. The preferred position is the upper part of the superior vena cava above the pericardial reflection8. On a postero-anterior view of X-ray chest it should be medial to the anterior border of the first rib9, or it should be no more than 2cm (in adults) below a line joining the lower surface of the medial ends of the clavicle10.

Figure 1 X-ray chest showing the coiling of central venous catheter in an abberant position
Irrespective of the route used there are chances that the catheter tip may be incorrectly placed. Veins used for access have their own peculiar anatomy which predispose the catheters inserted to unique aberrant positions. The most common aberrant locations include right internal jugular vein, right atria, right ventricle, or various extra-thoracic locations including veins of the upper extremity or the hepatic vein. The catheter may curl on itself and pass retrogradely.

Langston found that when he used arm veins he was accurate 74% of the time in proper placement of the catheter. The internal jugular vein was the commonest aberrant position being catheterized 16% of the time. Deitel and McIntyre found that malpositioning occurred 28% of the time when arm veins were used. They too noted frequent malpositioning in the internal jugular vein. In a series of 73 central venous catheters thought to be correctly placed on clinical criteria only 64% were in the contralateral brachiocephalic vein. The catheter may curl on itself and pass retrogradely.

Langston found that when he used arm veins he was accurate 74% of the time in proper placement of the catheter. The internal jugular vein was the commonest aberrant position being catheterized 16% of the time. Deitel and McIntyre found that malpositioning occurred 28% of the time when arm veins were used. They too noted frequent malpositioning in the internal jugular vein. In a series of 73 central venous catheters thought to be correctly placed on clinical criteria only 64% were in the contralateral brachiocephalic vein. The catheter may curl on itself and pass retrogradely.

An extravascular location of catheter tip may result in inadvertent infusion of fluids into mediastinal or pleural space. Mediastinal widening or an increasing pleural effusion should suggest this complication. A central venous catheter judged to be positioned correctly on clinical criteria by its length of the catheter inserted, by free back flow of blood through the catheter and by fluctuations in the venous pressure with respiration.

Kellner and Smart demonstrated that respiratory fluctuations alone were not an indication of correct placement of a catheter and x-ray chest is the only certain method of identifying the position of the catheter tip and should be obtained after every central venous catheter placement. If the location of the catheter remains in question contrast injection or CT is confirmatory.

This case report highlights the importance of confirming the position of central venous catheter tip by x-ray chest before starting infusion through it to avoid life threatening complications.

REFERENCES
15. Malatinsky J, Kudlic T, Majek M, Samuel M. Misplacement and loop formation of central venous...


