

# An Alternate Technique for Insertion of Central Venous Catheter in Patients with Permanent Pacemaker In-situ: A Case Report

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## Abstract

**Introduction:** Placing a central venous catheter (CVC) in presence of permanent pacemaker (PPI) is considered a relative contraindication as it carries the risk of pacing lead misplacement, dislodgement of any clots, dissemination of infection and pacing failure. This is an alternate technique for CVC insertion in patients with PPI in situ.

**Case presentation:** The case was conducted in the multi speciality Nayati Hospital Mathura. The placement of CVC was successfully done after taking informed written consent in supine position taking all aseptic precautions in operation theatre (OT) where there was a facility of continuous fluoroscopy helps to ensure that the catheter tip is in the best position and avoid the contact with the pacemaker leads. The use of continuous fluoroscopy spearheads anaesthetist and intensivists away from possible complications enumerated.

**Conclusion:** We conclude that Fluoroscopy in operating room and cardiac catheterization lab can be used to correctly, accurately and safely place the central venous catheter's (CVC) via internal jugular vein and subclavian vein with implanted permanent pacemaker whenever the need arises and the cannulation of femoral vein can be avoided to stay away from the complications such as infection and deep vein thrombosis.

**Keywords:** Pacemaker, Central venous catheter, Fluoroscopy

## Introduction

Central venous cannulation is done whenever peripheral venous access is not available, for resuscitation, for administration of hyperosmolar drugs, reliable delivery of vasoactive agents and frequent blood sampling.

Internal jugular vein, subclavian vein and femoral vein are the various vessels that are used for CVC cannulation where the catheter is advanced until the terminal lumen resides within superior vena cava or right atrium or inferior vena cava. The infraclavicular route for subclavian vein provides the maximum comfort to patient with highest risk of pneumothorax while access to femoral vein in groin carries the potential risk of infection and deep vein thrombosis.

Seldinger technique has remained unchanged despite the advancements [1], with ultrasound guidance as an adjunct to it and the rate of success and complication of procedure has remarkably changed [2].

Presence of permanent pacemaker is considered as an indication to place central line with extreme caution and a relative contraindication for attempting placement of central line in neck or thorax as it carries the risk of misplacing pacing lead, dislodgement of any clots, dissemination of infection, pacing failure and malfunction of internal defibrillator.

## Technique

The placement of CVC was attempted in OT where there was a facility of continuous fluoroscopy. The entire procedure was done under all standard aseptic precautions. Informed and written consent was taken for performing the procedure.

Patient was placed in supine position on OT table and a lead apron was used to protect the patient from radiation exposure to abdomen as the patient was a lady in reproductive age group.

After adequate skin disinfection and local anesthesia venipuncture was performed to identify the Right Internal Jugular Vein (IJV) as a permanent pacemaker was in situ through left subclavian vein and also the right IJV has a much wider diameter, relatively straight course, avoids iatrogenic damage to thoracic duct and runs more superficially than the left IJV, a right-sided approach is more acceptable than a left-sided one for CVC insertion via the IJV [3, 4], fluoroscopy was turned on and the guidewire was advanced through the puncture needle placed in right internal jugular vein till it was just short of the pacing leads. (Figure 1, Figure 2)

The initial puncture/finder needle was withdrawn and a dilator was introduced stabilizing the guidewire and monitoring the dilatation under fluoroscopy to ensure that the guide wire did not advance unintentionally.

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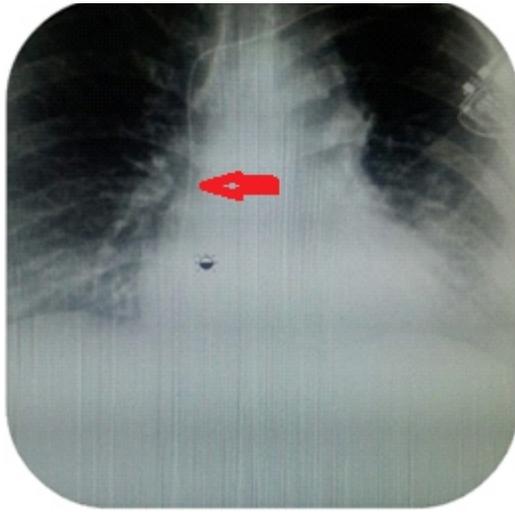
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**Figure 1:** Pacemaker lead in situ

Thereafter the dilator was withdrawn and the catheter was threaded over the guidewire under continuous fluoroscopy to avoid unintentional migration of guidewire and once the catheter was placed just short of pacing leads the guide wire was completely withdrawn and the catheter was secured with sutures and free flow of venous blood in all ports was confirmed. (Figure 3)

Finally, fluoroscopic chest imaging was done to rule out pneumothorax and hemopneumothorax. (Figure 4)

### Discussion

Presence of pacemaker is considered a relative contraindication for cannulation of internal jugular vein and subclavian vein which if done carries consequences worth avoiding such as pacemaker failure, knotting of guide wire with pacing leads, infection, accidental delivery of shock and clot embolization. Compared with traditional landmark catheterization, the actual site of placement of CVC with respect to the pacemaker leads could be done without the noted complications using continuous fluoroscopy guidance. Till date the most commonly used reference standard to see the position of CVC is a chest

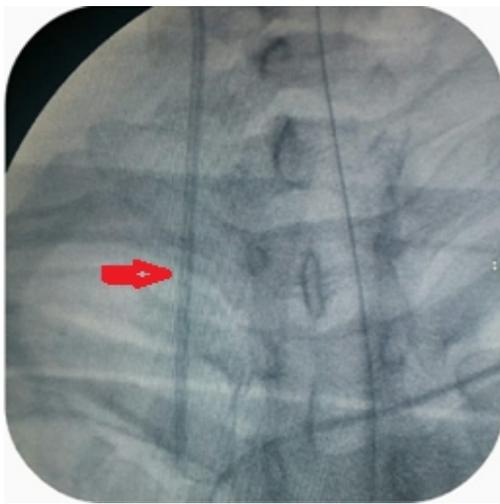


**Figure 2:** Tip of guidewire in superior vena cava

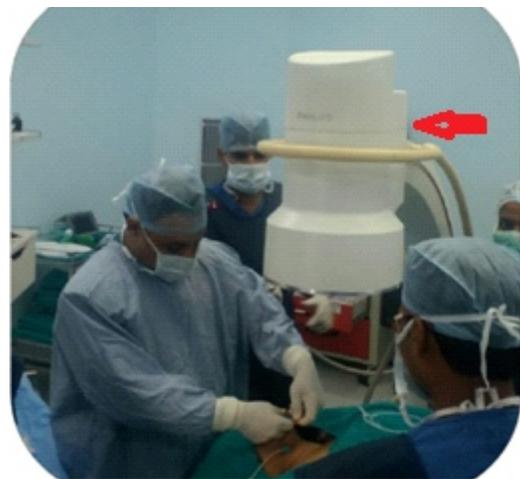
radiograph [5]. On the other hand, ultrasound cannot detect the exact placement of the catheter tip inside the thoracic cavity [6]. Fluoroscopy helps to ensure that the catheter tip is in the best position and avoid the contact with the pacemaker leads and also avoids need for post procedure chest radiograph to ensure correct position of catheter tip and to rule out potential complication of CVC placement [7]. The use of continuous fluoroscopy spearheads anesthetist and intensivist away from possible complications enumerated. The limitation with fluoroscopy guided catheter placement is exposure to radiation to both the patient and bystanders in addition to anaesthetist during the conduct of procedure. Therefore procedure was done within a range considered as safe for the patients with regards to time of exposure to radiation and the abdomen of the patient was shielded with a lead apron.

### Conclusion

Fluoroscopy in OT can be used for correct, precise and safe placement of the CVC via internal jugular vein and subclavian vein in patients with the presence of implanted PPI whenever the need arises and the



**Figure 3:** Central venous catheter over guidewire



**Figure 4:** Use of fluoroscopy

cannulation of femoral vein can be avoided to stay away from complications such as infection and deep vein thrombosis [8]. The dose of radiation exposure during this procedure is safe for the patient. Further studies are required about fluoroscopy guided approach in the future.

### Clinical significance

Fluoroscopy is routinely and easily available in most of the secondary and tertiary care hospitals and it can be used to reliably and safely place central venous lines in all patients having a PPI implanted via a subclavian vein.

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**Declaration of patient consent:** The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his/her consent for his/her images and other clinical information to be reported in the Journal. The patient understands that his/her name and initials will not be published, and due efforts will be made to conceal his/her identity, but anonymity cannot be guaranteed.

**Conflict of interest:** Nil **Source of support:** None

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