

COMPLICATION OF CATHETER KNOTTING, FOLLOWING RIGHT CEPHALIC VEIN CANNULATION

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Abstract—A right cephalic vein cannulation was performed in a patient scheduled for elective craniectomy in order to keep a constant record of the intra-operative fluid volume. The flow of the fluid through catheter was sluggish. The catheter was cautiously and gingerly withdrawn after an x-ray report confirmed knotting at the distal end. We believe that a chest radiograph is mandatory to rule out catheter knotting if an impediment is anticipated in the flow.

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Key words: cephalic vein; knotting; ultrasonic guide

INTRODUCTION

The clinical use of central venous pressure (CVP) was reported by Hughes and McGovern in 1959 (1). Since then, CVP monitoring has been widely used in surgical and intensive care unit patients. Catheter knotting has been reported with pulmonary artery, subclavian vein and internal jugular vein (IJV) catheterization. We report a case of catheter knotting associated with cephalic vein cannulation.

CASE REPORT

A healthy stout, 28-year-old young man weighing 80 kg with a meningioma at the cerebello-pontine angle and intruding the IV ventricle was scheduled for elective craniotomy in the semi-sitting position.

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An intravenous line (IV) was obtained and diazepam, 10 mg, along with 2 ml of 1% lidocaine was drawn in the same syringe and then infused. The pain associated with the injection of diazepam was not noticed. Later, 100 micrograms fentanyl was also injected through the same IV line. When the patient felt calm and became non-apprehensive, the skin overlying the right antecubital fossa was prepared by applying an antiseptic. Intradermal, 1% lidocaine was used to provide local anesthesia to the area earmarked for puncture. The vein was punctured and the catheter advanced gently. After the catheter advancement was complete, the stylet was removed and the catheter was connected to an intravenous drip. A free flow of fluid was aimed at but the flow of fluid was extremely sluggish in the beginning and steadily stopped altogether. The catheter was withdrawn a little and advanced again but the whole ordeal was unsuccessful and no fluid could flow through the catheter.

A chest x-ray was taken and a catheter knotting was suspected (Fig. 1). The catheter was suctioned, gently flushed with small amounts of normal saline and then cautiously withdrawn to avoid tearing of the large intrathoracic veins. The catheter was withdrawn safely and a knot at its distal end was visualized and confirmed (Fig. 2).

DISCUSSION

This case represents the risk of catheter knotting with cephalic vein cannulation and physicians and intensivists should be aware of its potential complication.

The subject of percutaneous central venous access, both in adult and pediatric patients, has been widely addressed in journals and text books, since it was introduced for the first time more than 40 years ago (2).

The internal jugular vein for central venous access is

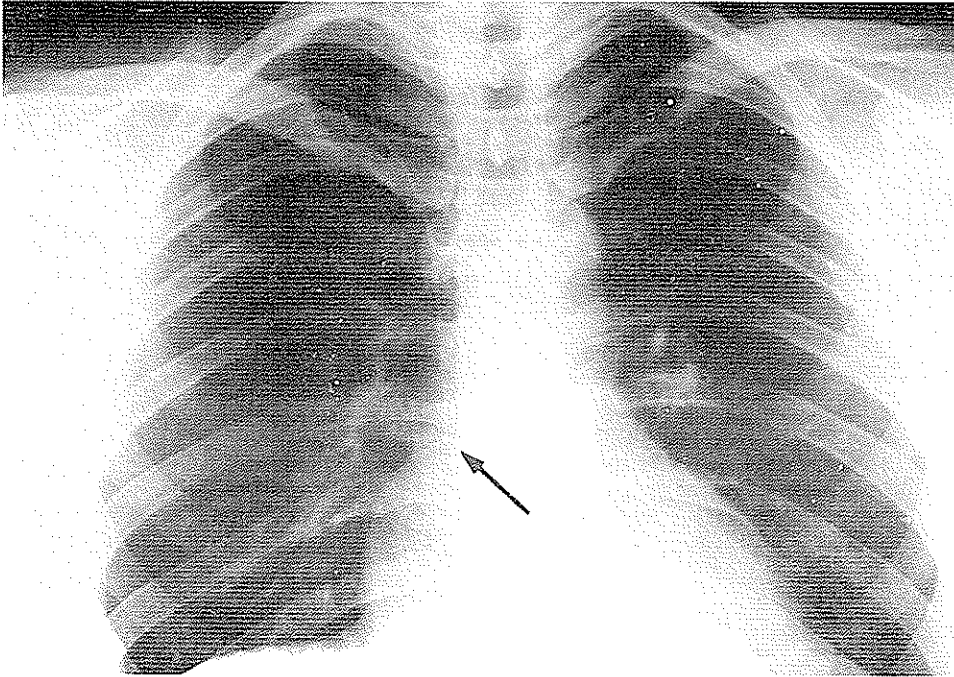


Fig. 1. Radiograph, revealing a small dot suspected to be catheter knotting.

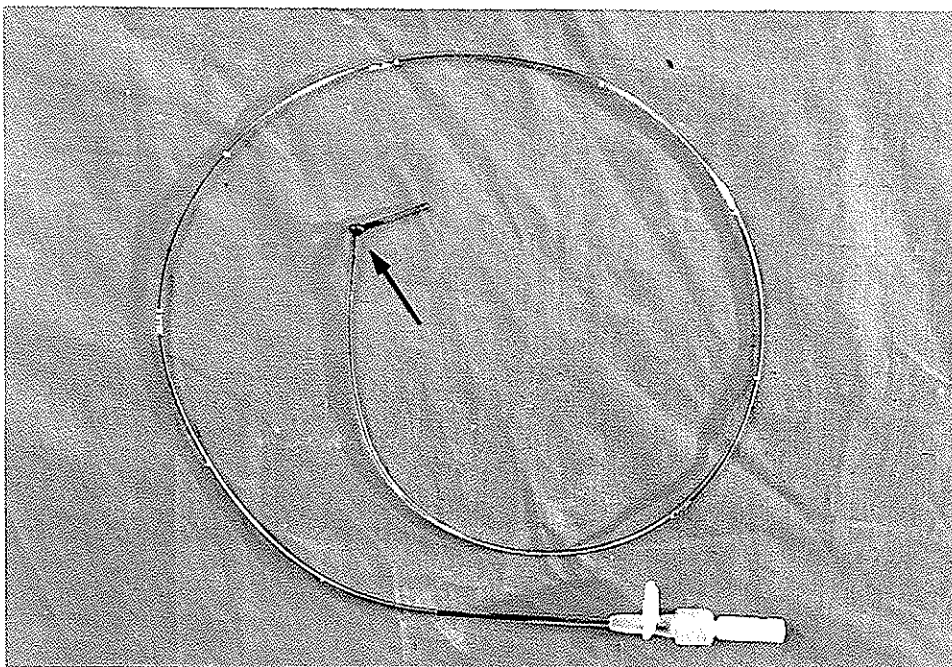


Fig. 2. The catheter after removal shows a tight knot at its distal end.

preferred because of its easy accessibility during surgery, predictable anatomic location, a short straight and valveless course to the superior vena cava (SVC), right atrium, and a success rate exceeding 90% in most cases (3,4).

The subclavian vein is another route for central venous access. Complications though seldom seen in the expert hands, but nevertheless, they do occur and should be anticipated.

The basilic and cephalic veins provide the least risk of complication in central venous catheterization (5). The apparent difficulty in reliably passing the catheters into the SVC makes them a less popular technique in routine practice (3,6). Likewise the meager success rate of 25-67% (3,5,7) with the antecubital veins do not make them the first option for central venous access. The antecubital veins have been employed to achieve access to the central veins in special situations such as the preoperative preparation of the neurosurgical patient, at risk for intraoperative embolism, and as an alternative site in patients with severe coagulopathy (6).

The reason why we didn't opt for the IJV and selected the antecubital veins was the close proximity of the former to the surgical site and the May field's head rest that could have possibly impeded the free flow of fluid through the IJV. The site of catheter insertion was the right antecubital fossa and the vein selected was the cephalic because the basilic vein was difficult to visualize and anatomically unpalpable.

Important complications resulting from antecubital catheterization include sterile phlebitis, thrombosis, infection, limb edema and pericardial tamponade (6). Catheter knotting has been cited as a complication with subclavian and jugular vein cannulation (5) and pulmonary artery catheterization (7). The latter, by virtue of large diameters, is well suited for rapid administration of large fluid volumes (7). At times it is difficult to insert the catheters through the cephalic vein because of obstruction at various levels (8).

Use of angiographic wire catheter and ultrasonic guides increase the success rate and ascertain the cannulation of external jugular vein and IJV (4,9).

We would like to underscore the point that although catheter knotting with the antecubital approach for central venous cannulation has not been found in the

literature, nevertheless the fear does exist. This complication should be borne in mind when a steady stream of fluid is not seen through the catheter. Deliberate and forceful insertion or unguided withdrawal, when an obstruction is felt or flow of fluid is impeded, can bring in its wake dangerous repercussions and thus should be avoided. We feel that insertion of the catheter tip farther into the right ventricle might be a cause for catheter knotting because of the turbulence and eddies formation of the blood. Although ultrasound guidance and angiographic wire catheter guides are time consuming and entail cost, nevertheless, these fool-proof measures of guaranteed cannulation should be employed in patients in whom difficulty in cannulation is anticipated.

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