more fluids, provided only the distal port of the PAC is used for continuous monitoring.

It occurred to us that this approach might be useful to anaesthetists managing patients at risk of massive haemorrhage or requiring multiple drug infusions.

Normand Tremblay MD FRCPC
Jean-François Hardy MD FRCPC
Institut de Cardiologie de Montréal
5000 est rue Bélanger
Montréal (Québec)
H1T 1C8

Complications with guide wires for central vein cannulation

To the Editor:

We would like to report two further cases that involved complications when using guide wires for central vein cannulation.

The first case involved a three-year-old girl, scheduled for repair of Tetralogy of Fallot.

Following induction of anaesthesia, with the patient paralysed and in a 15° head-down tilt, with the head turned to the left, right internal jugular venous cannulation was undertaken under strict aseptic conditions. Using a Cook double lumen #5 French 5 cm catheter system, the vein was located easily with the introducer needle, the guide wire was threaded, the dilator used and the catheter guided over the wire into the vein. The guide wire did not come away easily, but with increasing traction it suddenly became free and was pulled back. Almost at once there was sudden hypotension and arterial desaturation. The wire and catheter were removed *en bloc* and CPR was instituted. Urgent thoracotomy was performed with rapid establishment of extracorporeal circulation. When the chest was opened there was blood in the mediastinum and the right pleural space, and there was haematoma formation in the region of the right subclavian vein, but no obvious laceration or puncture of the vein was seen. Inspection of the removed guide wire showed it to be intact and undamaged.

The second case was a four-year-old girl admitted for repair of a primary atrial septal defect and mitral insufficiency.

Following induction of anaesthesia, the right jugular vein was cannulated using a #5 5F, 5 cm double-lumen Cook catheter system. Again, there was difficulty in

FIGURE

removing the guide wire but this was eventually achieved, and on inspection the coiled helix was seen to have become unwound (see Figure). Another double-lumen catheter was inserted following needling, guide wire insertion and dilation.

These two cases illustrate some of the hazards associated with central vein cannulation using a guide wire. The structure of guide wires used for vascular access consists of:

- (a) a coiled helix of stainless steel wire surrounding
- (b) a mandrel, or central core wire commonly fixed to the helix at one end and terminating about 3 cm from the other end;
- (c) a safety wire in the form of a small straight wire running parallel to the mandrel which is attached to both ends of the helix. This wire reduces the possibility of kinking or stretching of the helix with resultant fracture and possible embolization of the broken-off fragment;
- (d) and each end of the guide wire is finished by a polished, rounded tip.

In spite of these safety features, complications directly attributable to guide wires do occur and the following have been reported:

- 1 Knotting of the guide wire.
- 2 Partial or complete separation of a portion of the wire and embolization or displacement of the catheter tip.
- 3 Vascular injury particularly from the rough irregular surfaces of a damaged wire.

These two cases are further examples of problems attributable to guide wires. To minimize the incidence of complications, it is recommended that wires be inspected, treated as delicate instruments, sufficiently large skin incisions be made to minimize multiple manipulations and they should not be reused. Should difficulty in removing a guide wire be encountered, no effort should be made to remove it until preparations for urgent thoracotomy are complete, in case devastating intrathoracic bleeding is encountered on withdrawal.

Jacob Chacko MD

Sharon Litz MD

James Morrison MD

Department of Anaesthesia

IWK Children's Hospital

Halifax, N.S.

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Extrapleural haematoma after jugular vein cannulation

To the Editor:

Cannulation of the internal Jugular vein (IJV) is common practice in our hospital for major surgery. Recently we have encountered two cases with an extrapleural haematoma after an apparently uncomplicated IJV catheterization. The first case was a 66-yr-old woman, who was scheduled for a laparotomy. After induction of anaesthesia, the right IJV was catheterized, using a Seldinger technique and a single lumen catheter. We succeeded at the first attempt. The second case was a 57-yr-old man, also scheduled for a laparotomy. In this case we used a double-lumen catheter. After locating the IJV with a #22-gauge needle,

FIGURE Extrapleural haematoma with "extrapleural sign" (case #2).

cannulation was performed at the first attempt. In both cases blood returned on lowering of the infusion bottle and a typical CVP curve was registered. Both operations were Uneventful. In both cases a postoperative chest x-ray showed a shadow projecting over the top of the right lung (Figure). An extrapleural haematoma was diagnosed in both patients. The bleeding was probably caused by a lesion of the vessel wall or could have occurred while exchanging the needle for the catheter. Because there were no blood coagulation abnormalities and arterial puncture was improbable, we decided on a conservative approach. In the second case the correct position of the catheter was confirmed by injecting contrast under x-ray control. In both cases the haematoma disappeared within two weeks.

The extrapleural space is a preferential site for haematoma formation, because it is subjected to negative intrathoracic pressure. Due to the plano-convex configuration of an extrapleural fluid collection, the projection on a CXR depends on the location of the haematoma.¹ An apical or lateral haematoma will show a sharp convex border with tapering corners, the so-called "extrapleural sign."² A posterior or anterior haematoma will show this sign on a lateral x-ray only. An extrapleural haematoma can be confused with haemothorax, pulmonary infiltration, or atelectasis. Puncture of the haematoma is not indicated, as this leads to a haemothorax and tamponade.

Most cases of extrapleural haematoma will not be recognized unless a chest x-ray is taken after every IJV catheterization.