A Misplaced Hickman Catheter in a Left Superior Vena Cava

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Central venous catheterization has become commonplace and routine since the introduction of Hickman, Borvic and other long-term catheters. A small but significant percentage of procedures are complicated by misplacement, pneumothorax, hydromediastinum, catheter kinking and separation. We report a case of catheter misplacement secondary to a congenital anomaly.

Case Report

A 3½-year-old girl with resistant Histiocytosis X was referred for chemotherapy. A right internal jugular catheter, inserted in another hospital, was removed because of local infection. The initial chest radiograph is shown in Fig. 1a. A left Hickman catheter was inserted operatively via the left internal jugular vein. A chest radiograph after insertion (Fig. 1b) showed the
catheter to lie vertically along the left superior mediastinal border. Contrast injection showed flow into the coronary sinus and the right atrium. The child was returned to theatre and an attempt was made to reposition the catheter under fluoroscopic guidance, using angiographic techniques. The left brachiocephalic vein was patent but the catheter could not be manipulated to the preferred site. During this unsuccessful attempt multiple ectopics were seen when the guide wires were in the coronary sinus. The procedure was terminated and the catheter tip was withdrawn to the wires were in the coronary sinus. The procedure was terminated and the catheter tip was withdrawn to the junction of the left internal jugular and left subclavian veins.

Subsequent physical examination of the cardiovascular system was normal without evidence of congenital anomalies.

Discussion

The embryological precursors of the internal jugular veins and the superior vena cavae are the precardinal veins. They unite with the post cardinal veins to form the common cardinal veins which drain into the horns of the sinus venosus. The precardinal veins are initially of the same calibre. With the development of the left brachiocephalic vein the caudal portion of the left precardinal and common cardinal veins atrophy. The residua of the common cardinal is represented by the ligament of the left vena cava and the oblique vein of the left atrium which drains into the coronary sinus. 1

A left superior vena cava is present in 0.5% of the population. In approximately 50% it is visible on the chest radiograph as a straight vertical border of the left superior mediastinum. In the remainder it is lost within the normal superior mediastinal structures. 2

Between three and ten percent of patients with other congenital cardiac abnormalities have a left superior vena cava. The most common type of associated congenital cardiac anomalies are single atrium, atrioventricular canal, sinus venosus defect, ostium primum and fossa ovalis defects. 2

Central venous catheters may be malpositioned in a variety of sites. These include the subclavian veins, contralateral brachiocephalic, jugular veins, superior vena cava, inferior vena cava, internal thoracic veins, superior intercostal, accessory hemiazygous andazygous vein 3 and in subintimal pockets. 4 A chest radiograph after catheter placement is mandatory as malposition may vary in frequency between 5% and 38%. Malposition can produce not only unsatisfactory pressure readings but also toxic effects if drugs are infused. Catheters can also coil or kink, or can be ‘pinched off’ between the clavicle and first rib if a subclavian approach is used. 5 They may enter the mediastinum or the pleura or the pericardium causing hemothorax.

Malpositioned catheters can be repositioned either surgically or non-surgically. 4 Non-surgical repositioning uses angiographic techniques with fluoroscopic screening. Guide wires used include floppy wires, J-tipped, tip deflector wires, Fogarty and coronary balloon catheters. This can also be achieved with a pigtail catheter used as a ‘snare’ inserted via the femoral vein. 6, 7 In the case described we used only floppy and J-tipped wires and were unsuccessful.

Primary radiological placement of Hickman catheters has been advocated with the advantage of immediate confirmation of venous placement, and accurate measurement of the length of catheter required. It also allows prompt recognition and correction of malplacement, pneumothorax and pulmonary artery air embolism. 8-9 The complication and success rates are similar to surgical placement. 10

We were not able to manipulate the catheter into the preferred site though the tip was withdrawn to the confluence of the left internal jugular and left subclavian. Dunbar states that ‘positioning a catheter in a congenitally left-sided superior vena cava should not be considered a malposition, for acceptable pressure readings can be obtained in this location’. 3 Whether this position is also suitable for long-term infusion of cytotoxics is unclear.

References