Right atrial catheter placement

Open method

The common facial vein (CFV) is located by making a diagonal cervical incision across the anterior border of the sternocleidomastoid at or just below the level of the angle of the mandible (the CFV may be as far as ≈ 2 cm below this point). The platysma is divided, and the CFV is located as it joins the internal jugular vein (IJV) at the level of the hyoid bone. The CFV is cannulated with the atrial tubing and is secured with a snug ligature close to the junction with the IJV. If the CFV is not suitable, a purse-string suture is placed directly in the IJV, and the IJV is then opened in the center of the purse string and cannulated.

Percutaneous method

May be utilized in adults (and possibly peds). The IJV is catheterized using the Seldinger technique60 with a guide-wire and needle through a stab incision at the anterior margin of the SCM. Fluoroscopy is used to place the tip of the wire at the desired location (see below). A No. 13 French peel-away introducer and dilator are then inserted over the wire, which is then bent at the skin edge and with-drawn61 (for a pediatric case: may use a No. 7 French introducer with a 1.5 mm O.D. lumboperitoneal catheter for the distal atrial catheter). The atrial catheter is cut to the length of the wire distal to the bend, and the catheter is then threaded into the introducer. The position of the catheter tip should again be confirmed (e.g. with radio-opaque contrast under fluoroscopy). A short skin incision is then made starting at the point where the catheter penetrates the skin to permit subcutaneous tunneling of the tubing.

Location of distal tip

If the catheter repeatedly goes down the wrong vessel (e.g. the subclavian vein), a “J” guidewire may help. Also, rotating the head to a more neutral position sometimes works. The ideal location of the distal tip is in the right atrium (unlike the location for central catheters in the superior vena cava (SVC)) so that the turbulent blood flow will reduce the risk of thrombus formation. The tip may enter the right atrium but must not penetrate the tricuspid valve. A number of methods for optimal placement of the distal shunt tip may be employed, and include:

1. using an intraoperative chest X-ray to locate the tip between the level of T6–8 vertebra in an adult. In a growing child, initially insert to ≈ the T10 level. This method is subject to error due to malalignment of the X-ray beam (parallax error)

2. place the tip near the level described above, then inject iodinated contrast, e.g. 20 ml of Omnipaque 180 (iohexol) under intraoperative fluoroscopy to locate the tip in right atrium

3. fill the catheter with normal or 3% saline and use the catheter as an EKG electrode. The P-wave changes from a downward to a biphasic morphology as the tip enters the atrium. A sharp upward deflection occurs as the tricuspid valve is approached. Some recommend advancing the tip to maximal P-wave amplitude and then backing off a centimeter or two

4. fill the catheter with heparinized saline (1–5 U per cc NS) and measure the pressure as the tip is advanced, leave tip just short of where atrial pressure tracing occurs

5. utilizing intraoperative echocardiography

A growing patient is followed with annual CXRs. When the catheter tip is above ≈ T4, the catheter must be lengthened or converted to a VP shunt.

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