A Simplified Technique for Cannulation of the Jugular Bulb

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Abstract:
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A method of jugular bulb cannulation is discussed which is quick and easy to perform, ensures accurate placement of the catheter tip and causes minimal discomfort to the patient. Advantages of this technique are discussed.

Additional Key Words cerebral blood flow aneurysm surgery

Blood from the superior jugular bulb of the internal jugular vein representing cerebral venous blood has a wide application during studies of cerebral metabolism and cerebral blood flow.1, 2

The usual approach to the jugular bulb is by direct puncture, a technique first described by Myerson et al.,3 and subsequently modified by Gibbs, Lennox and Gibbs.4 However, using this method, serious extracerebral contamination has been reported5 far exceeding the accepted 3% contamination reported by Shenkin et al.6

We, therefore, have preferred to use a technique of jugular bulb cannulation using a peripheral vein in the antecubital fossa, modifying a technique first described by Meyer.7

The equipment required is a 24 or 36 inch 16-gauge E-Z catheter (Deseret Ltd.) and an Ovenfors-type guide wire, 120 cm long and 0.95 mm in diameter, and with a flexible tip prebent to 45° (Kifa Pe 160). The guide wire is marked at 24 and 36 inches, so as to give an indication of the position of the tip of the wire to the end of the catheter (fig. 1). To prevent leakage of blood from the catheter, a rubber stop from a 2 cc plastic disposable syringe is threaded over the guide wire and fits over the Luer end of the catheter.

The procedure is carried out under local anesthesia with the aid of image intensification, in the Department of Radiology. The antecubital fossa on the selected side is cleaned with 70% Chlorhexidine in spirit, and the arm draped with sterile towels. A tourniquet is applied around the upper arm, and the basilic vein identified. A small skin weal of local anesthetic is raised at the site of venipuncture, and the vein punctured with the E-Z catheter. The catheter and guide wire are advanced up the vein until they are seen to pass from the subclavian vein into the superior vena cava. The guide wire is now advanced through the catheter until the prebent flexible tip protrudes beyond the end of the catheter. The patient then rotates his head

FIGURE 1
Twenty-four-inch E-Z catheter and guide wire, with 45° prebent tip, marked at 24 and 36 cm.
to the opposite side, and the catheter and guide wire are pulled back at the same time being rotated so as to get the tip of the guide wire pointing cephalad. This maneuver should allow the guide wire to slip into the internal jugular vein (fig. 2), which lies approximately behind the medial third of the clavicle. If this is not accomplished, the catheter and guide wire are rotated at the same time being advanced and withdrawn until the maneuver is successful. If resistance is felt and seen after a few centimeters, then the external jugular vein has been cannulated. The catheter should be withdrawn and the above procedure repeated.

Once in the internal jugular vein the guide wire is withdrawn, and the catheter passes easily up to the jugular foramen. Resistance is felt when the catheter impinges on the skull, and the patient may experience some discomfort around the ear. The correct positioning of the catheter is now confirmed by injecting contrast medium, which will fill the jugular bulb and part of the sigmoid sinus (fig. 3). The catheter is secured to the skin, then filled with heparinized saline to prevent clotting. The whole procedure takes 15 to 20 minutes.

The technique has been used by us to obtain cerebral venous blood for the measurement of cerebral metabolism during surgery for cerebral aneurysms. Of the 20 cases performed so far, three had poor peripheral veins not allowing cannulation. There have been no failures once the catheter has passed centrally. On one patient the catheter entered a large superficial vein in the neck, and passed easily up the angle of the jaw. The incorrect placement of the catheter was recognized on injection of contrast medium, by the high oxygen content of the venous blood, and by the fact that the catheter was palpable superficially in the neck.

The main advantage of this method is that it allows accurate placement of the catheter at or beyond the superior jugular bulb, so preventing extracerebral contamination. It also avoids the risks of aseptic meningitis, facial nerve palsies and accidental carotid artery puncture with resultant hematomas in the neck, which may lead to respiratory embarrassment, especially when bilateral punctures are attempted. Our patients have already had bilateral carotid arteriograms, hematomas from which sometimes distort the anatomy of the neck, making direct puncture of the internal jugular vein a more difficult procedure.

Added advantages are that it allows free access for blood sampling, well away from the surgical field, and there is little danger of the catheter being displaced. Postoperatively the catheter may be withdrawn centrally for the monitoring of central venous pressure.

The method, unlike Meyer's technique, does not require a formal venisection, thus making it easier to perform and less distressing to the patients, who find it a pain-free experience.

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References
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FIGURE 3
Catheter tip at jugular foramen with contrast medium filling the sigmoid sinus.

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