Percutaneous technique for insertion of an atrial catheter for CSF shunting

Technical note

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A percutaneous technique for insertion of the atrial end of a ventriculointeritoneal shunt is described. The technique utilizes a catheter introducer set with a guide wire for insertion of the atrial catheter through the internal jugular vein.

KEY WORDS hydrocephalus cerebrospinal fluid shunt instrumentation

VENTRICULOOPERITONEAL (VP) shunts are widely used for cerebrospinal fluid (CSF) shunting; however, in some cases ventriculointeritoneal (VA) shunts are preferable. Usually, VA shunts are inserted in an open surgical procedure. Pritz has recently reported using a wire guide for revision of the distal end of a VA shunt in open surgery. We describe our percutaneous technique for insertion of the atrial end of a VA shunt using a catheter introducer set with a guide wire.

Instrumentation and Technique

The patient is placed with the head turned to the side away from the incision in a 20° Trendelenburg position (Fig. 1). The catheter is inserted into the cerebral ventricle in the standard fashion. The internal jugular vein is identified under the medial border of the lateral head of the sternocleidomastoid muscle. A No. 22 needle attached to a 3-ml syringe is inserted at the apex of the angle between the sternal and clavicular heads of the sternocleidomastoid muscle. The needle is inserted at an angle of approximately 30° with the skin, and advanced caudally and laterally toward the nipple. When venous blood is aspirated, the direction of the needle is noted and the needle is then withdrawn. A No. 16 Angiocath catheter* is then introduced in the same fashion, following the track of the No. 22 needle. After blood from the internal jugular vein is aspirated, the catheter is advanced into the vein toward the heart.

A Swan Ganz catheter introducer set† is used at this point (Fig. 2). The size used for adults is No. 8 French, and for children No. 5 French. The soft end of the guide wire is introduced into the Angiocath and advanced easily without resistance for approximately 20 cm. The Angiocath is then removed and the wire left in place. A 1-cm transverse incision is then made where the wire enters the skin. The black dilator and catheter sheath (Fig. 2) are advanced over the guide wire. The catheter sheath is advanced up to its hub, and the guide wire and dilator are removed. The return of blood back to the catheter sheath is noted. The distal shunt tubing is filled with heparinized saline and is passed through the catheter sheath for a distance of approximately 22 cm in the adult patient. Water-soluble contrast material should be injected into the catheter and the proper position of the tip of the shunt tubing confirmed by fluoroscopy or radiography. The shunt should lie in the midposition of the right atrium (Fig. 3). The catheter sheath is removed from around the shunt tubing. Finally, the shunt tubing is cut to the proper length and connected with the cephalic end of the CSF shunt.

* No. 16 Angiocath catheter manufactured by The Deseret Co., Sandy, Utah.
† Desilets-Hoffman sheath set manufactured by Cook Inc., Box 489, Bloomington, Indiana.
Percutaneous atrial catheter shunting

Case Reports

Case 1

This 15-year-old boy was admitted to the neurology service with headaches, stiff neck, and papilledema. A complete work-up revealed Cryptococcus meningitis and hydrocephalus. A VA shunt was inserted using the percutaneous technique, with the position of the distal end confirmed by x-ray film (Fig. 1). A Rickham reservoir was kept in place for daily intraventricular injections of amphotericin-B. The patient made a remarkable recovery, and his shunt has functioned well.

Case 2

This 28-year-old man had a VP shunt placed in 1975 for hydrocephalus due to aqueductal stenosis. He was admitted in July, 1978, for review of the malfunctioning shunt. Multiple revisions of the VP shunt failed to establish a permanently functioning shunt, and the VP shunt was converted to a VA shunt using open surgery. A shunt infection ensued. The shunt was removed, and the patient was treated by intraventricular antibiotics and external drainage using an Ommaya reservoir. In October, 1978, the patient underwent VA shunting using the percutaneous technique. There were no complications, and the shunt has functioned well.

Case 3

This 18-year-old man was involved in an automobile accident in 1978, resulting in brain contusion and basilar skull fracture. He developed meningitis and subsequent hydrocephalus. Later, a VA shunt was placed using the percutaneous technique. One month later, a shunt infection required removal of the shunt. Again the meningitis cleared, and the hydrocephalus resolved without the need for another shunt.

Discussion

Since 1939, many new CSF shunt operations have been developed. Of these operations, the VP shunt described in 1955 by Scott, et al., and the VA

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Fig. 1. Diagram showing the internal jugular vein between the two heads of the sternocleidomastoid muscle.

Fig. 2. Bottom to top: Guide wire, catheter sheath, black dilator, and the whole assembly. On the right is the shunt tubing.
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The percutaneous technique allows easy threading of the shunt tube into a hard sheath already positioned in the right atrium of the heart.

There are generally three approaches in relation to the two heads of the sternocleidomastoid muscle for puncturing the internal jugular vein. We prefer the technique described by Kaplan and Miller. We also use intraoperative fluoroscopy to aid in ensuring proper positioning of the tip of the atrial catheter, which should lie in the middle of the right atrium.

References


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