Chest Port Insertion

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Once placed exclusively by surgeons, venous access ports are now commonly placed by interventional radiologists. Overall, as is the case with any central venous access, image-guided procedures have demonstrated clear superiority over more traditional techniques that have relied on anatomic landmarks. Ports are best suited for long-term intermittent access and generally have the lowest rate of infectious complications among central venous catheters because of their nonexposed location. Nonetheless, ~5% of ports in most series must ultimately be removed prematurely because of infection, which remains the most common complication.

PROCEDURE

The patient is given preprocedural antibiotics such as 1 g of ceftizoxime immediately prior to the procedure. A cursory preprocedural ultrasound examination should be done to confirm patency of the central vein that will be used for venepuncture. The skin over the chest and neck is cleansed using a chlorhexidine solution and draped with sterile covers. In well-endowed women, breast tissue should be taped inferiorly or the catheter portion may move excessively cephalad when the woman assumes an upright posture.

Interventional radiologists should perform a surgical scrub and strictly adhere to sterile technique. All personnel involved with the procedure including technologists and nurses should wear masks. After subcutaneous administration of 1% lidocaine, the right or left internal jugular vein is punctured ~1 cm above the clavicle with a 21-gauge needle (Micropuncture set, Cook, Indianapolis, IN) using sonographic guidance (Fig. 1A). A puncture higher in the neck will lead to the catheter kinking, and a lower puncture is more difficult and unnecessary. The needle is exchanged over a 0.018-inch guidewire for coaxial 3 and 5 F dilators.

The 3 F dilator is removed and a guidewire is advanced from the puncture site into the inferior vena cava.

A small subcutaneous pocket approximately the diameter of the port and 1 cm in depth is created on the right anterolateral chest wall ~8–12 cm from the puncture site using sharp and blunt dissection (Fig. 1B). I typically make an incision and then enlarge the pocket to the size of the port using my fingers. A tunnel is then fashioned from the pocket to the puncture site in the neck using a tunneller included in the port access kit (Fig. 1C), and the catheter portion of the device is pulled through the tunnel. The catheter is then attached to the hub portion of the device and the entire device is flushed with saline and inspected to confirm integrity of connections (Fig. 1D). The catheter is then cut to appropriate length.

A peel-away sheath is then advanced over the guidewire into the superior vena cava. The dilator portion of the sheath and guidewire are removed and the catheter portion of the device is advanced via the sheath into the superior vena cava using fluoroscopic guidance. The sheath is then peeled away, leaving the catheter in place. Incisions are closed using resorbable subcuticular sutures and cyanoacrylate glue (Fig. 1E). The port may be left accessed using a Huber (noncoring) needle if needed for immediate use. A final fluoroscopic image is obtained to confirm correct tip position (Fig. 1F).

DISCUSSION

Implantable ports consist of a single- or dual-lumen reservoir hub attached to a catheter. The reservoir hub is inserted into a subcutaneous pocket in the arm or chest and the catheter is tunneled to the accessed vein. These catheters are typically used for long-term intermittent medications such as required for chemotherapy. The port is accessed using a Huber (noncoring) needle.

Venous Insufficiency; Editors in Chief, Brian Funaki, M.D., Peter R. Mueller, M.D.; Guest Editor, R. Torrance Andrews, M.D. *Seminars in Interventional Radiology*, volume 22, number 3, 2005. Address for correspondence and reprint requests: Brian Funaki, M.D., Section of Vascular and Interventional Radiology, University of Chicago Hospitals, 5840 S. Maryland Avenue, MC 2026, Chicago, IL 60637. ¹Section of Vascular and Interventional Radiology, University of Chicago Hospitals, Chicago, Illinois. Copyright © 2005 by Thieme Medical Publishers, Inc., 333 Seventh Avenue, New York, NY 10001, USA. Tel: +1(212) 584-4662. 0739-9529,p;2005,22,03,242,244,ftx,en;sir00318x.

Figure 1 Chest port insertion. (A) The internal jugular vein is punctured using sonographic guidance. (B) An incision is made for the port pocket. (C) A tunnel is created from pocket to puncture site in the neck. (D) The catheter portion of the device is pulled through the tunnel and attached to the hub of the port. (E) Incisions are closed using subcuticular sutures and cyanoacrylate glue. (F) A final fluoroscopic image is obtained to document catheter tip position.

In my hospital, chest ports are placed almost exclusively in patients with cancer and used for chemotherapy. We have largely abandoned arm ports because of their higher risk of infection and symptomatic subclavian vein thrombosis. As with other central venous access devices, procedural complications include inadvertent arterial puncture, pneumothorax, malposition, and central vein laceration.

Pneumothorax is very uncommon when the internal jugular veins are used as access sites and punctured using ultrasound guidance. Central vein laceration is a catastrophic complication that most commonly occurs when the peel-away sheath is advanced into the superior vena cava, causing buckling of the guidewire and inadvertent advancement of the dilator portion of the sheath through the vein. The best way to avoid this complication is to preclude wire buckling by advancing the peel-away sheath only over a stiff wire (such as an Amplatz superstiff wire) positioned with its distal tip in the inferior vena cava. Symptomatic central vein thrombosis generally occurs only with subclavian vein ports (5–10%)—it is exceedingly rare with internal jugular vein ports (<1%).

We reported the first series of internal jugular vein chest ports placed by interventional radiologists in 1997. Our series had complication rates lower than or equal to those of comparable surgical series and a rate of symptomatic central venous thrombosis (0%) less than in any reported series. This was attributed to the use of the internal jugular vein. Since this report, we have placed over 2000 of these devices in our hospital and it has become a routine procedure in our interventional radiology suites.

SUGGESTED READINGS

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