Percutaneous insertion of peritoneal shunt catheters with use of the Veress needle

Technical note

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A safe percutaneous method of insertion of peritoneal shunt catheters is described. The method is based on the use of the Veress needle.

KEY WORDS • cerebrospinal fluid shunt • abdominal catheter • Veress needle • percutaneous surgery • shunt placement • hydrocephalus

Placement of the distal end of cerebrospinal fluid (CSF) shunts, either lumbar or ventricular, in the peritoneum may be accomplished by either open or percutaneous techniques. The hazards of percutaneous introduction of peritoneal shunt catheters have prevented the widespread use of this procedure. The simplicity and speed of the technique presented here make its use desirable.

The Veress needle has been used extensively in the past to enter the peritoneal cavity for laparoscopy. This needle is also being used at our institution for diagnostic peritoneal lavage following blunt abdominal trauma. We have found this technique to be easily adaptable for safe and efficacious percutaneous insertion of intraperitoneal shunts. This procedure has been used in nine patients and is described in detail.

Technique

The Veress needle, first described in 1938, is a cutting needle with a spring-loaded blunt-tipped inner cannula (Fig. 1). The mechanical design of this needle allows for percutaneous advancement through body wall tissues into the peritoneal cavity with minimal risk of bowel perforation. When the blunt end of the needle encounters resistance, it is forced into the needle shaft, allowing the needle to cut tissue and advance. After the resistance is passed, the spring-loaded blunt end rapidly readvances and protects the intraperitoneal contents (Fig. 2).

In order to minimize the risk of trauma, the bladder should be emptied by a catheter in the operating room.

The patient’s abdomen should be draped to allow the surgeon to stand on either side of the operating table. For insertion of the peritoneal end of the catheter, the surgeon should stand on the patient’s left. The proximal end of the catheter may be either a ventricular catheter, the needle must be held on its ribbed edge for proper action.

Fig. 1. Left: Dismantled Veress needle showing the outer cutting edge and the inner spring-loaded blunt cannula. Right: Veress needle completely assembled. The needle must be held on its ribbed edge for proper action.
Percutaneous insertion of peritoneal shunt

**Fig. 2.** Diagram of the Veress needle penetrating the abdominal wall.  
A: The needle positioned against the skin above the linea alba.  
B: With pressure and resistance of the skin and fascia, the outer cutting edge advances.  
C: After penetration of the peritoneum and loss of resistance, the blunt tip advances and protects the intraperitoneal contents from the cutting edge. For placement procedure see Fig. 3.

**Fig. 3.** Placement procedure.  
A: The Veress needle, covered with a No. 12 intravenous catheter, entering the peritoneal cavity.  
B: The intravenous catheter is in the peritoneal cavity and the flexible guide wire is introduced. Note continued tenting of the abdominal wall.  
C: Placement of the peel-away introducer over the guidewire.  
D: Insertion of the shunt tubing through the peel-away catheter. Due to the peel-away design, all proximal connections may be secured before this stage.  
E: Removal of the peel-away catheter and final peritoneal positioning of the shunt tubing with forceps.
or a lumbar subarachnoid catheter. All connections may be introduced prior to introducing the peritoneal end. An infraumbilical stab wound is made with a No. 11 blade. The catheter is tunneled subcutaneously to the abdomen and temporarily brought out above the skin. The abdomen is grasped firmly from below with the surgeon’s left hand to tent up the peritoneal surface. The Veress needle, covered with a No. 12 intravenous catheter,* is advanced to the linea alba, and then thrust firmly through the fascia and peritoneum (Fig. 3A). The needle is then removed, leaving the catheter in place while the abdomen is still tented. A flexible guide wire is advanced through the intravenous cannula (Fig. 3B). The intravenous catheter is replaced over the guide wire by a No. 8 French peel-away catheter and obturator introducer set† (Fig. 3C). The obturator is withdrawn, and the peritoneal tubing is placed in the abdomen (Fig. 3D). The peel-away catheter is then separated, leaving the shunt tubing in the abdomen (Fig. 3E). The incision is closed with a single subcutaneous suture.

The Veress needle is used routinely for gas insufflation during laparoscopy procedures. Its safety and efficacy have been documented in large series.² Loffer and Pent¹ reported the use of the Veress needle in over 56,000 cases, with a complication rate of less than 0.3%.

Although we have previously described a method of percutaneous abdominal catheter placement with the lumboperitoneal shunt,‡ we prefer the method described here because of the safety of the Veress needle. Percutaneous laparoscopy has been utilized in the presence of previous abdominal surgery,¹,² but we have not used this technique for shunt placement in patients with abdominal scars.

References


* No. 12 intravenous catheter manufactured by The Deseret Co., 9450 South State Street, Sendy, Utah.
† Obturator introducer set manufactured by Cook Inc., P.O. Box 489, Bloomington, Indiana.
‡ Lumboperitoneal shunt manufactured by American Heyer-Schulte Corp., 600 Pine Avenue, Goleta, California.

Manuscript received June 30, 1983.
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