Case reports

Surgical Endoscopy
Ultrasound and
Interventional Techniques

Surg Endosc (1999) 13: 161–163

Laparoscopic transabdominal lumboperitoneal shunt

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Abstract. Communicating hydrocephalus can be handled either by the ventriculoperitoneal or, occasionally, the ventriculoatrial shunt. The lumboperitoneal shunt is another option. It does not require a transcranial approach; therefore, it is safer for the patient. We describe a technique that can be performed easily by a skilled laparoscopic surgeon through an anterior approach transabdominally. The lumboperitoneal (LP) shunt is placed laparoscopically under direct videoscopic vision, with the catheter inserted transabdominally through the L3 disc space into the thecal sac. In our patient, the lumboperitoneal shunt was placed at the L3 disc space for communicating hydrocephalus. There were no intraoperative or postoperative complications. The LP shunt can be easily placed by a skilled laparoscopic surgeon. The incidence of infection and complications is lower, and the patency rate is higher. This should be the initial choice for communicating hydrocephalus.

Key words: Lumboperitoneal shunt — Laparoscopy — Communicating hydrocephalus

Placement of cerebrospinal fluid diversions, or shunts, is a common neurosurgical procedure indicated for a wide spectrum of conditions impeding the normal flow of cerebrospinal fluid (CSF). The most common systems employed are ventriculoperitoneal, ventriculoatrial, and lumboperitoneal shunts. The lumboperitoneal method has the advantage of being a completely extracranial procedure; thus, it avoids the risk of intracranial complications.

Communicating hydrocephalus in adults can be caused by a number of different conditions: tumor, meningitis, pseudotumor cerebri, slit ventricle syndrome, or intracranial hemorrhage. These conditions have traditionally been treated with ventriculoperitoneal (VP) shunts. In a few situations where the intraabdominal cavity could not be used, the surgeons employed either ventriculopleural or ventriculoatrial (VA) shunts.

Lumboperitoneal shunts were first described in 1955 by Jackson and Snodgrass and Scott et al. [4, 6]. Initially popular because they did not require a transcranial approach, they soon fell from favor owing to frequent failures stemming from the polyethylene materials then used. But with the advent of new silastic catheters that are resistant to kinking, the lumboperitoneal shunt has become a much more acceptable alternative.

Case report

In December 1996, a 76-year-old white woman started experiencing symptoms of confusion, blurred vision, and dementia. The patient underwent a CT scan of the head, which revealed hydrocephalus. A spinal tap was also performed. A normal pressure hydrocephalus was diagnosed. In January 1997, a ventriculoperitoneal (VP) shunt was placed to treat the hydrocephalus. After placement of the shunt, the patient's symptoms improved and she was discharged home.

Within 2 weeks of discharge, the patient's symptoms of blurred vision and confusion returned, and she was referred back to her surgeon. A follow-up CT scan was performed; again, hydrocephalus was demonstrated. Since the patient's symptoms had improved after the shunt was placed and the patient was now worsening, it was concluded that the VP shunt had occluded or failed. A decision was made to take the patient to the operating room and visualize the intraabdominal portion of the VP shunt laparoscopically to determine if the shunt was draining. If the distal part of the shunt was draining, then no further intervention would be needed. On the other hand, if the VP shunt was not draining, the patient would require either a revision of the VP shunt or some other type of peritoneal shunt.

After informed consent was obtained, the patient was taken to the operating room for diagnostic laparoscopy and possible shunt revision. The VP shunt was found not be functioning, so we decided to perform a laparoscopic transabdominal shunt.

Laparoscopic technique

After general anesthesia, a Foley catheter is placed and pneumoperitoneum is established. Three trocars are then placed, either by the open Hassan

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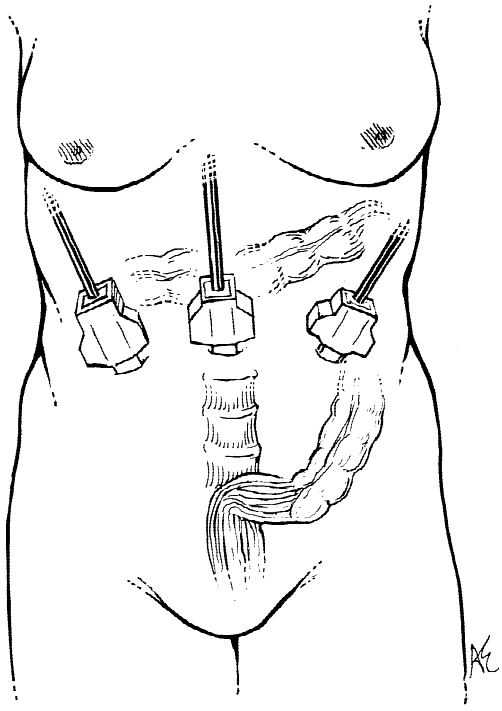

Fig. 1. Trocar placement of shunt.

method, or by the Veress technique (Fig. 1). The patient is placed in a steep Trendelenburg position, providing retraction of the small bowel. The bowel is retracted cephalad (a fourth trocar may be inserted and a fan retractor used), and the left colon is mobilized along the white line of Todt. The left ureter and the inferior mesenteric artery are identified to aid in localizing the L3–L4 disc space. After this space is identified, the patient is placed in a reverse Trendelenburg position, and a long Touhey needle is inserted percutaneously just lateral to the umbilicus on the left side. This needle is capped with the stylet so as not to lose the pneumoperitoneum.

The needle is directed to either the L3 or L4 disc space under direct videoscopic visualization, and is inserted through the disc space and into the thecal sac until CSF returns from the needle, confirming its positioning in the dural space. Gentle aspiration may be required if the patient has a normal pressure hydrocephalus. The proximal end of the shunt is then placed through the Touhey needle until ~6–8 cm of catheter is in the thecal space. The needle is removed over the silastic catheter. The catheter is sutured to the L4 disc with an intracorporal knot to prevent migration. The catheter is cut to the required length. If desired, a distal shunt valve can also be placed.

Discussion

The lumboperitoneal shunt is gaining acceptance among neurosurgeons for use in a variety of conditions, most frequently for communicating hydrocephalus. With the advent of improved silastic catheters, the long-term patency and reliability of this device have been much improved. A study by Eisenberg et al. [3] described its ease of placement and revision, as well as its low complication rate. They concluded that the lumboperitoneal shunt should be the initial choice of procedure in the treatment of communicating hydrocephalus. With the use of the laparoscopic transabdominal lumboperitoneal technique, a short segment of catheter may be used, and a direct route from the L3 disc space to the peritoneal cavity employed. Since no acute angles are made

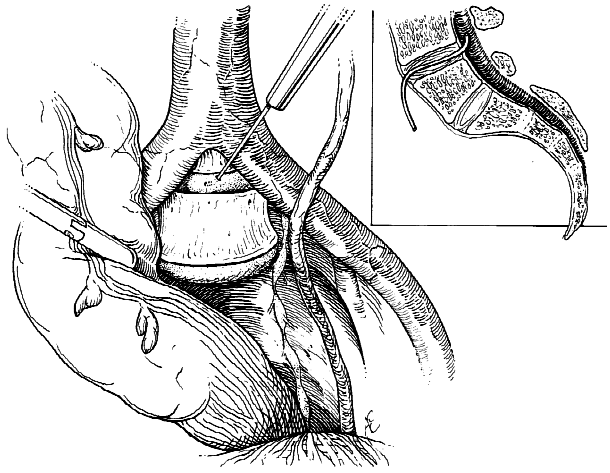

Fig. 2. L3–L4 disc space and landmarks of aortic bifurcation—left ureter and simoid colon. Inset photo shows a lateral view after the shunt is in place.

by the catheter en route to the peritoneum, kinking should be reduced and patency maintained.

The lumboperitoneal is the safest of the shunts. Eggenberger et al. [2] conducted a retrospective study of 27 patients with pseudotumor cerebri and found no major complications associated with the LP technique other than shunt failure. On the other hand, Lee et al. [5] found a 4.1% infection rate with the VP shunt, as well as an ~2% rate of subdural collections that required surgical drainage. Aoki [1] compared the results and complications of 207 patients who had LP shunts with 120 patient who had VP shunts, all placed by the same group at the same period. He found that LP shunts were associated with a significantly lower incidence of infection and malfunction. Lumboperitoneal drains are known to have a much lower rate of subdural collection. This is because ventriculo shunts drain via the lateral ventricles and cause collapse of the cortical mantle, sometimes producing subdural collection.

In addition, Spetzler et al. [7] have described a technique for a percutaneous lumboperitoneal shunt. Their method requires the shunt to pass from the posterior spine subcutaneously to the peritoneum. The laparoscopic lumboperitoneal shunt passes directly from the spinal canal anterior to the peritoneum (Fig. 2). This direct route eliminates any unnecessary turns that might cause kinking. Although the technique of placing a lumboperitoneal shunt is fairly straightforward, there are rare occasions when the dorsal lumbar spine must be avoided. Patients who have undergone fusion and instrumentation of the lumbar spine are in this category, for example. The laparoscopic technique described here is a safe, simple, and direct alternative for creating a CSF diversion in those patients for whom the dorsal lumbar spine is better avoided.

Conclusions

The laparoscopic lumboperitoneal shunt can be easily performed by a skilled surgeon. The technique has many ad-

vantages over the traditional VP shunt and should be the initial choice for communicating hydrocephalus. The incidence of infection and complications is lower, while the patency rate is higher. These advantages, combined with the shunt's ease of insertion, make it the preferred technique.

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