Preventive Stitching for Migration of a Peritoneal Catheter Into the Abdominal Wall After Ventriculoperitoneal Shunting

—Technical Note—

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Abstract

Migration of the distal end of a ventriculoperitoneal shunt into the abdominal wall (epi-peritoneal layer) is a complication which is especially likely in obese patients with high intra-abdominal pressure and wide dead space around the catheter remaining after laparotomy. A preventive abdominal stitching method for this complication was developed consisting of sutures beside the catheter penetrating the peritoneum, posterior and anterior sheath of rectus abdominis muscle, and subcutaneous fat. This method was applied to more than 20 patients who underwent ventriculoperitoneal shunting. No patient experienced shunt migration. The technique is easy and safe to perform, avoids leaving a dead space around the peritoneal catheter, and prevents catheter migration.

Key words: abdominal wall, migration, obesity, peritoneal catheter, ventriculoperitoneal shunt

Introduction

Ventriculoperitoneal shunt surgery is very common but may cause various types of complications. Migration of the peritoneal catheter into the abdominal wall, that is the epi-peritoneal layer, is a complication of the distal end of the catheter which results in malfunction of the shunt with pooling of cerebrospinal fluid in the abdominal wall. Repositioning of the migrated catheter is possible,^{1,2,4-6,9)} but corrective measures have not been detailed. We have developed a preventive abdominal stitching method for this complication.

Technical Method

The preventive abdominal stitching method has been applied to more than 20 obese adults who underwent standard ventriculoperitoneal shunt for hydrocephalus since 2007. At placement of the peritoneal catheter, a pararectal transverse incision with a length of 3–5 cm is made, and the abundant fat is retracted to obtain an adequate field for laparotomy. The anterior sheath of the rectus abdominis muscle, the belly of the muscle, and the posterior sheath of the muscle are divided, and a small opening is made in the peritoneum. The direction of division of the sheaths and the peritoneum is transverse, that is vertical to the peritoneal catheter. A hydrogel-processed peritoneal catheter (Bioglide; Medtronic, Minneapolis, Minn.,

U.S.A.) is inserted into the peritoneal cavity through the opening of the peritoneum. A non-absorbable suture is applied to the peritoneum as close as possible to both sides of the catheter, and is knotted. The applied suture is attached to a needle to penetrate the layers overlying the peritoneum, that is the posterior and anterior sheath of rectus abdominis muscle, and the subcutaneous fat approximately 1 cm superficial to the catheter. After penetrating those

Fig. 1 Schematic showing the suture beside the peritoneal catheter which penetrates the peritoneum, posterior and anterior sheath of rectus abdominis muscle, and subcutaneous fat to prevent formation of dead space.

layers, the sutures beside the catheter are knotted, thus forming an artificial sheath surrounding the catheter, which avoids migration of the catheter into a dead space in the abdominal wall (Fig. 1). The subcutaneous layer and skin are closed in standard fashion.

The artificial sheath can be formed in less than 5 minutes. No migration was experienced during the follow-up period of 1–26 months. No technique-related complications, such as obstruction of the catheter or pain of the wound, were encountered.

Discussion

Migration of the peritoneal catheter into the preperitoneal space is known in a few cases,⁹⁾ and we have experienced such a case.⁴⁾ This migration has multiple causes. The epiperitoneal dead spaces including the space between two layers of the fascia, and that between the anterior layer of fascia and the subcutaneous fat, are preserved by laparotomy. The space tends to be large in obese patients due to the excessive retraction to obtain an adequately large field for laparotomy. Excessively increased intraabdominal pressure may push out the peritoneal catheter which migrates into the dead spaces.

Normally, intra-abdominal pressure is atmospheric (0 mmHg) or slightly subatmospheric (<0 mmHg).^{3,7,10)} However, measurement of intra-abdominal pressure with a transurethral bladder catheter in 84 morbidly obese patients found that higher sagittal abdominal diameter was associated with significant increase in this pressure.⁸⁾ Intra-abdominal pressure was well above 8 mmHg and could be as high as 12 mmHg in some obese patients. In addition, the use of a hydrogel-processed peritoneal catheter covered with hydrogel may have contributed to the catheter migration. These catheters become hydrophilic and slippery when hydrated, resulting in low friction between the catheters and surrounding tissue, so increasing the possibility of migration.

The present method is easy and safe to perform, and the preventive stitching is effective to avoid catheter migration by closing the entry of the dead space around the catheter.

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