Incisional hernia after ventriculoperitoneal shunt

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Abstract

Ventriculoperitoneal (VP) shunt is a common neurosurgical procedure that is performed to drain the cerebrospinal fluid (CSF) into the peritoneal cavity. Although a relatively safe procedure, at times, it can be associated with a variety of complications at the abdominal end such as displacement, cyst formation, inguinal hernia, hydrocele, perforation of intra-abdominal organs, or extrusion. Rarely, an incisional hernia may occur at the abdominal incision. We present a rare case of an incisional hernia occurring at the abdominal site of shunt insertion and highlight the problems faced while repairing it.

Introduction

Since the first reports by Kausch in the early part of the 20th century of the use of the peritoneal cavity for diverting CSF, ventriculoperitoneal (VP) shunts have become the standard procedure for the treatment of hydrocephalus [1,2]. Like any surgical procedure, VP shunting is also associated with complications; the most common causes of shunt malfunction are proximal obstruction and infection [1] and these usually present with headache, changes in the mental status, and vomiting [3].

Complications that occur at the distal (abdominal) end are also a cause of significant morbidity, and in various series, nearly 5 - 47 % of all shunt failures are thought to be due to malfunction of the distal catheter [4-7] with a higher incidence in patients with scoliosis, obesity and those who have undergone prior abdominal surgery [4,8]. Abdominal complications that have been reported are; shunt infection, development of an inguinal hernia, subcutaneous collections of CSF, peritoneal or omental cyst formation, mesenteric pseudotumors, bowel perforation, intestinal volvulus around the shunt tubing, catheter disconnection; and various types of catheter migrations such as extraperitoneal retraction and displacement, migration of the catheter into the pleural cavity or heart, or protrusion of the catheter through the mouth, umbilicus, bladder, vagina, anus, or scrotum. Knotting of the shunt has also been reported on occasion [1–7], as have been other less common complications such as adhesive bowel obstruction, intra-abdominal abscesses, cerebrospinal–enteric fistula and intractable CSF ascites [1,3].

The development of an incisional hernia at the abdominal end after shunt placement is an extremely rare complication. Theoretically, any abdominal operation has the potential for developing into an incisional hernia, but the incidence of this problem after a VP shunt is quite low. Although many reviews on the topic of complications or abdominal complications after shunt do mention this complication, we could come across only two actual reports of incisional hernia occurring at the abdominal end [9,10], and we present another such case, highlighting the various problems we faced while dealing with this rare type of hernia.

Case Report

This 23 years old gentleman came to our outpatient department with swelling and pain in the upper abdomen. The swelling gave a typical history of a hernia, with increase in size on exertion and reduction while lying down. The patient gave history of surgery about a year and a half back, when he underwent VP shunt insertion followed by endoscopic surgery for a third ventricular colloid cyst. He remained well for nearly a year, after which he noticed this gradually increasing swelling over his upper abdomen.

On examination, there was a visible, horizontal scar in the epigastrium, with a palpable soft lump that showed cough impulse, and reduced in size on lying down. A defect of approximately 2x2 cms was palpable in the

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abdominal wall here. The VP shunt could also be palpated to the left of this defect (Figure 1). The patient was worked up for elective surgery for the incisional hernia, and a neurosurgical opinion was taken for the removal of VP shunt. The neurosurgical team felt that it would be better if the shunt remained in situ, and advised avoidance of injury to the shunt while operating the hernia.

Figure1. Photograph showing incisional hernia at the abdominal site of VP shunt insertion

Surgery was performed under general anesthesia. Scar tissue from the previous surgery was excised and the incision was extended on either side. Carefully, the skin flaps were mobilized, repeatedly palpating the shunt and taking care not to damage it as it ran in the subcutaneous planes onto its point of entry into the peritoneal cavity. The muscle sheath was mobilized all around, as was the hernial sac. The sac was invaginated, and an incision was given onto the muscle sheath parallel to the closure. The free edges of the sheath were sutured together to provide additional support, as well as to reduce tension on the closure. A polypropylene mesh was then used to cover the area and was sutured to the margins of the sheath all around. Closure was performed over a drain.

The patient remained well in the post-operative period, and is well on a short follow up, with no recurrence of the hernia.

Discussion

An incisional hernia can occur after any type of abdominal wall incision, although the highest incidence is seen with midline and transverse incisions. Multiple risk factors are implicated in the development of an incisional hernia, and can be broadly classified into surgical or technical factors (expertise, choice of suture material, technique of closure, closure under excessive tension, wound infections, emergent surgery, post-operative infections, etc.), and patient factors (advanced age, malnutrition, obesity, ascites, corticosteroid usage, diabetes, cigarette smoking, obesity, other illnesses, etc.) [11]. In our patient, it was quite possibly a combination of increased intra-abdominal pressure (due to CSF drainage into the peritoneal cavity) and a compromised technique of abdominal wound closure that contributed to the formation of his incisional hernia.

Surprisingly, an exhaustive search through the internet, various databases and cross referencing through article bibliographies (even a search for articles on the etiology of incisional hernias) did not yield much information about the occurrence of incisional hernia after VP shunt surgery. Although many series mention incisional hernia at the abdominal end of the shunt as a complication of the procedure, despite going through a large amount of literature available on VP shunts (and its complications), we found only two reports that actually reported the occurrence incisional hernia in their patients [9,10].We accept the fact that given the vast amount of literature on the topic of VP shunts, despite our efforts, we still might have missed some reports on this topic, but even then, the development of an incisional hernia after VP shunt remains the rarest of complications. Quite possibly, the rarity of this complication in comparison to the other reported abdominal complications after VP shunt is responsible for the paucity of information on this topic. Unfortunately, this translates into very practical problems while managing such cases since there is not much evidence or guidelines to go on except one's own experience in dealing with incisional hernias.

We felt that the continued presence of the shunt tubing at the hernia site, and the point of its entry into the

peritoneal cavity would always act as a weak point in the anterior abdominal wall and a potential site of herniation. Therefore, to our minds, removal of the shunt if it was no longer required, and repair of the incisional hernia was the best option, but this had already been vetoed by the treating neurosurgeons who wanted to keep the shunt in place. The second option that we discussed was re-positioning of the abdominal end of the shunt through another area and mesh repair of the incisional hernia, both laparoscopically, but the patient was not willing for this since (a) he did not want any manipulation of the shunt, and (b), the costs of this procedure in our set up are quite high and were unaffordable for him. In the end, we were left with no other option but to perform an open hernioplasty, taking care not to damage the shunt during surgery.

Not surprisingly, laparoscopy has found application in VP shunts also, not only to deal with the complications of the procedure, but also initially, at the time of performing the shunt. With its advantage of better vision and less tissue trauma, laparoscopic placement of the abdominal end of the shunt is rapidly becoming accepted as a procedure of choice, and has reportedly brought down the incidence of complications at the distal end [3,4,6,8–10]. In addition, laparoscopic placement of the shunts allows for confirmation of shunt patency and function by direct visualization of CSF flow from the shunt tubing [10]. The advantages of the laparoscopic approach also include a shorter hospital stay, less post-operative pain, lower chance of incisional hernia formation, and, since the catheter is positioned under direct vision with minimal bowel manipulation, there is a much lower chance of bowel injury and adhesion formation [6,8]. Even when dealing with complications, laparoscopy offers a distinct advantage over laparotomy, especially in terms of superior visualization of the peritoneal cavity, retrieval of displaced shunts, lysis of adhesions, culture of abdominal fluid, repositioning of displaced tubings, and assessing the abdomen for any other pathology [2-4,6,8, 10]. However, the flip side is that separate incisions (for port and shunt placement) as well as two separate teams (neurosurgical and laparoscopic) are required, which may not be available everywhere.

Being unable to perform laparoscopic surgery in our patient, we proceeded with open, onlay hernioplasty. Marking of the shunt pre-operatively, repeated digital palpation, careful dissection, and taking care not to pass the suture needle through the shunt tubing at the time of fixing the mesh were important steps that we took to avoid inadvertent damage to the shunt tubing during surgery, which could have had disastrous consequences. As we mentioned above, the application of laparoscopic surgery in VP shunt placement will further reduce the incidence of incisional hernia after VP shunting, but we hope that our experience with open repair of such a rare hernia might help those who may occasionally come across such cases who do not have access to laparoscopic facilities.

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- Incisional hernia after VP shunt insertion is a rare complication at the abdominal end.
- Treatment options include:

  -Removal of the shunt if it is no longer required, and repair of the incisional hernia.

  -Laparoscopic re-positioning of the abdominal end of the shunt through another area and mesh repair of the incisional hernia.

  -Open, onlay hernioplasty, avoiding inadvertent damage to the shunt tubing during surgery.