Case Report

Rare complication of ventriculoperitoneal shunt: Ectopic distal catheter in a Grynfeltt hernia – case report

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ABSTRACT

Background: Ventriculoperitoneal shunts (VPSs) insertion is the most common used intervention in cases of hydrocephalus. The main postoperative complications are infections and catheter obstructions. Although the literature has well-documented cases describing migration of the distal catheter, this rare presentation can become more confusing when occurring in conjunction with some unusual preexistent morbidity in the patient, as a Grynfeltt hernia.

Case Description: This study reports a rare case of a VPS postoperative migration, in which the distal catheter exits the abdominal cavity through a Grynfeltt hernia. This condition was not discovered until the catheter fistulated through the overlying skin. The Grynfeltt hernia is the most uncommon among the lumbar ones and it’s asymptomatic in the majority of the cases, being hardly diagnosed.

Conclusion: The unusualness of the reported case deserves furthermore discussion to properly evaluate these underlying mechanisms of catheter migration.

Keywords: Catheter migration, Cerebrospinal fluid shunts, Grynfeltt hernia, Hydrocephalus, Postoperative complications, Ventriculoperitoneal shunt

INTRODUCTION

The cerebrospinal fluid (CSF) flow shunts are known as surgically implanted valvular drainage devices with the aim of directing CSF from the ventricles to the pleural cavity, the superior vein cava, and especially, the peritoneal cavity, regulating the intracranial pressure. Most distal terminations occur in the peritoneal cavity, characterizing the ventriculoperitoneal shunt (VPS).[10]

This procedure is usually indicated in cases of hydrocephalus and intraventricular hypertension. The VPS is composed of a system containing a proximal catheter, which is placed intraventricularly and connected to a valve, which is placed subgaleally, responsible for controlling the CSF drainage. The valve is then connected to a distal catheter that departs from
the head region, crosses the thoracic region, just under the subcutaneous tissue, and reaches the peritoneal cavity, where the CSF will be absorbed.\[10,11\]

The most common complications in this procedure are infection (15%), obstruction and malfunction (33%), or shunt migration.\[9\]

This paper reports a rare complication, in which a VPS procedure evolved with exteriorization of the distal catheter in the thoracic-abdominal region and left flank with abscess formation in a Grynfeltt hernia found in the patient, also a very uncommon condition.

**CASE REPORT**

A 37-year-old male patient was diagnosed with recurrent atypical clear cell meningioma of the foramen magnum, cervical spine (C1-C2 level), and lumbar spine, confirmed by magnetic resonance imaging (MRI). The preoperative MRI also revealed hydrocephalus consequent of the tumor compression of the fourth ventricle. The first surgery procedure was performed in late 2014 to allocate a VPS system. After 1 month, in early 2015, resection surgery of the meningioma in the foramen magnum and in the cervical spine was executed. The patient had no neurologic complications in the immediate postoperative time in any of the two occasions.

However, he returned to outpatient clinic with dizziness and headache 20 days after the last surgery. A new brain MRI was performed and exhibited the ventricular catheter outside the ventricular space. Therefore, surgery was needed to relocate another catheter. Only the intracranial catheter was replaced and reconnected with the rest of the former system, which was still functional. The symptoms resolved after the procedure and the patient was discharged without further complications. Between 2015 and 2020, he maintained in observational follow-up with MRI.

In early 2020, as the cervical intradural extramedullary tumor portion revealed relapse in the MRI, a fourth surgical procedure was required. The same occurred with no obstacles in the postoperative time. At the end of the same year, the patient developed dermal-epidermal atrophy at the thoracic-abdominal level leading to an externalization of the distal catheter, resolved only with antibiotic therapy.

About 2 months after this incident, there was an alteration in the catheter’s trajectory, with the formation of an abscess in the left flank [Figure 1], which later fistulized to the external environment [Figure 2]. The patient arrived at the outpatient clinic reporting that a family member visualized a tubular structure manifesting itself through the orifice of the lesion. At the time, examinations were performed, among which an abdominal CT scan revealed hyperdensity in subcutaneous cellular tissue and muscles of the left flank, as well as an anomalous distal catheter path in the retroperitoneal region [Figures 3-5]. A soft-tissue ultrasound was also performed identifying, in the upper lumbar trigone, a muscle herniation (Grynfeltt hernia) [Figure 6].

Urgent surgery was indicated to remove the catheter and exchange it. During surgery, an attempt was made to find the tip of the catheter in the region of the left flank together with the general surgery team. The fistulous pathway was dissected, but it was not possible to identify the distal catheter. Thus, it was decided to section the catheter in the anterior thoracic region and pull the distal catheter to remove it. After removal, the proximal portion was tested with negative pressure to verify the functioning of the ventricular shunt system, however, there was no CSF drainage. Therefore, the proximal tip was closed...
and covered in the subcutaneous region of the anterior thorax. The abdominal region was left with a Penrose drain [Figure 7] and the tip of the distal catheter was sent to culture as well as the fluid collected in the thoracic part of the catheter.

The decision of leaving the thoracic and cranial part of the VPS system was owning to an elevate risk of bleed in the entire system removal and the absence of the systemic and neurologic infectious signs. The aerobic and anaerobic cultures were negative which led to neurosurgical team to maintain the conservative conduct. The patient was kept under neurological and infectious surveillance, showing no signs of meningism. He was discharged after 5 days of hospitalization, with only a few scars in the thoracic-abdominal level [Figure 8].

DISCUSSION

There are several VPS complications described in the literature, which can be differentiated into mechanical and nonmechanical failures. The mechanical failures are: system obstruction, disconnection of the VPS parts and catheter migration. Among the known nonmechanical failures are usually: infections and complications in the distal compartment of the system, such as ascites, abdominal pseudocyst, herniations, intestinal obstructions, pleural effusion, in addition to other complications described in the literature, which are less frequently found.[4,8] The most recurrent complications are the infectious and the obstructive causes.[9] Studies indicate that
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Internal migration, the catheter perforates the viscus without exteriorization. External migration, on the other hand, occurs when the catheter penetrates the body wall completely or subcutaneously. And finally, in compound migration, the catheter perforates the hollow organ and reaches a natural cavity in the body.\[1\] The most common site of migration is the perforation of the intestine, followed by migration to the genitourinary region, abdominal wall, chest, intracranial region, cardiac/intravascular system, breast, and subgaleal plane.\[8\] Complications such as anal extrusion\[7\] and protrusion into subcutaneous tissue have also been found in the literature.\[5\]

Only one report was found in the literature about the migration of a distal catheter to the retroperitoneal region, and there was not fistulation to the external environment, which has migrated to the paraspinal muscles.\[6\] Furthermore, only one case of catheter migration through a hernia was reported, which was a diaphragmatic one (Morgagni's hernia) described in a Down's syndrome patient.\[2\]

The Grynfeltt hernia is characterized as a type of lumbar hernia that arises from a defect (acquired or congenital) in the fibromuscular fascia of the posterolateral abdominal wall, more precisely in the upper lumbar triangle (Grynfeltt space), resulting in the extrusion of intra- or extra-peritoneal organs. This group represents <1.5–2% of all abdominal wall hernias. Concerning the lumbar hernias as a whole, there are just over 300 cases in the English language medical literature.\[12,13\] This pathology has an indolent characteristic of not producing a hernial sac, being asymptomatic and often even not diagnosed.

Delineated this outline, this case is potentially unprecedented in the literature once the catheter fistulized to the outside due to a rare preexisting Grynfeltt hernia in the patient, in addition to following a false pathway to the retroperitoneal region. Although, the specific mechanism of this unique situation has not yet been fully elucidated.

**CONCLUSION**

We emphasize the unusualness of the reported case, once it associates a retroperitoneal pathway poorly described in the literature with fistulization of the distal VPS catheter through a rare Grynfeltt hernia. Thus, this condition deserves furthermore discussion in the future to properly evaluate these mechanisms.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent.

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Nil.
Conflicts of interest

There are no conflicts of interest.

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