Proximal subcutaneous migration of the distal end of a ventriculoperitoneal shunt presenting with recurrent cerebrospinal fluid galactorrhea

Case report

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The authors report an unusual case of recurrent proximal migration of the distal end of a ventriculoperitoneal shunt catheter presenting as CSF galactorrhea. The authors review the pertinent literature and discuss the possible causes as well as techniques to prevent a similar occurrence.

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Key Words • ventriculoperitoneal shunt complication • proximal shunt migration • cerebrospinal fluid galactorrhea

Ventriculoperitoneal shunt insertion is a well-established technique for permanent CSF diversion to treat a variety of intracranial pathological conditions most often resulting in hydrocephalus, but it is also used to treat other disorders causing intractable intracranial hypertension. Usually, the distal catheter is inserted by performing a small laparotomy in the right paraumbilical, right subcostal, or median supraumbilical region. Despite advances in shunt technology and implant materials, a myriad of various complications continue to be reported, some most unusual. It is estimated that within 1 year of shunt placement 25%–40% of patients experience shunt complications. The risk reduces to 4%–5% annually thereafter. The mean survival of a shunt is approximately 5 years.

We present a case of CSF galactorrhea as the sole presenting symptom of a delayed proximal subcutaneous migration of the intraabdominal portion of a VP shunt.

Case Report

History and Examination. A 46-year-old woman presented with a 6-year history of headaches and progressive visual loss diagnosed as idiopathic intracranial hypertension. All imaging failed to reveal a cause. The only observed risk factor was moderate obesity; the patient had a BMI of 31 kg/m². After medical therapy failed and a left optic nerve sheath fenestration was unsuccessful, she was referred for CSF shunting as definitive treatment. She was scheduled for a VP shunt.

Operation. An image-guided right frontal approach was chosen and the peritoneal cavity was entered via a standard right subcostal minilaparotomy by using a muscle-splitting technique through the rectus abdominus. The peritoneum was closed with a purse-string suture after a 90-cm peritoneal catheter connected to a PS Medical Strata II programmable valve (Medtronic, Inc.) was passed freely into the peritoneal cavity. The procedure was without complication and the patient’s postoperative imaging revealed intraabdominal placement of the catheter.

Postoperative Course. Six weeks after the shunt was implanted, the patient presented with painless, spontaneous clear fluid leakage from her right nipple; on compression it originated from a single duct in a jetlike fashion (Fig. 1). There was no palpable subcutaneous fluid collection along the course of the shunt catheter, and both breasts appeared symmetrical without deformity or sign of injury. She denied any recurrence of her previous symptoms to suggest a shunt malfunction. A sonogram was diagnostic for a subcutaneous fluid collection starting at the abdominal incision and extending to the inferior medial quadrant of the breast. A shunt series demonstrated the path of the distal catheter medial to the breast shadow and complete proximal migration of the peritoneal catheter into the subcutaneous tissues just at the level of the abdominal incision (Fig. 2).

This migration was treated by repositioning of the distal end of the migrated catheter into the peritoneal cavity. In addition to a new peritoneal entry site, a subfascial tunnel under the anterior rectus sheath and purse-string sutures were used to anchor the catheter in place. Ten days later the catheter migrated out a second time, with identical clinical presentation. For the second revision
we used a dual-port laparoscopic technique with distal subcutaneous tunneling and distant 3-mm puncture entry site through the left rectus abdominis muscle. The laparoscopic technique allowed for a precise and ideal position of the distal catheter into the greater pelvis under direct vision. The patient did well postoperatively and remains asymptomatic 12 months later.

Discussion

A high rate of surgical failure is related to the distal placement of a peritoneal catheter, which is particularly difficult in obese patients, those with previous abdominal surgeries, and patients with chronic inflammatory diseases. Proximal migration of the peritoneal end of a VP shunt has been described with various clinical presentations, the most frequent being shunt failure and formation of a subcutaneous pseudocyst. Peritoneal catheter migration has also been described ending into the pulmonary vein and cardiac chambers, chest cavity, and around augmented breast implants. This case report illustrates 2 unusual complications of CSF shunting occurring in the same patient. To our knowledge this is the first presentation of a proximal migration associated with a lactiferous duct injury and CSF galactorrhea.

The mechanism for subcutaneous retrograde migration of the distal end of a successfully implanted peritoneal catheter is not well understood. It is possibly associated with elevated intraabdominal pressure and high BMI. Nagasaka et al. have presented a series of 3 cases. All 3 had a BMI greater than 30 kg/m². It is hypothesized that the higher intraabdominal pressure induced by excess weight allows the catheter to gradually inch its way out over time. The average observed time of 6 weeks between implantation and diagnosis seems to be consistent in all reported cases. Changes in bowel habit, especially severe constipation, can be associated with high intraabdominal pressures and shunt malfunction. Extended subfascial tunneling and nonocclusive anchoring techniques have been reported to prevent this occurrence. This case report, however, demonstrates that despite these efforts recurrence can occur. We add an interesting observation that in our case the catheter tip positioned itself into the right upper quadrant on both occasions (Fig. 3), suggesting perhaps a greater influence of normal peristalsis than if it had been positioned into the greater pelvis.

We suggest, as others have in the past, that laparoscopic positioning of the distal catheter into the greater pelvis might be preferable to open minilaparotomy in...
preventing delayed distal migration. Laparoscopic techniques have the added benefit of visualizing the placement of the catheter to ensure that the catheter is in the peritoneal cavity, allowing for identification of any adhesions that could potentially be preventing the appropriate placement of the catheter and causing it to migrate. Although laparoscopic techniques do not provide the opportunity to suture the catheter at its insertion site, it has been reported that the rate of catheter migration might be less than with open laparotomy.\textsuperscript{10,13,14}

Cerebrospinal fluid galactorrhea is a rare complication of VP shunting and has been associated with an injury to the lactiferous ducts from the subcutaneous tunneling of the distal shunt tubing. Techniques to avoid the injury include passage of the subcutaneous catheter either lateral or medial to the breast tissue. Breast lobules are embedded within fatty tissue and suspended by ligaments and connective tissue. The amount of fat in the breast largely determines their size. The actual milk-producing structures are nearly the same in all women, suggesting that damage to the lactiferous system might be more prevalent in women with a lower BMI and hence smaller breasts, allowing more exposure of the lobules to injury by a passing trocar. With the exception of previously reconstructed breasts with the inherent scarring onto the chest wall, an injury to the lactiferous system is very unusual.\textsuperscript{5} The rarity of the injury is implied by the absence of reported symptoms and signs such as pain, swelling, hematoma, or bloody discharge.

There are 3 other case reports of CSF galactorrhea.\textsuperscript{6,8,12} Two presented with symptoms of distal shunt obstruction from intraabdominal pseudocyst formation and retrograde seepage along the catheter tract as the cause for the CSF galactorrhea. The third is a case of proximal migration of the distal end of a cystopleural shunt in a patient with multiple shunt infections and numerous revisions. Perhaps a lumboperitoneal shunt could be to considered for women with smaller breast mass or prior surgical breast remodeling to avoid this complication altogether. However, lumboperitoneal shunts have been associated with higher revision rates.\textsuperscript{1}

**Conclusions**

What makes this case unique is that it illustrates 2 unusual shunt complications in the same patient. This case report illustrates the importance of adapting the surgical technique to the patient’s body habitus, with special attention to women with a high BMI and smaller breast mass or prior surgical remodeling of breast tissue with its associated scar formation.

**Disclosure**

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

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