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doi:10.1016/j.jocn.2009.09.039

## A ventriculoperitoneal shunt catheter wrapped around a right mammary prosthesis forming a pseudocyst

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### ARTICLE INFO

#### Article history:

Received 17 September 2009

Accepted 13 October 2009

#### Keywords:

Cerebrospinal fluid  
 Ventriculoperitoneal shunt  
 Migration  
 Pseudocyst  
 Prosthesis

### ABSTRACT

Breast cerebrospinal fluid pseudocysts are a rare complication of ventriculoperitoneal (VP) shunting. It is very unusual for the peritoneal catheter of a shunt to become wrapped around a prosthesis a previously augmented breast. Three previously reported patients developed an enlarging breast lump and were diagnosed with shunt migration around the prosthesis. Our patient underwent bilateral breast augmentation and subsequently a VP shunt. We observed on frequent follow-up chest X-rays performed for pneumonia and mechanical ventilation that the peritoneal catheter had gradually wrapped around her prosthesis. She developed a progressively enlarging breast lump which resolved with drainage of the cerebrospinal fluid collection and revision of the VP shunt.

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### 1. Introduction

Ventriculoperitoneal (VP) shunting is a common surgical procedure used to treat hydrocephalus; however, it is associated with numerous complications including obstruction, infection and migration. The distal end of a VP shunt may migrate to the anus, umbilicus, vagina, scrotum, pulmonary artery, hollow organs, or even the oral cavity.<sup>1</sup> Breast-related complications such as cerebrospinal fluid (CSF) pseudocysts<sup>2–4</sup> and galactorrhea,<sup>5–7</sup> caused by shunt fracture or leakage, have previously been reported. However, in these case the shunt tip remained in the correct location. Only three other case reports have discussed a shunt migrating around a breast prosthesis, causing an enlarging breast lump.<sup>8–11</sup> No definite mechanism of shunt migration was determined in these reports. Over 2 months follow-up we observed on a chest X-ray that our patient's peritoneal shunt had gradually migrated around her mammary prosthesis, forming a lump.

### 2. Case report

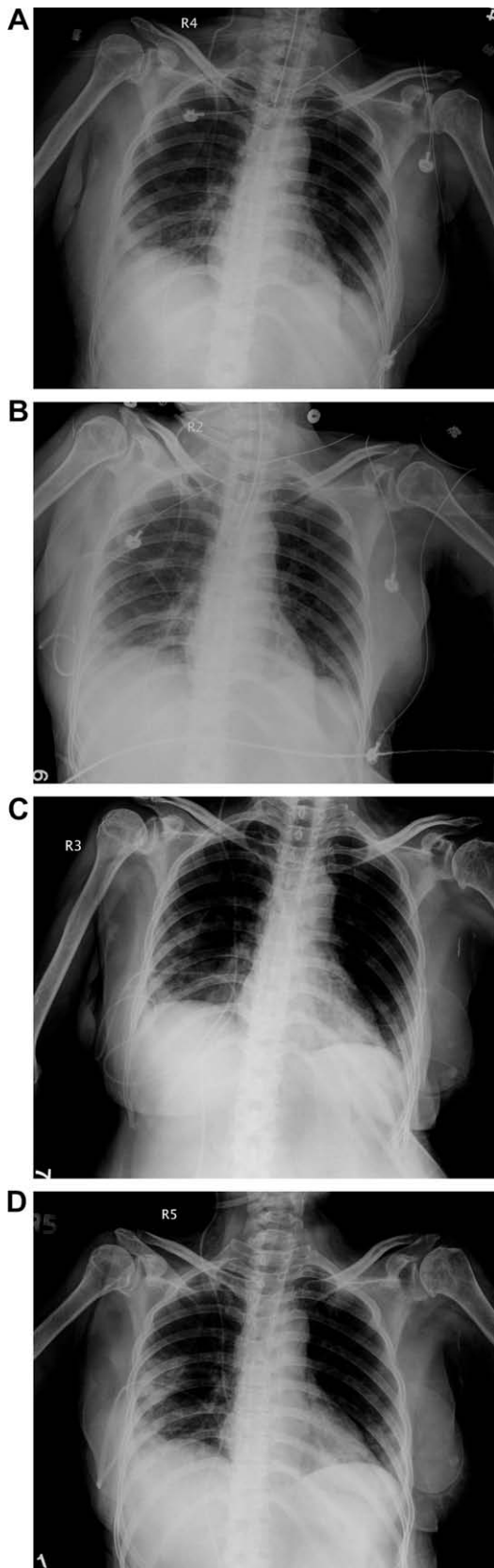
A 55-year-old woman with a history of stroke (right basal ganglia intracerebral hemorrhage) causing left hemiplegia visited our neurosurgery department following recent progressive memory loss and urinary incontinence. After a physical examination and her history was taken, a brain CT scan showed a small lacunar

infarction and hydrocephalus. She also had dyspnea and bilateral lower lobe lung atelectasis. Her respiratory condition deteriorated and she was intubated for pneumonia and given prophylactic antibiotics. After her infectious status and respiratory function improved, she received a VP shunt to treat her hydrocephalus.

The patient's history did not elicit that she had received a bilateral saline breast implant. Subcutaneous tunneling was performed smoothly without any obvious resistance from the capsule or fibrous tissue and there was no fluid leakage from the scalp or abdominal skin incision wounds after tunneling. The distal end of the shunt was placed intraperitoneally under direct vision. We did not use a suture to anchor the shunt to the abdominal fascia. A postoperative chest X-ray showed the shunt was well positioned (Fig. 1A). Because she had difficulty weaning from mechanical ventilation, her lung condition from monitored frequently by chest X-ray. We first noted at 5 days postoperative that the peritoneal shunt tip began to twist (Fig. 1B). A breast lump did not form initially and her neurological status was relatively stable during the following days (Fig. 1C,D). There were no signs of increased intracranial pressure, even when the distal tip of the shunt completely withdrew from the abdominal cavity 64 days after shunting, and fluid accumulated in her right breast as a palpable and asymmetrical mass (Fig. 2).

The patient was afebrile but could not communicate, therefore shunt revision was discussed with her family, who agreed to the procedure. A small incision was made over the clavicle and we reinserted the distal end of the shunt. After making the incision and withdrawing the distal end, about 500 mL of CSF was ejected and the breast lump resolved spontaneously (Fig. 3A,B).

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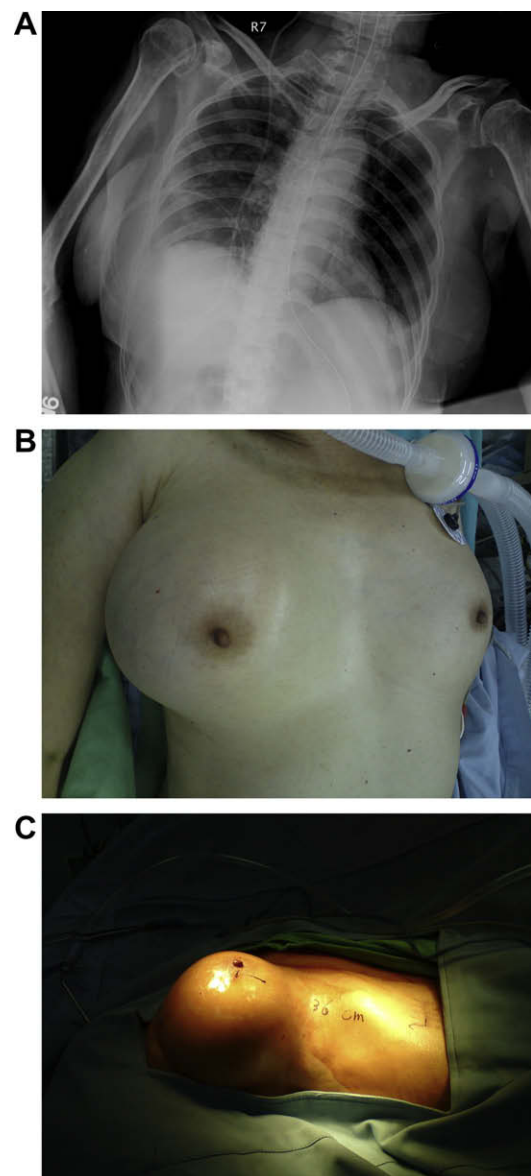
**Fig. 1.** Post-operative follow-up X-rays showing: (A) the shunt in the correct position; (B) the peritoneal tip starting to withdraw and form a loop at the right breast (day 5); (C) one loop has formed (day 11); and (D) two loops at the right breast (day 23).

### 3. Discussion

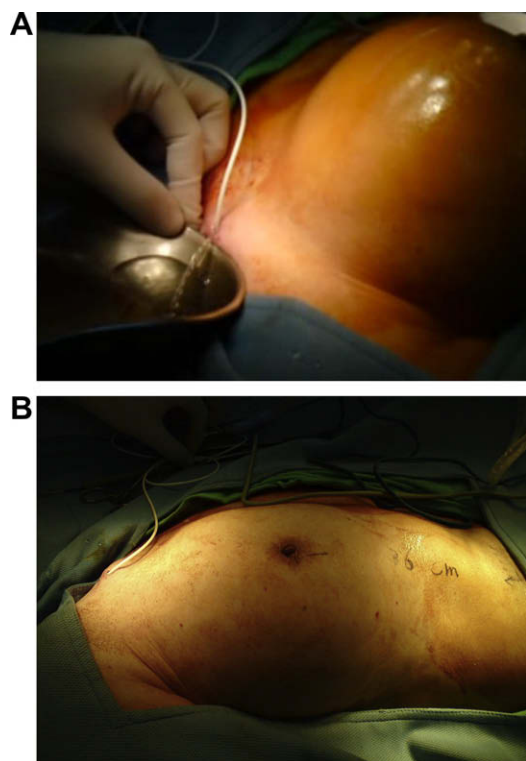
VP shunting is a common procedure used to treat hydrocephalus. Although it is a straight-forward operation, many complications, including infection, obstruction, fracture and migration, have been reported. The distal end of the shunt may migrate to the anus, umbilicus, pulmonary artery, hollow organs, vagina, scrotum, or oral cavity.<sup>1</sup>

An enlarging breast mass with CSF pseudocyst formation caused by shunt fracture or leakage has been reported.<sup>2–4</sup> Some patients have developed CSF galactorrhea if the lactiferous duct is injured during subcutaneous tunneling, in addition to the formation of an intra-abdominal CSF pseudocyst.<sup>5–7</sup>

Between 2005 and 2008 Iyer et al.,<sup>8</sup> Spector et al.,<sup>9,10</sup> and Torres et al.,<sup>11</sup> have each reported a patient with a breast CSF pseudocyst



**Fig. 2.** (A) X-ray post-operative day 64 showing three loops and the peritoneal tip completely wrapped around the prosthesis. Operative photographs showing (B) asymmetrical breast with skin expansion and (C) preparation for clavicle and abdominal incision with enlarging breast lump. (This figure is available in colour at [www.sciencedirect.com](http://www.sciencedirect.com).)



**Fig. 3.** Photographs showing (A) cerebrospinal fluid (CSF) ejection after clavicle incision; and (B) collapse of the breast lump after relief of accumulated CSF. (This figure is available in colour at [www.sciencedirect.com](http://www.sciencedirect.com).)

with shunt migration around a breast implant (Supplementary Table 1). Spector et al. first reported a patient who had breast augmentation several years prior to shunting and, as for our patient, the neurosurgeon was not aware of her augmentation history.<sup>9</sup> The neurosurgeon thought that migration may have occurred as a result of the patient having lifted heavy items and that traction on the catheter occurred from scarring between the pectoralis major muscle and capsular tissue along the shunt tunnel. In contrast, the patient described by Iyer et al. underwent augmentation 4 months after shunting.<sup>8</sup> Although care was taken to avoid communication between the prosthesis and the shunt, a breast CSF pseudocyst still occurred. The surgeon believed this was caused by vigorous manipulation of the patient's breasts during "rough" sexual intercourse, resulting in erosion of the implant toward the catheter. Torres et al. reported a similar patient to Spector et al. and they believed shunt migration was due to perforation of the periprosthetic capsule. These patients did not have X-rays showing how the shunt gradually wrapped around the prosthesis before either breast pain or a painless lump was evident. Our patient's history was similar to the patient described by Spector et al., but as our patient's lung condition was followed, we could observe the migration of the peritoneal catheter. Lee et al. reported a patient with CSF galactorrhea after VP shunting.<sup>7</sup> They performed a

shuntogram and found an intra-abdominal CSF pseudocyst, indicating poor CSF drainage and retrograde opacification of an irregular tract outside the peritoneal catheter of the VP shunt, suggesting that CSF may circulate around the entire tract.

We believe the migration of the peritoneal shunt tip may have occurred as a result of two conditions. First, our patient may have had poor intra-abdominal CSF drainage due to adhesions or an ileus and formed a CSF pseudocyst or may have developed high intra-abdominal pressure from, for example, suction-related coughing or constipation. Second, the prosthetic capsule may have communicated with the shunt during tunneling or from erosion. Our patient is unique because we observed the shunt migration, through a series of chest X-rays. Timing revision surgery depended on the patient's neurological condition.

#### 4. Conclusion

To avoid migration of a VP shunt: (i) take a history for prosthesis; (ii) tunnel carefully without perforating the capsule; (iii) tunnel close to the midline; (iv) insert the shunt tip into the abdomen smoothly to decrease pseudocyst formation; and (v) suture of the peritoneal tip to the abdominal fascia. Even if every method to prevent shunt migration is attempted, surgeons should still bear in mind this complication and inform their patients.

#### Appendix A. Supplementary material

Supplementary data associated with this article can be found, in the online version, at [doi:10.1016/j.jocn.2009.10.021](https://doi.org/10.1016/j.jocn.2009.10.021).

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