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CASE REPORT | ENDOSCOPY

Acute Shunt Failure Due to Perforation of Ventriculoperitoneal Shunt Tubing during Percutaneous Gastrostomy

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ABSTRACT

The placement of a percutaneous endoscopic gastrostomy (PEG) in a patient with a pre-existing ventriculoperitoneal shunt is generally regarded as safe. A critical but often overlooked technical consideration is confirmation of the course of the distal shunt tube prior to PEG insertion. We present the case of a 4-month-old male infant with shunted hydrocephalus who experienced shunt malfunction due to perforation of the distal shunt tubing after PEG placement.

INTRODUCTION

Children with congenital hydrocephalus often require medical support to maintain adequate nutrition. Since its initial description in 1980 by Gauderer et al., percutaneous endoscopic gastrostomy (PEG) has become the standard of care for patients requiring long-term enteral support.[1-3] Though it is generally accepted that placement of a PEG is feasible and safe in patients with ventriculoperitoneal shunts (VPS), there are technical details related to the gastrostomy placement that bear consideration.[4]

CASE REPORT

An 8-week-old male infant with congenital hydrocephalus due to germinal matrix hemorrhage underwent insertion of a strata-programmable VPS (Medtronic, Minneapolis, MN). The abdominal portion of the shunt was placed using a mini-laparotomy technique through a small midline abdominal incision half the distance between the xyphoid process and the umbilicus. Postoperative imaging and clinical course after placement of the VPS were unremarkable.

Due to difficulty feeding and chronic vomiting, long-term feeding access via PEG was recommended for the infant at 4 months of age. He underwent placement of a 14-French PEG. Weight-based cefazolin was administered preoperatively. The PEG was introduced without fluoroscopy by a standard pull-through technique with endoscopic guidance, as has been described previously.[5] No resistance or other untoward event was noted during the PEG placement. The distal shunt tubing was identified preoperatively and was not felt to have been violated at the time of the procedure.

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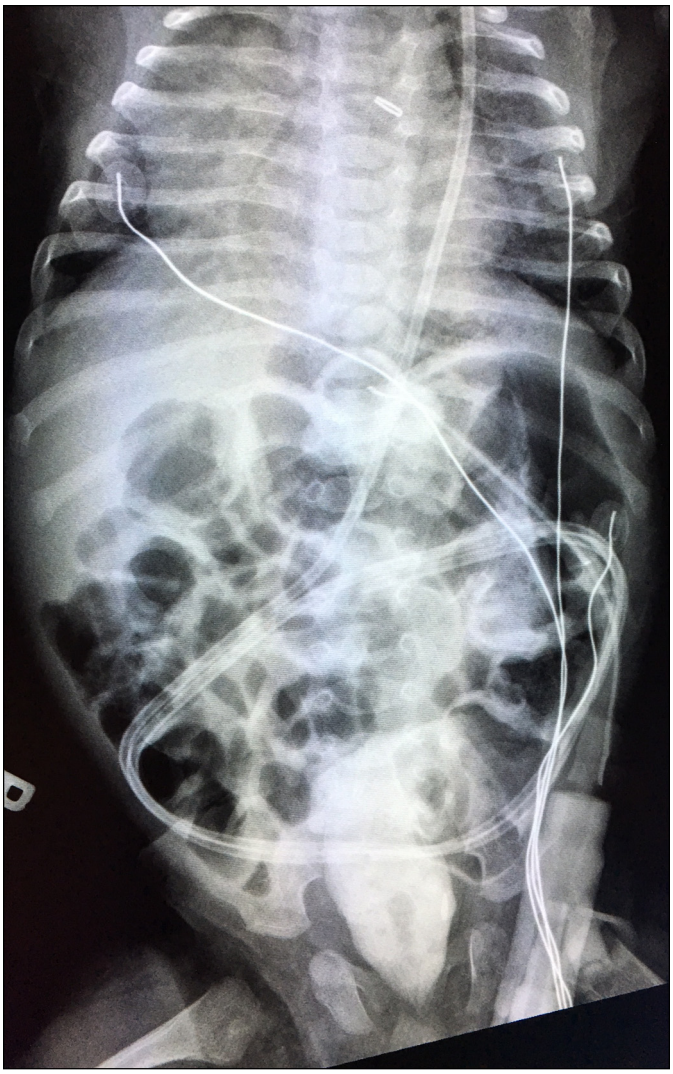

Figure 1. Frontal radiograph, initially interpreted as negative for discontinuity, demonstrating superimposition of shunt catheter and gastrostomy tube.

The patient developed progressive irritability, increasing head circumference, and tensing of his fontanelle postoperatively. After magnetic resonance imaging demonstrated increased ventricular caliber, an x-ray shunt series was obtained (Figure 1). The study was interpreted as normal by the radiologist, and an abdominal ultrasound revealed no pseudocyst or excess of fluid within the abdomen. The shunt reservoir was accessed percutaneously and demonstrated excellent proximal flow of cerebrospinal fluid under high pressure.

On the basis of these findings, abdominal computed tomography (CT) was ordered to rule out distal shunt malfunction. CT with three-dimensional reconstruction demonstrated perforation of the shunt tubing by the gastrostomy (Figure 2). The entire shunt was removed and an external ventricular drain was placed. The patient was treated with empiric broad-spectrum antibiotics for presumed infection. After being cleared by the infectious disease team on postoperative day 6, he underwent reinsertion of his VPS. He had no signs of shunt or PEG infection or malfunction at his 1-year follow-up.

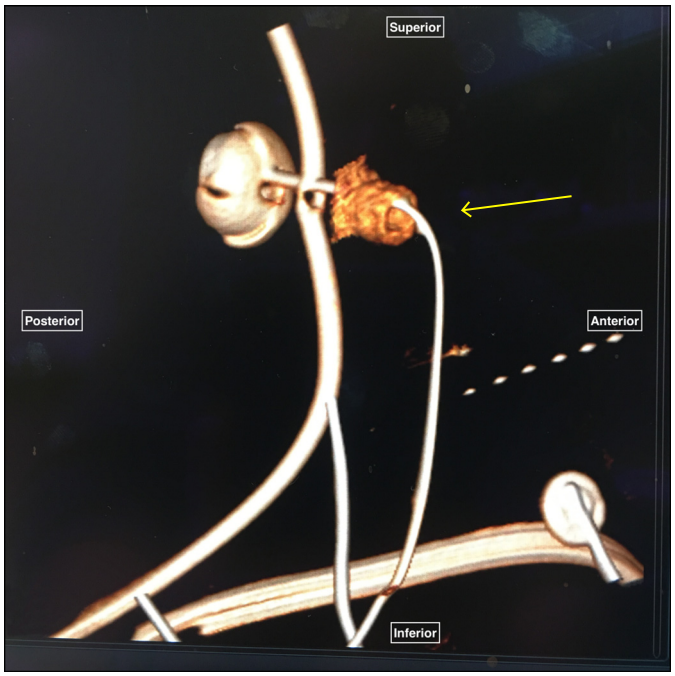

Figure 2. Three-dimensional reconstruction of the CT demonstrating direct perforation of the ventriculoperitoneal shunt tube by the gastrostomy tube on an oblique view. The arrow demonstrates the puncture site.

DISCUSSION

To our knowledge, this is the first description of shunt failure due to perforation of VPS tubing after PEG insertion. Despite this unusual occurrence, the most feared complication after PEG insertion in shunted patients is infection. Studies addressing whether PEG insertion leads to shunt infection have yielded conflicting results. A retrospective analysis of 55 adult and pediatric patients found that PEG placement in patients with a VPS did not result in an increased incidence of shunt infection.[6] The order of PEG and VPS placement was not found to affect the incidence of shunt infection. An analysis of 467 children receiving PEGs found that preexisting VPS was a risk factor for major complication (32% risk).[7] It is unclear how many of the complications were from infection. The risk of infection is obviated by administration of perioperative antibiotics.[8] While there may be a higher risk of infection in patients who undergo simultaneous PEG and shunt insertion, PEGs placed 4 weeks after shunt insertion do not appear to have increased rates of infection.[9]

Proceduralists must be aware of the course of any preexisting hardware prior to percutaneous procedures. This is especially

true in purely endoscopic techniques, where fluoroscopy is not used for guidance. In patients with VPS, the course of the distal tube should be marked out prior to cannulation of the gastrostomy to prevent inadvertent perforation. Preoperative plain radiographs should be available and reviewed at the moment of PEG insertion. Identifying the course of the distal catheter may be challenging in overweight children or in children who had their distal tubes tunneled subfascially. In cases where the distal tube is not readily identifiable, we recommend fluoroscopic localization of the tube prior to the procedure to prevent this complication. Other modalities such as transabdominal and endoscopic ultrasound (in older children) may also be useful. In extreme cases, alternative strategies such as open gastrostomy may be preferable.

PEG placement in patients with an indwelling VPS requires additional surgical planning to prevent inadvertent perforation of the shunt tubing at the time of gastric cannulation. Careful study of preoperative imaging, thorough physical examination, and communication between multidisciplinary teams may help to avoid this rare complication. Signs and symptoms of shunt malfunction in the setting of a recent abdominal procedure should raise the question of whether there is disruption of the distal end of the shunt.

DISCLOSURES

Author contributions: AC Vivas and GF Tuite wrote and edited the manuscript. M. Wilsey, JK Potthast, and GF Tuite acquired and interpreted the data. GF Tuite is the article guarantor.

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Informed consent was obtained for this case report.

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REFERENCES

1. Gauderer MWL, Ponsky JL, Izant RJ. Gastrostomy without laparotomy: A percutaneous endoscopic technique. *J Pediatr Surg*. 1980;15:872–5.
2. Grant JP: Comparison of percutaneous endoscopic gastrostomy with Stamm gastrostomy. *Ann Surg*. 1988;207:598–603.
3. Ponsky JL, Gauderer MW, Stellato TA, Aszodi A. Percutaneous approaches to enteral alimentation. *Am J Surg*. 1985;149:102–5.
4. Baird R, Salasidis R. Percutaneous gastrostomy in patients with a ventriculoperitoneal shunt: Case series and review. *Gastrointest Endosc*. 2004;59:570–4.
5. Glaser D, Mason AT, de Tarnowsky GO. "Push and pull" technique for percutaneous endoscopic gastrostomy. *Gastrointest Endosc*. 1986;32:245.
6. Roeder BE, Said A, Reichelderfer M, Gopal DV. Placement of gastrostomy tubes in patients with ventriculoperitoneal shunts does not result in increased incidence of shunt infection or decreased survival. *Dig Dis Sci*. 2007;52:518–22.
7. Vervloessem D, van Leersum F, Boer D, et al. Percutaneous endoscopic gastrostomy (PEG) in children is not a minor procedure: Risk factors for major complications. *Semin Pediatr Surg*. 2009;18:93–7.
8. McSweeney ME, Kerr J, Jiang H, Lightdale JR. Risk factors for complications in infants and children with percutaneous endoscopic gastrostomy tubes. *J Pediatr*. 2015;166(6):1514–9.
9. Taylor AL, Carroll TA, Jakubowski J, O'Reilly G. Percutaneous endoscopic gastrostomy in patients with ventriculoperitoneal shunts. *Br J Surg*. 2015;88:724–7.