Small bowel injury during percutaneous nephrostomy tube placement causing small bowel obstruction

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Direct small bowel injury is an exceedingly rare complication of percutaneous nephrostomy tube placement. In this report, we present a case of inadvertent injury to the small bowel during percutaneous nephrostomy tube placement with subsequent development of small bowel obstruction. We reviewed the literature to determine the risk factors and appropriate management of small bowel injuries as a result of such a procedure.

Key Words: small bowel injury, percutaneous, nephrostomy, complications

Introduction

Percutaneous nephrostomy tube placement is a widely accepted and generally safe method for urinary diversion in obstructed patients. Complications are rare but include hemorrhage, sepsis, pneumothorax, and injury to adjacent organs.[1] Damage to intraperitoneal organs is exceedingly infrequent during this procedure. However, several case reports have described injury to the colon during tube placement, whereas few have reported injury to the small bowel. We report a case of small bowel injury during percutaneous nephrostomy tube placement for obstructive acute renal failure.

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Case report

A 72-year-old female presented to the emergency department with a 1 week history of low back pain, left lower quadrant tenderness, and difficulty urinating with increased frequency. Her past medical history was significant for breast cancer 1 year status post lumpectomy and radiation therapy. She was found to have acute renal insufficiency with markedly elevated serum blood urea nitrogen (BUN), creatinine, and potassium levels. Non-contrast computed tomography (CT) of her abdomen and pelvis demonstrated a large pelvic mass likely of ovarian origin given her elevated levels of CA-125. The mass was found to be extrinsically compressing the ureters bilaterally causing severe hydroureteronephrosis. At that time, the decision was made by gynecologic oncology to place bilateral nephrostomy tubes in order to preserve renal function.

Using ultrasound guidance, the interventional radiologist achieved percutaneous access into both kidneys. 8.5 French by 24cm nephroureteral stents were placed bilaterally and antegrade pyelography confirmed proper placement. Subsequently, both sites drained adequate amounts of urine and her serum creatinine and potassium levels normalized.

On postprocedure day 5, the patient developed signs and symptoms of small bowel obstruction. CT of the abdomen confirmed interval development of small bowel obstruction without a clear transition point. Given the absence of prior abdominal surgery, it was believed by the radiologist and the patient's gynecologic oncologist that the obstruction developed secondary to metastatic implant from the pelvic mass. Upon determination by the gynecologic oncologist that her primary pelvic mass was potentially resectable, she promptly underwent an exploratory laparotomy, total abdominal hysterectomy, bilateral salpingo-oophorectomy, omentectomy for cancer staging, as well as an attempted resection of both the pelvic and bowel masses that were thought to be obstructing the upper urinary and gastrointestinal tracts respectively. Intraoperatively, however, it was discovered that the cause of her small bowel obstruction was not an implanted metastasis. Rather the lesion was found to be a through and through injury of the jejunum by the right nephroureteral tube, Figure 1. The bowel was otherwise free of disease. Therefore, an enterotomy was made by the gynecologic surgeon freeing the bowel from the tube and the bowel was primarily repaired. Unfortunately, her cancer was too widespread for complete resection or optimal debulking and the abdomen was closed.

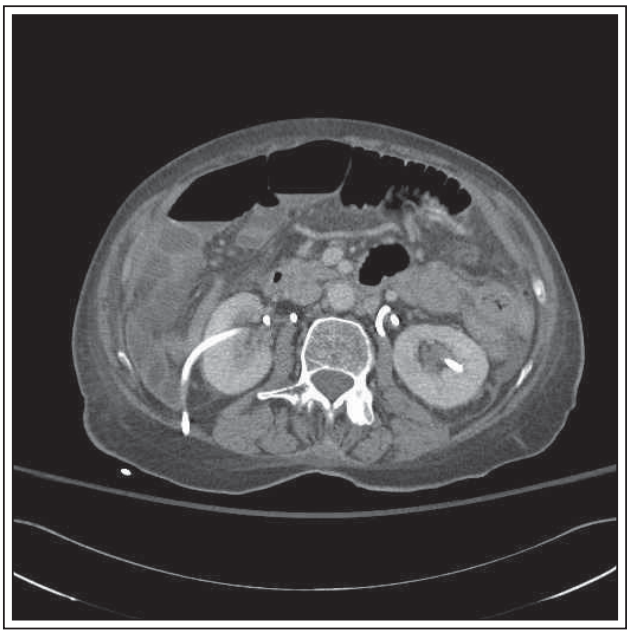

Figure 1. Abdominal CT displays right percutaneous nephroureteral stent coursing through a portion of small bowel.

Recovery from the operation was uneventful. She promptly resumed a regular diet and passed gas and had a bowel movement within 2 days postoperatively. The patient was discharged on postoperative day 6 to a rehabilitation facility with bilateral nephroureteral tubes intact.

Discussion

Percutaneous nephrostomy is a viable option for treatment of malignant extrinsic ureteral obstruction as well as emergent obstruction from urolithiasis. The complications associated with this procedure are rare and typically minimal. The major complication rate for percutaneous nephrostomy is reported as less than 4% overall.[1] Sepsis is among the most serious complications of this procedure and may occur as a result of a contaminated operation, improper wound care during the immediate postoperative period, or bacteremia from placement. Adjacent organ injury is another potential complication, one that is particularly rare. Organs that may be involved include the spleen, small and large bowel, liver, and pleura. The potential for adjacent organ damage depends on the approach taken (supracostal versus subcostal), the patient's body habitus, the amount of manipulation required to obtain access to the kidney, and the size of the nephrostomy tract needed for adequate drainage.[2]

Injury to the bowel is a particularly infrequent complication reported in less than 0.5% of cases.[3] The majority of bowel injuries occur in the ascending and descending colon due to their proximity to the kidneys in the retroperitoneal space (retrorenal colon). Colon injuries are typically recognized at the time of placement, and the tube is left in place as a colostomy tube while a separate percutaneous nephrostomy tube or ureteral stent is placed. Broad spectrum antibiotics are initiated, and both the urinary and digestive tracts are imaged at 1 week (nephrostogram/retrograde pyelogram and colostogram); tubes are removed depending on results of imaging.

Iatrogenic small bowel injuries during nephrostomy placement are extremely uncommon. In the cases reported, the majority of puncture sites occur in retroperitoneal segments of the duodenum. These injuries typically occur on the right side with placement of the tube through the kidney into the duodenum; optimal management is thought to involve

"de-vancing" the tube into the renal pelvis and initiating total parenteral nutrition with bowel rest. The presentation of small bowel injuries from nephrostomy tube placement is similar to findings after large bowel injury. The presentation can range from subtle findings such as low grade fever, ileus, and leukocytosis to severe symptoms such as fecaluria, pneumaturia, rectal bleeding, and peritonitis. The onset of symptoms also varies from immediate to gradual. Complications from injuries to the small bowel include septicemia, fluid and electrolyte imbalance, malnutrition, and obstruction.

Small bowel injuries can either be managed conservatively or operatively depending on the nature of the injury. Gerspach and colleagues demonstrated success in managing such injuries conservatively with bowel rest, parenteral nutrition, and proper wound care alone.[2] Tan and colleagues described factors necessitating operative intervention including distal obstruction, radiation enteritis, cancer, foreign body in the tract and local inflammation.[4] In our case, clinical obstruction with a foreign body traversing the segment of bowel necessitated operative repair. The nephrostomy tube injury was not recognized on initial CT scan; if that injury had been recognized, exploration would have been advisable even without the indication to explore based on treatment of gynecologic malignancy.

Conclusions

We report a case of small bowel injury during percutaneous nephrostomy tube placement for malignant extrinsic ureteral obstruction. This is an extremely rare complication of what is generally considered to be a safe and effective procedure. The patient developed a clinical small bowel obstruction necessitating exploratory laparotomy and separation of the nephroureteral tube from intestine. Potential factors that may have led to this rare occurrence include distorted abdominal anatomy from advanced gynecologic malignancy and an anterior trajectory of the nephrostomy needle taken by the operator. This case illustrates how both patient and technical factors can impact the risk of bowel injury during this procedure. □

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