CLINICAL VIGNETTE

A Case of Non-Surgically Managed Bowel Perforation

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A 58-year-old woman without significant past medical history presented to an outside hospital with pain localizing to her lower abdomen, nausea, and vomiting. In the emergency department (ED) she had a temperature of 100 degrees Fahrenheit (F), leukocytosis of 15×10^9/L, hyponatremia of 130 mmol/L, and hypokalemia of 2.7 mmol/L. Physical exam revealed moderate distress and tenderness to palpation over the right lower quadrant of her abdomen. Initial computed tomography scan (CT) of her abdomen and pelvis was concerning for enteritis, although appendicitis could not be ruled out. Her COVID swab was negative and she was admitted, made nil per mouth (NPO), started on intravenous (IV) fluids while possible infectious etiologies were being evaluated. Blood cultures, urine and stool samples were initially unrevealing. Despite treatment with broad spectrum IV antibiotics, her symptoms persisted and repeat CT imaging showed worsening of her enteritis, small bowel dilatation and possible secondary colitis. The patient was transferred to our hospital for further management.

Upon arrival, the gastroenterology service was consulted and recommended continued evaluation for presumed infectious causes of enteritis. On day three of hospitalization, CT imaging from the outside hospital was re-examined by our radiologist and raised "suspicion for perforated appendicitis. Enteritis in the terminal ileum, and small bowel obstruction or ileus." Repeat CT revealed ruptured appendicitis with an enlarging peri-appendiceal abscess and partial small bowel obstruction (Figures 1 and 2). General surgery service was consulted and after discussion with the patient the decision was made to proceed with non-operative management given that the she was hemodynamically stable and had no evidence of significant peritonitis. Interventional Radiology (IR) was then consulted for percutaneous drainage of the abscess. Initial drain placement was attempted on day four but no safe window was visualized and the procedure was aborted. The next evening of day five, a 10 French (Fr) all-purpose drain loop catheter was successfully placed into the pelvic abscess without any noted complications. The evening after tube placement (day six), the patient noted new onset of more severe diffuse abdominal pain associated with flushing of the drain. The quality of the drain output also changed from serosanguinous to bilious. Repeat CT imaging noted "interval percutaneous drain placement, the drain traversing a small bowel loop, and there was opacification of this loop upon contrast injection of the catheter." Given the drain's malposition and likely iatrogenic small bowel perforation, a multidisciplinary discussion was conducted with IR, general surgery, the medicine team and the patient. The decision was made to keep the drain in place as it was still draining the fluid collection and allow for spontaneous closure of the perforation. On day seven, total parenteral nutrition (TPN) was started. The patient was observed for several days and remained clinically stable. On the tenth day of hospitalization, general surgery began the process of slowly removing the drain by 1-1.5 cm per day. Two days later, repeat CT showed the IR drain in the subcutaneous tissue and it was removed. On day thirteen, repeat CT showed a tiny defect along the posterior wall of a loop of proximal ileum in the mid abdomen with trace high density mesenteric fluid suggestive of leaked contrast. This was considered clinically insignificant given her overall stability. Clear liquids were started and advanced cautiously until the patient tolerated a regular diet. TPN was discontinued. IV antibiotics were discontinued on day 18 and the patient was discharged to have follow up with her Primary Care Physician and general surgery. She will have a CT Abdomen/Pelvis six weeks after drain removal and GI referral to rule out underlying neoplasm as cause for the initial perforation.

Discussion

For over forty years, imaging-guided percutaneous drainage has been a less invasive treatment for intra-abdominal fluid collections. In well trained hands, it is regarded as safe, reliable and effective. Undrained abdominal abscesses can have reported mortality of up to 35%.[1] Avoidance of general anesthesia, reduced hospital length of stay, and limiting trauma to the surrounding tissue are some of the major advantages of this approach. While sometimes used as a short-term treatment before surgery, image-guided percutaneous drainage is routinely used as the primary treatment for several intra-abdominal fluid collections including, but not limited to, hepatic abscesses, pancreatitis-associated fluid collections, retroperitoneal and intramuscular fluid collections, and bowel-related fluid leaks/abscesses, such as in our patient.[2] Owing to the superior anatomic detail and better localization of a fluid collection, computed tomography (CT) is the best imaging modality for the detection of abscesses/fluid collections within the abdomen and pelvis and their relationship to nearby structures. Finding radiographically high attenuation fluid or the presence of gas inside a collection are reliable indicators of infection.[3] The choice of access route to the fluid collection should follow the shortest possible path to the fluid, avoid all vital structures, and provide the least intrusive location for the

patient for comfort and subsequent drain management. When managing primary abnormal intraabdominal fluid, small collections (<3 cm) are often treated with antibiotics alone.[4] Percutaneous drainage of appendicitis complicated with abscesses has shown to significantly reduce complication rates.[5] As with our patient, percutaneous drainage of perienteric collections, even in the setting of a postoperative anastomotic leak or perforation, have been shown to decrease the length of hospital stay and reduce the need for surgical intervention.[5] In cases with persistent collections despite drainage, management options could include catheter manipulation and catheter upsizing. Small intestinal bowel perforations can be caused by both iatrogenic and non-iatrogenic causes, with the most commonly cited iatrogenic causes being laparoscopic abdominal surgeries and endoscopy.[6] Patients may present with immediate abdominal pain or acute pain that is localized based on perforation site (i.e. back pain from retroperitoneal perforation). Perforation of the upper gastrointestinal tract may irritate the diaphragm and lead to referred shoulder pain. In patients that present sub-acutely complications such as abscess/ phlegmon and fistula formation may also be present especially in patients with underlying Crohn's Disease. There should be a high degree of suspicion for perforation in patients that present with acute chest or abdominal pain after surgery or instrumentation.

Our patient did not present with a classic presentation of abdominal pain immediately after a procedure, but noted the onset of severe pain when her drain was flushed. In addition, the drain output changed from serosanguineous to bilious alerting the team to the possibility of drain malplacement. Given our patient's overall clinical stability, essentially contained perforation and evidence that the fluid collection was decreasing in size on repeat scans, she was managed conservatively. After removal of the tube, the patient had an uneventful recovery and was discharged to have follow up with outpatient surgery. Two weeks after discharge she saw general surgery and continued to be clinically stable.

Figures

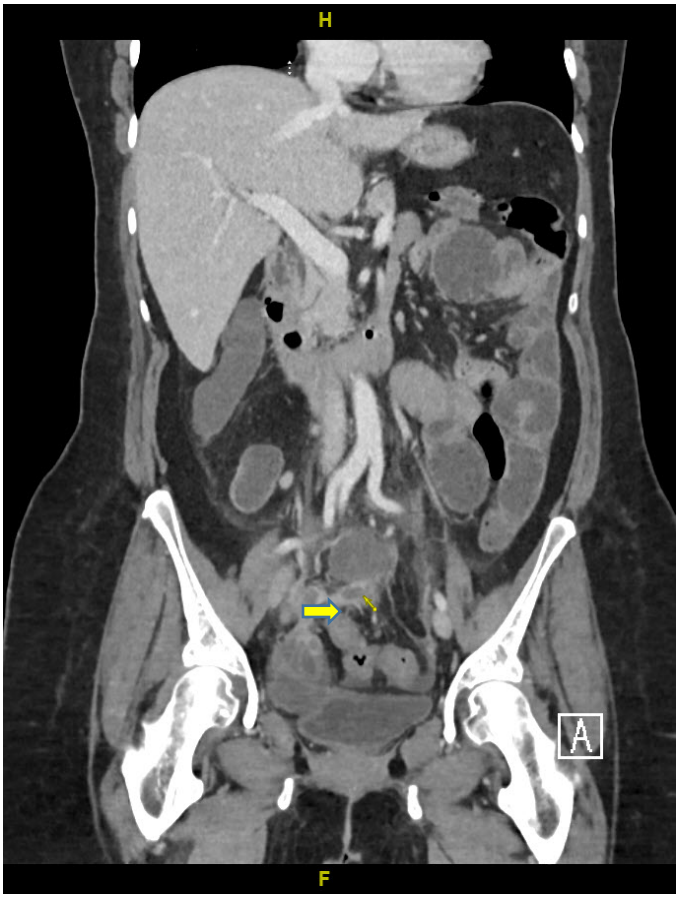

Figure 1: Contrast enhanced CT coronal view of the abdomen and pelvis showing the appendiceal base as markedly thickened and enhancing. The lumen is dilated and fluid-filled and there appear to be several areas of discontinuity of its wall (arrow).

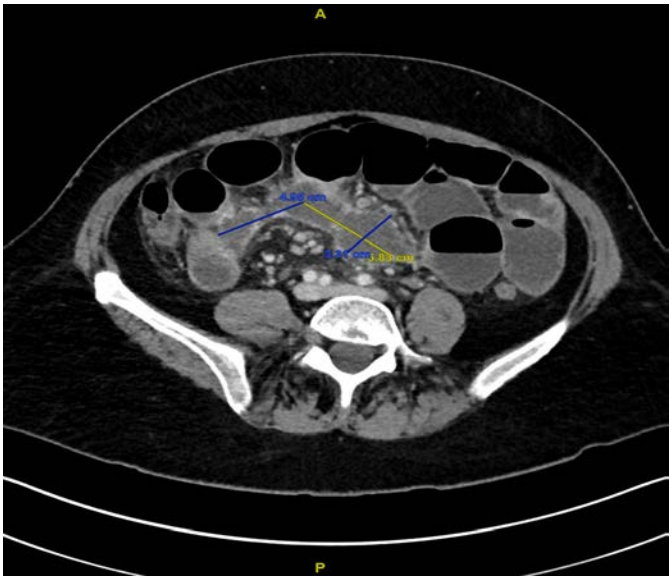

Figure 2: Contrast enhanced CT transverse view of the lower abdomen. Appendix associated fluid collection follows the course of the appendix into the right abdomen, the most cephalad component measuring approximately 10 x 3 cm and a caudad component measuring 5.83 x 4.95 cm. (See blue and yellow arrows)

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