Fat necrosis of transverse colon and necrotizing pancreatitis in a patient with acute lymphoblastic leukemia (ALL): cause of massive ascites and high fever

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We report a nine-year-old boy with acute lymphoblastic leukemia L3 (ALL-L3) and necrotizing pancreatitis in which necrosis was not limited to the pancreas. As our patient had a defective inflammatory process as a result of underlying malignant disease and neutropenia, the peripancreatic collection could not be limited and no pseudocyst was formed. In our patient, the unlimited inflammatory process and pancreatic secretions infiltrated the transverse mesocolon and transverse colon, leading to fat necrosis of the transverse colon, causing massive ascites and high fever. As there was no response to medical treatment, the success was achieved only by surgical resection. The infiltration of surrounding tissue and nearby organs by inflammation and fat necrosis in necrotizing pancreatitis has not been reported previously in a pediatric patient.

***Key words:** acute lymphoblastic leukemia, necrotizing pancreatitis, transverse colon, massive ascites, high fever, fat necrosis.*

Acute pancreatitis is the acute inflammation of pancreatic tissue, which can be caused by some chemotherapeutic drugs, like L-aspariginase[1]. In some patients with acute pancreatitis, the inflammation goes on with a diffuse or focal area(s) of nonviable pancreatic parenchyma, which is typically associated with peri-pancreatic fat necrosis. This pathology is called necrotizing pancreatitis[2]. The necrosis could spread to surrounding tissue[2-4]. We report a nine-year-old boy with acute lymphoblastic leukemia L3 (ALL-L3) and necrotizing pancreatitis in which necrosis was not limited to the pancreas. The inflammation and fat necrosis infiltrated the transverse colon and emerged as massive ascites and intractable high fever in the clinic. Although medical treatment was given, massive ascites and fever continued to progress and were only controlled by transverse colectomy. The infiltration of surrounding tissue and nearby organs by inflammation and fat necrosis in necrotizing pancreatitis has not been reported previously in a pediatric patient. Our patient is the first child reported in the literature.

Case Report

A nine-year-old male patient had been receiving chemotherapy since 2005 with a diagnosis of ALL-L3. L-asparaginase was also involved in the chemotherapy protocol. After chemotherapy, while neutropenic, the patient consulted our department with abdominal pain. Physical examination revealed mild distension and mild diffuse tenderness on the abdomen. Abdominal ultrasonography and computerized tomography (CT) were reported as nodular lesions in the pancreas, leukemic infiltration-like appearance throughout the transverse colon, intraperitoneal minimal ascites, and aortocaval lymphadenopathy (Fig. 1 a, b). As serum amylase level was 317 IU/L (normal levels: 28–110) and serum lipase level was 260 U/L (13– 60), meropenem, teicoplanin, caspofungin, and octreotide were

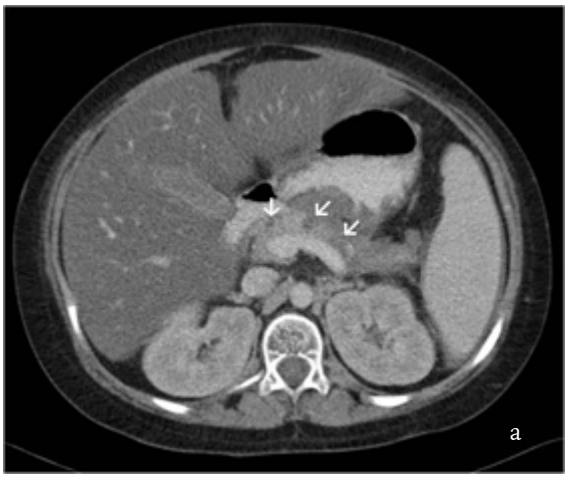
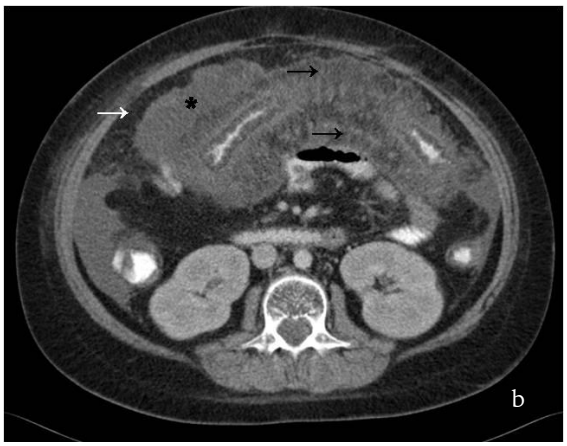


Fig. 1. a) CT portal phase images show cystic changes and edema in the pancreatic corpus and tail (white arrows). b) There is prominent soft tissue thickening surrounding the transverse colon (black arrows) and mass appearance at the omentum (black asterisk). Intraperitoneal fluid collections are also present (white arrow).



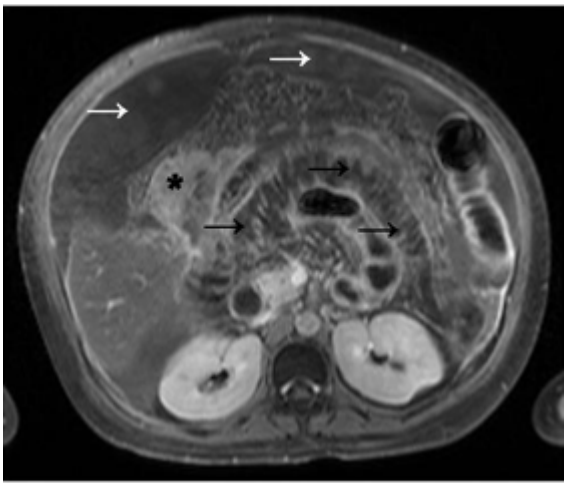


Fig. 2. Postcontrast MRI demonstrates thickening of the transverse mesocolon and omentum (black arrows). There is a contrast-enhanced soft tissue mass appearance at the omentum (black asterisk) and fluid collections in the peritoneal cavity (white arrow).

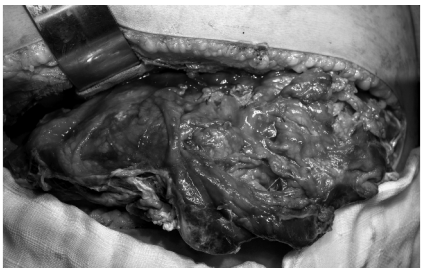


Fig. 3. Transverse colon, cologastric ligament and omentum were all stiffly adhered to each other, forming a dark-colored conglomerated mass with calcification loci and necrotic appearance. There were firm, fibrous adhesions between the intestines, gallbladder and liver surface. There was no fecaloid content or abscess formation.

started as medical treatment for pancreatitis. During the follow-up, abdominal magnetic resonance imaging (MRI) was reported as dilated pancreatic duct, heterogeneous lesion in the retroperitoneal region in the anterior-inferior neighborhood of the pancreas, which was thought to be a locus of a phlegmonous lesion, same-sized leukemic infiltration in the transverse colon, and intraabdominal massive ascites (Fig. 2). Tru–cut needle biopsy taken from the transverse colon was devoid of any living tissue and demonstrated necrosis. A peritoneal drainage catheter was placed due to increased ascites and respiratory distress during the follow-up. The catheter drained 2000–3000 ml ascites per day. Biochemical tests of ascites indicated pancreatic ascites. The ascites was brownish in color and contained particles. Amylase level was 20,240 IU/L and lipase level was 5077 U/L in ascites, while serum amylase level was 333 IU/L and serum lipase level was 373 U/L at the same time. In spite of long-course wide-spectrum antibiotic treatment, there was uncontrollable fever as high as 39.9°C. The patient was diagnosed as necrotizing pancreatitis. As medical treatment was unsuccessful, transverse colectomy and proximal colostomy with Hartmann pouch of the distal colon were done, and drainage catheters were placed in the field.

In the exploration, the patient's peritoneum was thick and hypervascular. There was massive, brownish in color intra-abdominal fluid. The transverse colon, cologastric ligament and

Fig. 4. Gross calcification loci were especially visual in the inferior aspect of the transverse colon.

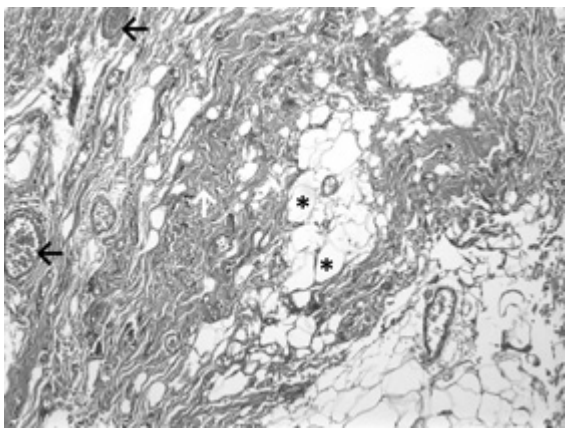


Fig. 5. Section through the transverse colon (hematoxylin&eosin, x100 magnification). Fibroadipose tissue (white arrow), vessels with congestion (black arrows), and cystic changes in fat cells (black asterisk) resembling fat necrosis are seen.

omentum were all stiffly adhered to each other, forming a dark-colored conglomerated mass with calcification loci and necrotic appearance (Fig. 3). Gross calcification loci were especially visual in the inferior aspect of the transverse colon (Fig. 4). There were firm, fibrous adhesions between the intestines, gallbladder and liver surface. There was no fecaloid content or abscess formation. The mesentery of the transverse colon was also necrotic and contained calcification loci. The transverse colon was isolated from its mesentery by tying and cutting its vascular components. In the regions in which the mesentery was necrotic (black-colored, spongy regions), the transverse colon was dissected bluntly without bleeding. The transverse colon was resected from the ascending colon at the level of the hepatic flexura, the proximal ascending colon was released from its mesentery while preserving circulation, and end-colostomy was made. The transverse colon was resected distally from the descending colon at the level of the splenic flexura, and the descending colon was closed as Hartmann pouch. The operation ended with a drain placed intra-abdominally.

Pathologic examination of transverse colon was reported as fat necrosis and granulation tissue (Fig. 5). The amount of drained ascites decreased in time and the drainage catheters were removed. Fever did not recur postoperatively. The postoperative follow-up was uneventful. One week later, serum amylase level was 34 IU/L and serum lipase level was 49 U/L. Soon after the operation, intensive chemotherapy was started and after eight months of therapy, maintenance chemotherapy for ALL-L3 was started. One year later, the colostomy was closed. The follow-up was uneventful.

Discussion

Chemotherapeutic-induced pancreatitis can be seen in patients with hematological or oncological pathologies[1]. In these patients, abdominal pain and other symptoms of the gastrointestinal system can be attributed to other pathologies, like the side effects of chemotherapeutic drugs, and diagnosis can be delayed. Although the inflammation and necrosis are limited to the pancreas, and pancreatitis recovers with medical treatment in most patients, in our patient, inflammation and necrosis infiltrated the surrounding tissue and the patient did not recover with medical treatment. This may have been a result of the defective immune system that failed to limit the inflammation. Generally, after acute or chronic pancreatitis, maturation of the acute inflammatory process limits the pancreatic damage and a pseudocyst is formed. Pseudocysts do not have an epithelium-lining wall, its wall consists of fibrous or granulation tissue[5,6]. As our patient had a defective inflammatory process as a result of the underlying malignant disease and neutropenia, the peripancreatic collection could not be limited and no pseudocyst was formed. The peripancreatic collection, collection of pancreatic secretions and the products of the inflammatory response can accumulate in a lesser sac and then by the Winslow foramen, the collection can spread to greater sac, causing ascites formation[2]. Also, in our patient, the unlimited inflammatory process and pancreatic secretions infiltrated the transverse mesocolon

and transverse colon, leading to fat necrosis of the transverse colon, causing massive ascites and high fever. As there was no response to the medical treatment, success was achieved only by surgical resection.

The mesentery of the transverse colon, transverse mesocolon, is attached to the anterior margin of the pancreas and contiguous with the pancreas[7]. Although seen rarely, the inflammatory process of the pancreas could spread through this connection[2,4,8-10]. Total severe colonic complications, such as bowel necrosis, pancreatic carcinoma resulting in intestinal obstruction, direct extension of pancreatic inflammation to the large bowel with stricture formation, and pseudocyst eroding into the splenic flexura, are reported in less than 1% of all patients admitted with pancreatic disease[8]. In our case, although the wall and pericolonic tissues were affected by the inflammation and necrosis, the lumen of the transverse colon was open but narrow with normal feces passage. There are a limited number of cases reported with extension of the inflammatory process of pancreatitis though the transverse mesocolon to the transverse colon, and these are in the adult age group[4, 8-10]. We did not encounter any case in the pediatric age group in the English literature. Our patient is the first such child reported.

The mass infiltrating the transverse colon was first thought to be leukemic infiltration. Although rare, in patients with ALL, leukemic cells can also infiltrate any organ, including the pancreas[11]. However, in our case, the pathological examination of excised tissue ruled out this probability. Leukemic infiltration is mostly confused with superposed infection of the tissue, and for a differential diagnosis, tissue sampling is needed. In our patient, Tru-cut biopsy was done to define the nature of the mass, but the sample that was taken was inadequate for diagnosis. We thus had suspected leukemic infiltration until the operation.

As the patient's general condition was poor, we followed him with medical treatment for 45 days before deciding surgical intervention. The disease progressed over time in spite of treatment – the ascites increased and his fever continued. Eventually, surgery became unavoidable for both diagnosis and treatment. Postoperatively, the ascites decreased, fever did not recur, and the patient completed ALL therapy.

Pancreatitis can be seen after chemotherapy, especially that containing L-asparaginase. In our patient, necrotizing pancreatitis was seen after chemotherapy. The defective immune system of the patient caused the spread of the inflammatory process of pancreatitis to the transverse mesocolon and transverse colon, and presented as massive ascites and high fever. Medical treatment was unsuccessful, and transverse colectomy was done. After the operation, the patient was cured and continued his ALL treatment. After the treatment, the colostomy was closed. A limited number of similar cases have been reported in the adult age group; however, infiltration of the transverse mesocolon and transverse colon in necrotizing pancreatitis has not been reported previously in the pediatric age group.

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