The Management of Iatrogenic Chylous Ascites

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Iatrogenic chylous ascites, although extremely rare, appears to follow direct lymphatic injury during intra-abdominal surgery or to be due to specific postoperative complications such as pancreatitis. Statistically, truncal vagotomy has produced the largest number of cases. Any noticeable lymphatic injuries at the time of surgery should be controlled with appropriate sutures or clips. If iatrogenic chylous ascites develops postoperatively, a course of conservative treatment including multiple paracenteses should be tried for several weeks if reasonable nutritional balance can be maintained. If fluid volume does not diminish or the patient's nutritional status is jeopardized, early exploration should be undertaken. A lipophilic dye instilled into the duodenum immediately before operation can help to locate the leak. Simple oversewing of the injured area is curative.

Chylous ascites, a relatively rare condition, usually reflects abdominal or retroperitoneal lymphatic involvement by neoplastic or inflammatory processes, but it may complicate pregnancy, nephritis, obstruction of the thoracic duct by aortic aneurysm, and other seemingly unrelated thoraco-abdominal problems. Persistent chylous ascites following intra-abdominal surgery is exceedingly rare with only eight cases reported in the English literature. For this reason, a further case is presented with a review of the pertinent literature.

Case Report

This 52-year-old Caucasian man had a 14-year history of progressive renal failure secondary to polycystic kidney disease. During mid-December 1971, he experienced a particularly severe exacerbation of chronic alcoholic pancreatitis complicated by a right pleural effusion. This episode cleared with conservative treatment and the pleural effusion did not recur following thoracentesis.

On March 17, 1972, the patient was admitted with a three-day history of nausea, vomiting, left flank pain, and gross hematuria. Moderately severe hypertension was treated with hydralazine and guanethidine. After a left wrist arteriovenous fistula had been created, he was placed on a hemodialysis program preparatory to elective bilateral nephrectomy, which was performed on May 31, 1972. Removal of the right kidney was uneventful. After the left kidney had been mobilized, bleeding around the tail of the pancreas was encountered. To define the site of injury, the distal portion of the pancreas was elevated and multiple bleeding points were oversewn. The surgeon later stated that no obvious lymphatic leaks or unusual fluid accumulations were present during abdominal closure.

For the first three postoperative days, pneumococcal pneumonia and bibasilar atelectasis were treated with intravenous penicillin and vigorous respiratory therapy. Hemodialysis was restarted every other day without problems. On the 13th postoperative day, a small right pleural effusion was noted on routine chest x-ray, but the patient remained symptom free. Shortly thereafter, he developed watery diarrhea, anorexia, and fever, but these were not accompanied by any signs of intra-abdominal pathology. Elevated amylase and lipase levels fell to normal over the next week without...
specific treatment. Fatigue and exertional dyspnea gradually developed and a chest x-ray taken on the 23rd postoperative day revealed a large right pleural effusion (Figure 1). Thoracentesis produced 3500 mls of a milky-white fluid containing chylomicrons. Biochemical determinations performed on this fluid and blood are presented in Figure 2. In an attempt to control the recurring chylothorax, several nutritional regimens were tried, including a low fat diet, medium chain triglycerides and intravenous hyperalimentation. These diets successfully lowered the lipid content of the fluid but failed to reduce its rate of production. On July 7, 1972, ascites was noted for the first time. Paracentesis produced chylous fluid with a biochemical composition similar to that of the pleural fluid. Examinations for tuberculosis, fungi, and neoplastic cells were unproductive. Ten cc of Evans Blue instilled percutaneously into the peritoneal cavity could be recovered from the right chest by thoracentesis within 24 hours. This maneuver demonstrated conclusively that the chylous material originated within the abdomen.

At this point the patient refused abdominal exploration. Over the next four months, reasonable nutritional balance was maintained through hyperalimentation during dialysis despite an accumulated loss of over 84 liters of chylous fluid through numerous thoracenteses. However, after the patients had several bouts of transiently incarcerated ventral hernia during periods of excessive ascites formation, he gave permission for surgery. December 29, 1972, 5 gms of a lipophilic dye, Sudan Black B, mixed with cream were instilled through a Cantor tube into the duodenum approximately two hours before operation. When the abdominal cavity was entered through the old scar, essentially no adhesions were encountered. After all unstained chylous fluid had been aspirated, no obvious leak could be seen. However, approximately four hours after the dye was instilled, a faint-blue discoloration was noted around the inferior-lateral border of a firm nodular pancreas. The leak occurred from several lymphatic channels (approximately 1-3 mm in diameter) which were oversewn with multiple sutures.

Observation of the operative field for 30 minutes revealed no further leakage.

The postoperative course was complicated by a fulminant right parotitis controlled with antibiotics and cold packs. Although the ascites did not recur, six further thoracenteses were required over a three-month period to drain straw-colored, nonchylosous effusions. Approximately one year after bilateral nephrectomy, a renal transplant from a living sibling was performed without difficulty. As of September, 1975, renal function remained satisfactory. There was no physical or x-ray evidence of pleural or abdominal fluid collections (Figure 3).

**Discussion**

Several detailed studies of lymphatic anatomy in man have demonstrated its great variability. Classically, lymphatic channels draining the gastrointestinal tract, the lumbar region, and the lower intercostal spaces join in the midline anterior to the vertebral bodies of T-12, L-1 and L-2 to form the cisterna chyli. Its cephalic projection, the thoracic
Iatrogenic Chylous Ascites

duct, passes through the aortic diaphragmatic hiatus between the aorta and the azygos vein to terminate eventually in the venous system at the left internal jugular-innominate vein junction. However, in a large series of dissections, no discrete structure corresponding to the cisterna chyli could be demonstrated. Instead, lymphatic vessels of the abdominal viscera and supporting structures spread out in a network over the upper lumbar and lower thoracic vertebrae to form the thoracic duct. Fortunately, very few intra-abdominal procedures require extensive dissection that could directly injure these larger, confluent vessels. Aberrant channels, however, although relatively uncommon, can be found in strategic points of many commonly performed intra-abdominal procedures. For example, in the collected series of iatrogenic chylous ascites, including this report (Table I), three of nine cases involved injury to a lymphatic structure during truncal vagotomy. In two of these three instances, reoperation was required, and a sizable leaking lymphatic structure was found either anterior or lateral to the gastroesophageal junction. In the remaining cases, no specific pattern of injury could be discerned although seemingly large dissections were required in most.

In all cases where stated, iatrogenic chylous ascites developed within the first six postoperative weeks, with approximately half appearing in the first three weeks. According to Nix, confirmation of chylous effusion should involve documentation of one or more of the following criteria: 1) fat content of abdominal fluid higher than plasma; 2) protein content of fluid approximately half that of plasma; 3) free fat microscopically; and 4) definite lymphatic leak demonstrated at laparotomy or autopsy.

Although three of the nine patients responded to one or more paracenteses over a 15-71 day period with eventual, definitive control, most cases (67%) required operative intervention. In one patient, the right saphenous vein was transposed to the peritoneal cavity but failed to decompress the ascites, which subsided spontaneously several months later. In the other reoperated patients, the offending leak was controlled with suture ligatures or clips. The average time between causative and corrective procedures was 12 weeks with a range of 15 days to seven months.

In our patient, the etiology of the leak was uncertain. Injury to lymphatic drainage around the tail of the pancreas could have occurred at the time of left nephrectomy or following postoperative pancreatitis with autolysis of these channels and subsequent leak. It is clear that the chylous ascites followed a path of drainage into the right chest established by an earlier bout of pancreatitis in December, 1971. A detailed inspection of the diaphragm during laparotomy failed to demonstrate any gross defect that would account for this preferential drainage.

To help localize the site of lymphatic leak at the time of reexploration for this problem, lipophilic dyes such as Sudan III, Drug and Cosmetic Red #17-18, Green #6, or Sudan Black B can be instilled with fat-rich solutions into the proximal small bowel through a suitably placed intestinal tube. The lipophilic dyes absorbed with the fatty substances eventually enter the lymphatic drainage of the gut and hopefully escape through the injured portion of the system. Sudan III and the Drug and Cosmetic Red dyes stain lymph varying shades of pink and can easily be confused with collections of blood in the operative field. Because Sudan Black B stains lymph a light-blue color, it offers a better contrast and is, therefore, preferred. The time interval between instillation of this dye into the duodenum and its subsequent appearance at the site of leak varies between two and four hours. An alternative but potentially less rewarding method of identifying lymphatic leaks requires the injection of Evans Blue into the base of the mesentery or in local lymphatic plexuses.

Fig. 3
Chest x-ray several months after operative correction of iatrogenic chylous ascites.
TABLE I
Reported Patients with Iatrogenic Chylous Ascites

<table>
<thead>
<tr>
<th>Author</th>
<th>Age</th>
<th>Sex</th>
<th>Underlying Disease(s)</th>
<th>Causative Operation</th>
<th>Interval to Development of Chylous Ascites</th>
<th>Interval Between Causative &amp; Corrective Operations</th>
<th>Structure Injured</th>
<th>Treatment</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boyd²</td>
<td>7F</td>
<td>F</td>
<td>congestive splenomegaly, splenectomy, bleeding varices</td>
<td>inferior mesenteric vein-renal vein shunt</td>
<td>2 weeks</td>
<td>-</td>
<td>-</td>
<td>single paracentesis</td>
<td>complete resolution</td>
</tr>
<tr>
<td>Kelley⁷</td>
<td>19F</td>
<td>F</td>
<td>congenital malrotation of colon</td>
<td>correction of malrotation</td>
<td>“developed immediately after operation”</td>
<td>N S</td>
<td>Injury to lymphatic &amp; venous drainage of bowel</td>
<td>right saphenous vein transposed to peritoneal cavity; multiple paracenteses</td>
<td>resolution after 8 months</td>
</tr>
<tr>
<td>Cox⁵</td>
<td>43F</td>
<td>M</td>
<td>obstructing duodenal ulcer</td>
<td>truncal vagotomy, pyloroplasty</td>
<td>40 days</td>
<td>-</td>
<td>-</td>
<td>multiple paracenteses</td>
<td>resolution over a 10-week period</td>
</tr>
<tr>
<td>Walker³</td>
<td>37M</td>
<td>M</td>
<td>chronic relapsing pancreatitis; pseudocyst</td>
<td>pancreato-duodenectomy</td>
<td>4 weeks</td>
<td>-</td>
<td>-</td>
<td>multiple paracenteses</td>
<td>resolution over a 7-week period</td>
</tr>
<tr>
<td>Bradham³</td>
<td>71M</td>
<td>M</td>
<td>abdominal aortic aneurysm</td>
<td>resection</td>
<td>3 weeks</td>
<td>8 weeks</td>
<td>multiple small lymphatics to the left of the proximal anastomosis</td>
<td>multiple paracenteses; multiple ligatures &amp; clips</td>
<td>cure</td>
</tr>
<tr>
<td>Clain⁴</td>
<td>43M</td>
<td>M</td>
<td>chronic duodenal ulcer</td>
<td>truncal vagotomy, pyloroplasty</td>
<td>4 weeks</td>
<td>10 weeks</td>
<td>large lymphatic vessel to the right of gastroesophageal junction</td>
<td>multiple paracenteses; multiple ligatures &amp; clips</td>
<td>cure</td>
</tr>
<tr>
<td>Musgrove⁶</td>
<td>40F</td>
<td>M</td>
<td>chronic duodenal ulcer, cholecystitis &amp; lithiasis</td>
<td>truncal vagotomy, pyloroplasty, cholecystectomy</td>
<td>one week</td>
<td>9 days</td>
<td>lymphatic channel with leak on anterior surface of gastroesophageal junction</td>
<td>suture ligature</td>
<td>cure</td>
</tr>
<tr>
<td>Ikard⁶</td>
<td>29M</td>
<td>M</td>
<td>recurrent pancreatitis</td>
<td>sphincteroplasty, bilateral celiac ganglioneuroma</td>
<td>N S</td>
<td>N S</td>
<td>cisterna chyli, medial &amp; posterior to the aorta just caudal to left renal vein</td>
<td>multiple paracenteses; oversewing of leak</td>
<td>cure</td>
</tr>
<tr>
<td>Lewis</td>
<td>52M</td>
<td>M</td>
<td>polycystic kidney disease, pancreatitis</td>
<td>bilateral nephrectomy</td>
<td>3 weeks</td>
<td>7 months</td>
<td>several small lymphatic vessels at inferior-lateral pancreatic border</td>
<td>multiple paracenteses &amp; thoracenteses, oversewing vessels</td>
<td>cure</td>
</tr>
</tbody>
</table>

N S = not stated in report.
Iatrogenic Chylous Ascites

Addendum

Since this article was accepted for publication, a second case of iatrogenic chylous ascites has been successfully treated at Henry Ford Hospital.

A 33-year-old Caucasian woman underwent laparotomy for an abdominal mass five years prior to admission. At laparotomy, a nonresectable tumor was found in the mesentery of the small intestine. Biopsy was consistent with a benign neurofibroma. In the postoperative period, abdominal distension developed and paracentesis produced chylous fluid. In the interim she was treated with a low fat diet, medium chain triglycerides, and diuretics, but the ascites was poorly controlled.

On April 23, 1979 a peritoneo-venous shunt* (flow rate category 40-49 ml/min) was placed from the right lower quadrant through the right sapheno-femoral junction with the distal end of the device at the level of the right atrium. Her chylous ascites has since been controlled by this shunt.

When iatrogenic chylous ascites develops secondary to disruption of specific intra-abdominal lymphatics, laparotomy with oversewing of the involved channels is preferable. However, when chylous ascites results from disruption of the lymphatic channels secondary to neoplastic or inflammatory intra-abdominal problems, a peritoneo-venous shunt might offer the greatest chance of control.

* Denver Peritoneo-Venous Shunt, Denver Biomaterials, Inc, Englewood, CO 80150

References