A STUDY OF MESENTERIC CYSTS*

WITH A REPORT OF TWO RECENT CASES

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In an attempt to bring the subject of mesenteric cysts up to date I have reviewed the literature since 1920 which included 129 case reports. There were probably an additional nine or ten cases, the articles of which were not available. I also submit two successfully operated cases from the records of the Children's Hospital.

History and frequency.—The first case was observed in 1507 by Benevieni, a Florentine anatomist, who accidentally found a mesenteric cyst at autopsy and characterized it as an anatomical curiosity. In 1803 Portal classified these cysts. Rokitansky in 1842 first described a chylous cyst at autopsy. In 1880 Tillaux successfully operated on a cystic mesenteric tumor. Pean in 1883 marsupialized such a tumor successfully and a little later Bramann, Kilian, Millard, and Marklen also treated similar cases surgically. In 1886 Augagneur found that eighteen out of ninety cases of mesenteric tumors were cystic. Arekion in 1891 referred to eighty-one case reports. In 1892 Braquehaye added twenty-three cases, thus making 104. Moynihan in 1897 added nine, and Dowd in 1900 added thirty-two, thus bringing the total published cases to 145. In 1906 Porter estimated the reported cases to be 200. Paskowski in 1912 collected thirty-one cases of dermoid tumors, twelve of which were in the mesentery of the large bowel and rectum, and a year later Mounier collected twenty cases of dermoid cyst of the mesentery. In 1912 Friend collected fifty-two cases of the chylous type and in 1913 Benedict supplemented this and brought the total to ninety-six cases of chylous mesenteric cyst. Carter in 1921 says there have been 200–300 case reports, Higgins and Lloyd in 1924 state about 250, and Flynn in 1930 judges 200–300 cases have been published.

Some writers have divided the history of these tumors into four periods: (1) 1507–1850, when the tumor was observed only at autopsy; (2) 1850–1880, when there was an occasional cyst found at operation, but no recoveries; (3) 1880–1900, when there were some cases of recovery after operation in which the cyst was accidentally found; (4) since 1900, when the condition was suspected and occasionally diagnosed.

Mesenteric tumors are the rarest tumors in the abdomen (Flynn, 1930). Of the true mesenteric tumors the cystic are four times more common than the solid neoplasms. Many text-books barely refer to the subject. A number of physicians of wide experience have neither operated nor seen a case. The majority of writers have been surgeons but a few were pathologists.

* Read before the Medical Society of the District of Columbia, December 16, 1931.

Most authors report a single case but several include two case reports and one author (DePena, 1924) recorded four cases.

It is difficult to estimate the number of reported cases to date. Up to 1900 there were 145 published cases and since 1920 I have reviewed 129 cases. It is fair then to judge that about 500 cases have been reported in the literature.

Etiology and classification.—Portal in 1803 first classified these tumors. In 1842 Rokitansky tried to prove their origin from degenerated lymph nodes. Braquehaye in 1892 classified mesenteric cysts according to their contents and in 1897 Moynihan gave a similar classification and suggested the causes to be (1) hæmorrhage between mesenteric layers; (2) dilatation of lacteals or lymphatics; (3) degeneration of lymph glands. In 1900 Dowd divided these cysts according to their origin into (1) embryonic; (2) hydatid; (3) cystic malignant. He first noted the close embryonic relationship of the wolffian body and the root of the mesentery and suggested that sequestrated cells from the wolffian body might be displaced forward into an intramesenteric position and later develop into a tumor. He also suggested that sequestrated cells from the developing gut might likewise be displaced between the mesentery and develop into a cyst.

Writers since have amplified Dowd's classification and added additional ideas of the genesis of these neoplasms. Each writer has offered a new etiological classification so that to the reader it now becomes confusing. Among these writers I might mention Ayers (1906), Niosi (1907), Gould (1913), Miller (1913), Carter (1921), Bartlett (1923), Higgins and Lloyd (1924), Humiston and Pietti (1925), Hueper (1926), and Wilson (1929).

The causes of mesenteric cysts might be listed as follows:

(1) Embryonic retroperitoneal organs, as germinal epithelium, ovary, wolffian or müllerian bodies. Remnants of these organs become displaced forward between the mesenteric layers. Many of these neoplasms develop in this manner. The rare pararenal cysts probably originate from wolffian body remnants but retain their position and are not displaced into the mesentery. These cysts bear a close resemblance to the mesenteric cysts. Dermoids of the mesentery apparently arise from the ovary. No retroperitoneal nor mesenteric dermoids have been reported in the male though they have occurred in the testis (Ayers, 1906) which is originally a retroperitoneal organ. Swartley (1927) reports a sebaceous cyst in a male, twenty-six years, and Forster (1921) an epidermoid in a male, fourteen years. Both of these occurred in the jejunal mesentery but neither seems to have been a true dermoid so the fact that mesenteric dermoids always occur in the female and arise from the ovary still holds.

(2) Displaced embryonal intestinal tissue. Sequestrations from intestinal diverticula or from the vitelline duct become displaced between the mesenteric layers. In 1908 Lewis and Thyng described the regular occurrence of intestinal diverticula in embryos of the pig, rabbit and man and established the fact that the formation of diverticula and cysts is a regular occurrence

in the embryonic development of the gut. Hence cysts from intestinal diverticula may occur anywhere along the bowel while those from the vitelline duct occur principally in the terminal ileum. Like the first cause many of these tumors also develop in this manner.

(3) Dermal inclusions. This origin was suggested by Bartlett (1923) but probably very few if any arise from dermal inclusions.

(4) Angiomas of blood and lymph vessels. This also includes but few of these cysts.

(5) Parasitic and bacterial infection. A few mesenteric cysts have originated from the echinococcus and from tuberculous abscesses.

(6) Necrosis of lymph glands or solid tumors, as tuberculosis, typhoid fever, lipomata, malignant tumors, *etc.*, is responsible for a few of these cysts.

(7) Trauma and foreign bodies. Hæmatoma from injury may degenerate to form a cyst. Usher (1926) reports such a case. Genkin (1928) removed a chylous cyst formed around a gauze tampon left in at a previous operation.

(8) Lymphatic obstruction. This possible origin of mesenteric cysts has practically been discarded. These lymphatic vessels anastomose so freely it is hardly conceivable that plugging of a chylous vessel would produce a cyst.

Cases are recorded at all ages from the fœtus to the octogenarian but the fourth decade is most common. Women are affected twice as often as men. Very few are reported in the colored race.

Age	Cases	Sex	Cases
0–1	9		
1–10	21	Female	71
10–20	16		
20–30	18	Male	37
30–40	24		
40–50	17		
50–60	11	Unknown	21
60–70	3		
unknown	10		

Symptomatology and diagnosis.—There are no pathognomonic signs nor symptoms. The tumor is often too large or too small to accurately diagnose. Contrary to previous writers mesenteric cysts have been diagnosed before operation in a few cases, certainly since 1920 and probably before. Reports recording correct diagnoses are Haworth (1920), Bertolini (1921), Naumann (1921), Levinson and Wolfsohn (1926), Ciarlo (1927), Aloi (1927), and Finucci (1930). Others have suspected the condition.

An abdominal tumor which is rounded, smooth, not tender, cystic and quite mobile should suggest the probability of a mesenteric cyst. The mobility of the tumor is often striking and especially in the transverse direction,

due to its mesenteric attachment. Pain is more frequently present than with any other type of abdominal cystic tumor.

Other symptoms are due to the presence of some complication, principally intestinal obstruction. Hence a story of repeated attacks of abdominal pain sometimes with vomiting and alternating periods of diarrhœa and constipation is very important. The patient's weight may increase or decrease.

To repeat then, the symptoms may be those of a silent, cystic, abdominal tumor or those of intestinal obstruction. In the presence of rupture of the cyst or acute inflammation it is difficult to differentiate this condition from the other causes of an acute surgical abdomen. Hancock (1929), however, reports that he found at operation a ruptured cyst of the transverse mesocolon which had produced no acute symptoms.

Viadya (1927) reported a cyst of the ascending mesocolon which he only aspirated at operation and which filled again, and three weeks after the operation it apparently ruptured into the bowel for the patient passed quantities of liquid similar to the contents of the tumor and the distended abdomen became flattened.

In the differential diagnosis other conditions which must be considered are ovarian cyst, retroperitoneal tumors, pancreatic cysts, intestinal new-growths, pedunculated uterine fibroids, movable kidney, hydronephrosis, hydrops of the gall-bladder, ascites, tuberculous peritonitis, pregnancy, acute appendicitis, cholycystitis, intestinal obstruction, intussusception, perforated peptic ulcer, extrauterine pregnancy, ruptured pelvic or tubal abscess, acute peritonitis, acute pancreatitis, and acute diverticulitis.

To differentiate between the types of mesenteric cyst is practically impossible except on pathological examination.

Location.—Mesenteric cysts may occur anywhere along the intestinal tract from the duodenum to the rectum. Over half of the cases occur in the small bowel and one-fourth in the mesentery of the ileum. Of those in the large bowel the ascending, transverse and sigmoid colons share about equally.

Of the 129 cases reviewed I have listed the location of the cyst in order of frequency as follows:

Ileum	38	Appendix	2
Jejunum	14	Duodenum	1
Cæcum and ascending colon	14	Gastro-hepatic mesentery	1
Transverse colon	13	Colon (portion unknown)	6
Sigmoid	12	Small bowel (portion unknown)	6
Descending colon	5	Unknown	15
Duodeno-jejunal juncture	2		

Pathology.—These neoplasms may be so small that they cannot be palpated or so large that they practically fill the entire abdomen. The greater majority are single cysts, though a few are recorded of multiple tumors. About one-half of the cases are unilocular while the other half present two or more compartments. A duct connecting two cysts or a cyst and the intestinal lumen is said to have been described. (Hueper, 1926.)

The cyst wall is usually thin but varies in thickness and composition. The lining of these tumors is mostly epithelial though often destroyed by the internal pressure of the cyst. The epithelium is usually simple columnar, sometimes stratified and rarely ciliated. The structure of the cyst wall very often reveals the genesis of the neoplasm. The presence of primitive glomeruli demonstrate wolffian-body origin. Layers of smooth muscle, epithelium, and sometimes goblet cells establish intestinal tract etiology. An endothelial lining suggests the tumor arose from a lymphangioma. High columnar epithelium and pseudomucin or the presence of hair, teeth, *etc.*, indicate primitive sex-organ ancestry.

The contents of these tumors denote accidents that have befallen the cyst and only occasionally have any bearing on the etiology. The first classifications were based upon the cystic contents and included such terms as serous, lymphatic, lymphorrhagic, chylous, sanguinous and hæmorrhagic. The lymphatic and chylous cysts are about equally divided in number. The fluid may be clear, colorless, yellow, milky, mucinous, brown, sebaceous, or bloody. The reaction is alkaline, the specific gravity about 1.015 or 1.016. It often contains a large amount of albumin, cell débris, blood and cholestrin.

Malignant degeneration is rare and may be either carcinoma or sarcoma.

The case reports since 1920 might be classified pathologically as lymphatic or serous thirty, chylous twenty-eight, hæmorrhagic nine, dermoid six, malignant three, (one adenocarcinoma and two spindle-cell sarcoma), sebaceous two, epidermoid one, echinococcal one, unknown forty-nine.

Complications.—(1) Intestinal obstruction is the most frequent and most serious of the complications. It occurs in one-third of the cases and of these the mortality is 50 per cent. The obstruction is mechanical and includes intestinal narrowing or occlusion, kinking, volvulus, adhesions, and intussusception. Sala and Nachamie (1929) reported a case of prenatal volvulus of both the small and undescended large bowel and mention that two cases of prenatal volvulus of the small intestine had been reported in the past fifteen years.

Other complications occur only occasionally.

(2) Peritonitis is a sequel to obstruction.

(3) Hæmorrhage into the cyst has been fatal.

(4) Rupture of the cyst into the peritoneum or into the bowel has caused death. This may occur spontaneously or be due to trauma.

(5) Torsion of the cyst.

(6) Impaction of the cyst in the pelvis causes symptoms depending on the organ upon which it presses.

Ordinary post-operative complications sometimes occur such as shock, pneumonia, dilatation of the stomach, post-operative hernia, recurrence of the cyst after incomplete removal, *etc.*

Prognosis.—The prognosis depends upon the size, location, site of attachments, time of diagnosis and operation, whether benign or malignant,

type of operation, presence of complications, age and general condition of the patient.

Treatment.—The treatment of mesenteric cyst is entirely surgical. In the acute cases the treatment is directed principally toward the complications, the chief one being intestinal obstruction, while in the subacute and chronic cases the operation consists of removing or obliterating the mesentric cyst by one of several methods.

(1) Enucleation is undoubtedly the operation of choice, but it is not always feasible without injuring the bowel and hence each case must be studied at operation to determine the technic best adapted to the case at hand. This procedure is the one most often used and with the lowest mortality—9 per cent.

(2) Enucleation with intestinal resection is often necessary and has a mortality of 27.3 per cent. The enterogenous tumors usually cannot be separated from the intestine and require resection.

(3) Either drainage or marsupialization has been done in a number of cases and certainly has a place in the treatment of large, extensively adherent mesenteric cysts where enucleation even with resection is out of the question. The mortality of these two procedures in the reviewed series of cases was 16.6 per cent. This seems high and includes deaths due to complications. The mortality rate is better judged perhaps by the kind of complications present, size and location of the tumors, *etc.*, than by the type of operation employed. Marsupialization or drainage is rarely apt to result in a permanent sinus or recurrence which would ultimately require excision. The length of time of drainage varies from one to three months. Gurewic (1926) reports a cured case after marsupialization of a chylous cyst of the mesosigmoid that drained for one year. There have been several recurrences following drainage that afterwards have been enucleated.

(4) Aspiration may at times be helpful in diagnosis but should not be employed in the treatment of these tumors. It was often used by the older surgeons and there is an occasional case of recent years that has been aspirated.

The following table gives the types of operation used and results of the cases reported since 1920.

Operation	Cases	Cured	Recovered	Died	Res. Unknown
Enucleation	56	42	..	5	9
Enucleation with resection	22	14	..	6	2
Marsupialization	15	11	..	1	3
Drainage	5	2	..	3	..
Aspiration	4	..	3	1	..
Laparotomy	24	8	2	5	9
Autopsy	3	..	..	3	..

Of the twenty-four deaths the diagnosis before operation was obstruction in twelve, abdominal tumor in five, peritonitis in two, appendicitis in one, ectoptic pregnancy in one, gall-bladder disease in one and unknown in two.

The location of these cysts was jejunum eight, colon seven, (transverse four), ileum seven, duodenum one, and unknown one. Thirteen of the twenty-four deaths were in cases of five years or under, six were over thirty years and five between five and thirty years of age. The deaths were equally divided in sex.

CASE I.—White, male, six years, admitted to Children's Hospital, September 20, 1930.

History.—Swelling of the abdomen for three weeks. Appetite good, no constipation, vomiting, fever, night sweats nor urinary symptoms except enuresis. He was a full-term baby and breast fed for nine months. The only illnesses have been colds and at six months of age a diarrhœa which lasted several weeks. Both parents living and well. Three other children well. No tuberculosis in the family.

Examination.—Temperature 99.2°, pulse 100, respiration 26. Weight 42 pounds. The child was anæmic looking, thin, and with a greatly distended abdomen. Teeth in poor condition and tonsils enlarged. Heart and lungs negative. There was some chronic adenitis of cervical, axillary and inguinal nodes. The abdomen was symmetrically distended, tense, flat on percussion, cystic, with a flare at the costal margins and the skin stretched. No abdominal organs could be palpated and no tenderness, tumor mass nor rigidity was noted. Extremities negative. The blood on admission showed red blood cells 3,180,000, hæmoglobin 63 per cent., white blood cells, 6,700, lymphocytes 51 per cent., polymorphonuclears 49 per cent. (lobulated 45, bands 4). The urine was repeatedly negative. The Wassermann was negative (October 6). Röntgen studies revealed the heart enlarged to the left, thymus 34 per cent. Both diaphragms were displaced upward and the abdominal walls flared out; probably fluid in the abdominal cavity. The colon was negative. Several tuberculin tests were negative. Laryngoscopic examination showed hoarseness and redness of the vocal cords suggestive of tuberculosis. No tubercles were seen and smears were negative for the tubercle bacillus.

The impression was tubercular peritonitis and laryngitis, and diet, rest and ultraviolet therapy were advised. The child showed no progress. His weight increased 1 pound (43) but the abdomen became more distended; the blood-picture and hoarseness remained the same. The abdomen was tapped November 1, and November 25, 1930. Each time 20 cubic centimetres of bloody fluid was withdrawn, showing no growth on culture nor tubercle bacilli on smears. A laparotomy was finally decided upon.

Operation.—(By author) November 28, 1930. Avertin anæsthesia. A low mid-line incision revealed no free fluid. There presented a very large, dark-bluish, cystic tumor attached along the entire left lateral peritoneal wall, across the brim of the pelvis, bulging into the mesentery of the ascending and transverse colons and extending high up toward the liver and spleen where it was attached to the posterior peritoneum. It seemed to have two large cystic lobules, one toward the liver, and the other toward the upper left quadrant. The ascending and most of the transverse colon were seen to the right of and running across the upper portion of the tumor toward the left. The cæcum was fixed in the pelvis at or beneath the attachment of the cyst and was not seen. The small intestine was felt in the upper right quadrant and also seen after the cyst was opened. The ascending and transverse colon and small bowel were of normal appearance. The cyst was opened in the mid-line and contained bloody fluid. The cyst wall was thin and its lining smooth and shiny. This emptied only one lobule and a large lobule on the right was opened from the mesial side and underneath the ascending colon. There was possibly another lobule high up posteriorly that could not be reached but it was hoped this might communicate with the compartments already opened. The cyst wall was sutured to the anterior parietes and a rubber tube drain was placed in each lobule. About 1,900 cubic centimetres of bloody fluid was aspirated and approximately an equal amount spilled on the floor. Closure.

Laboratory Examination of the fluid revealed 1,900 cells per cubic millimetre. No pancreatic enzymes were present.

The temperature came down in a few days and the drainage was profuse. On the ninth post-operative day (December 7th), the temperature rose to 103° and became septic. The white blood cells varied from 18,000 to 20,000 with 85 per cent. to 90 per cent. polymorphonuclears and 18 to 25 band forms. The drainage changed to seropurulent and lessened. On palpation a large, tender mass appeared in the right side of the abdomen.

Second Operation.—December 24, 1930. Avertin anæsthesia. The sinus was explored with the finger and found to run up, back and to the left. The lobule on the right had closed but was opened and emptied of a large amount of foul, brown fluid. Six rubber drainage tubes were inserted.

His convalescence was long. The drainage was yellowish brown. The temperature slowly lowered but lasted for five weeks. The drainage tubes were very gradually shortened and removed six weeks after the second operation. Ultraviolet therapy helped considerably. His lowest weight was 32 pounds and on discharge (February 17, 1931) 41½ pounds.

On March 9, 1931, his weight was 45 pounds, red blood cells 4,600,000, white blood cells 8,000, hæmoglobin 75 per cent. The wound had healed and the abdomen was flat, symmetrical, soft, not tender, and there was no palpable mass. The hoarseness had improved.

Five months after operation (June 8, 1931) the boy looked well but pale. He played hard, had gained weight, ate well and the bowels were regular. The abdomen was flat without masses, tenderness or rigidity. The operative scar had widened and there was a separation of the recti muscles between which intestines protruded on straining.

He was seen November 11, 1931, about one year since operation. He is slender and pale but has been well and attending school. The recti muscles are separated ¾ inch below the umbilicus. Otherwise the abdomen is negative.

CASE II.—White, male, two and one-half years, admitted to Children's Hospital September 16, 1929. There were no symptoms. An abdominal tumor had been noticed at a baby show. Examination revealed a movable, cystic mass the size of a small grapefruit in the lower abdomen. The pediatrician (Doctor Copeland) made a diagnosis of mesenteric cyst. At operation (Doctor White) a serous cyst containing yellow fluid was enucleated from the mesentery of the small bowel. The convalescence was smooth and the child left the hospital in twelve days.

Summary.—The first case was observed at autopsy by Benevieni in 1507. Tillaux in 1880 successfully operated on a cystic mesenteric tumor. There have been approximately 500 cases reported to date. Dowd in 1900 classified these neoplasms according to their origin, which is chiefly embryonic from mesodermal remnants behind the developing peritoneum of from intestinal diverticula or persistent portions of the vitelline duct. There are no pathognomonic signs nor symptoms. One-half of these tumors occur in the small intestine and one-fourth in the mesentery of the ileum. The structure of the cyst wall varies with the origin of the tumor, while its contents have little bearing on the etiology. One-third of these cysts are complicated by intestinal obstruction in which the mortality is 50 per cent. The treatment consists of enucleation with or without intestinal resection, drainage, or marsupialization.

The two cases reported contrast the difficulty and simplicity of treat-

ment. The first case reported illustrates the fact that the tumor was too large to diagnose correctly though the fluid removed at several tappings should have been more completely examined. The operation of choice was certainly marsupialization due to the enormous size and extensive attachments of a multilocular cyst. I believe the tumor originated in the mesentery of the ascending colon. Unfortunately, a pathological section was not obtained and hence the etiology is not known. It was no doubt embryonic and possibly pressure from the growth had destroyed any definite pathology of the cyst wall. A second operation was necessary to establish adequate drainage which lasted for two and one-half months. The child was seen nearly one year after the operation and had a diastasis of the recti muscles but there was no evidence of a recurrence of the cyst.

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