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1903

Modern Surgery - Chapter 27. Diseases and Injuries of the Abdomen - The Peritoneum

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Recommended Citation

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THE PERITONEUM.

Acute Peritonitis.—Peritonitis, or inflammation of the peritoneum, is a common and important disease.

Aseptic irritation by a traumatism or a chemical irritant produces aseptic peritonitis, a condition which is strictly limited; which may produce local pain and tenderness; which may cause aseptic fever from the absorption of fibrin-ferment and the products of tissue-change; which leads to the formation of temporary or permanent adhesions, and which is, in reality, a process of repair.

Peritonitis, as the term is used by the surgeon, is always due to bacteria. Bacteria may reach the peritoneal cavity by means of an abdominal wound or the entrance of foreign bodies; by extravasations from the stomach, bowel, vermiform appendix, gall-bladder, urinary bladder, kidney, Fallopian tube, or uterus, or by the passage of micro-organisms through the damaged walls of any of these viscera or structures; by way of an open Fallopian tube; from the breaking of an abscess into the peritoneal cavity; from areas of necrosis due to volvulus, strangulation, or intussusception of the intestine; twisting of the pedicle of an ovarian tumor, a floating kidney, or a floating spleen; blocking of a mesenteric vessel by a thrombus or an embolism; gangrene of the pancreas or spleen, and fat-necrosis.* In some cases the peritoneum may contain a point of least resistance, and bacteria contained in the blood reach this point and produce infection. It used to be thought that cold could produce peritonitis, but it seems probable that it can only act by producing an area of least resistance. The capacity of the rheumatic poison to produce peritonitis is doubtful.

The peritoneum is in reality a great lymph-sac, and, as Fowler points out, peritonitis is lymphangitis. "When the peritoneum is infected the lymphatics furnish an exudate which clots in the lymph-channels, blocks them, and limits or prevents absorption. This blocking of the lymph-channels serves to preserve the life of the subject, on the one hand; while a failure in this respect, either because of the enormous and overwhelmingly rapid increase of septic material and the large size and number of channels necessary to destroy and obstruct, on the other hand, permits the destruction of the organism."† Absorption takes place most actively from the region of the diaphragm, hence peritonitis in this region is peculiarly fatal. Absorption takes place very rapidly from the intestinal region, although not quite so quickly as from the diaphragmatic area. Absorption takes place slowly from the pelvic region, hence peritonitis of this region is much less dangerous than is the disease in the intestinal region, and vastly less dangerous than is the disease in the diaphragmatic region (Fowler).

Various bacteria may be responsible for peritonitis, especially staphylococci, streptococci, pneumococci, and colon bacilli. The infections which spread most rapidly and widely are due to streptococci. In streptococcus infection the protective exudate does not coagulate, barriers of leukocytes are not heaped up, encompassing adhesions do not form, there is rapid absorption of toxins, and overwhelming systemic poisoning. Colon bacilli

* See Park's "Surgery by American Authors."

† George R. Fowler, "Diffuse Septic Peritonitis," in *Medical Record*, April 14, 1900.

cause a very grave form of peritonitis, but less rapid and diffuse than that caused by streptococci—in fact, the process is often encompassed for a time by coagulated lymph, leukocytes, and adhesions. The omentum particularly is thickened, and is apt to apply itself about the area of infection. Staphylococci and pneumococci produce peritonitis which is more apt to be limited than that produced by colon bacilli. In most cases of peritonitis a mixed infection exists; for instance, colon bacilli and staphylococci or colon bacilli and streptococci. In some apparently severe cases of acute peritonitis cultures have remained sterile.

Forms of Peritonitis.—An accurate bacteriological classification is not as yet possible.

Peritonitis can be named, according to regions, pelvic, subdiaphragmatic, etc.; it can be divided pathologically into diffuse septic, putrid, hemorrhagic, suppurative, serous, and fibrinoplastic (Senn); it can be classified, etiologically, into traumatic, puerperal, perforative, metastatic, etc.; and it can be divided, clinically, into circumscribed suppurative, general suppurative, and diffuse septic.

Circumscribed Suppurative Peritonitis.—In this condition, which is frequently met with in appendicitis, the area of infection is circumscribed by coagulated exudate, leukocytes, and adhesions, and an abscess forms. After a time distinct localization becomes evident.

The *symptoms* of circumscribed peritonitis are pain, at first general and then local, tenderness in a particular region, muscular rigidity, distention, vomiting, rapid and often wiry pulse, constipation, fever, great weakness, and dorsal decubitus with the thighs flexed. After a time a distinct mass can usually be detected by palpation, and there may be dulness on percussion, local rigidity, irregular temperature, sweats, and possibly edema of the belly-wall. An abscess, though limited for a time, is always liable to break through its walls and produce general peritonitis. Such an accident may be produced by muscular effort on the part of the patient or by injudicious palpation on the part of the surgeon; its occurrence is announced by shock, and the symptoms of general peritonitis quickly arise.

Diffuse septic peritonitis is apt to destroy life even before the peritoneum presents any marked change. Death ensues from the absorption of toxic alkaloids. Septic peritonitis may arise during puerperality, through lymphatic infection; it may be due to infection from without by an operation or an accident; to perforation of an ulcer; to gangrene of a portion of the intestine; to rupture of an abscess into the peritoneal cavity; or to migration of micro-organisms through a damaged wall of the bowel. Peritonitis due to perforation is called *perforative peritonitis*. Perforation is made manifest by a chill, shock, or rapid collapse. Gas may pass into the peritoneal cavity, and if it does so the area of liver-dulness may be lessened or abolished. Symptoms and signs of hemorrhage may arise. Diffuse peritonitis is announced by a very rapid pulse, which is at first wiry and later gaseous; a temperature which may be at times febrile, but which is apt to be subnormal or which soon becomes so; diffused abdominal pain, general tenderness, dry tongue, delirium, persistent vomiting, constipation, and collapse. Rigidity may exist, and also intestinal obstruction; often, but not invariably, there is distention. In puerperal peritonitis or septic peritonitis from

operation there is often no severe pain; in perforative peritonitis there is acute pain. Patients usually die within five or six days.

Diffuse suppurative peritonitis differs clinically from diffuse septic peritonitis in the fact that it is less apt to be fatal and widespread. In fact, adhesions may form about an area representing a considerable portion of the peritoneal cavity. The causes of both are identical. In septic peritonitis death occurs from absorption of toxins before obvious pathological changes occur in the peritoneum; in suppurative peritonitis the microbes are fewer, are less virulent, or vital resistance is more decided, and suppuration follows marked changes in the peritoneum. In suppurative peritonitis the pyogenic bacteria are always present, and there exists in the peritoneum a wound or damaged area to constitute a point of least resistance.

Symptoms.—Chilliness or a rigor is common, followed by fever, the temperature rising to 102° or 104° F.; pain is intense, and is accentuated by motion and pressure; the attitude of the patient is assumed to relieve pain (he lies upon his back, with the shoulders raised and the thighs drawn up); there are vomiting, obstinate constipation, and rigidity of the abdominal walls, followed by distention when the intestine becomes parietic from septic poisoning. The pulse is rapid; is at first wiry, but may become gaseous. The constipation may be due either to tympanitic distention or to the shock and toxemia inhibiting intestinal peristalsis. Vomiting is frequent. In perforation gas often passes into the peritoneal cavity and it may obscure the liver-dulness; in tympanites without perforation the liver is pushed up and its dulness usually remains, but on a higher level. Pus unconfined by adhesions will gravitate to the most dependent part of the peritoneal cavity. In some cases of suppurative peritonitis there is no tympanitic distention or rigidity; in some cases there is no fever, and a subnormal temperature may even exist.

Treatment.—In the beginning of ordinary peritonitis without perforation give a saline cathartic, which will empty the peritoneal cavity of fluid, will favor the elimination of microbes, and will combat inflammation. The old-time remedy was opium, but Tait proved its inefficiency, and showed that it masked the symptoms and often created a false sense of security in the very midst of imminent dangers. The usual method of administering salines is to give ʒj of Rochelle salt and ʒj of Epsom salt every hour until a free movement occurs. This treatment will often cut short beginning peritonitis, and will frequently prevent peritonitis after an abdominal operation. Administer an enema of turpentine at the time the first dose of the saline is given. If this treatment fails, open the belly, explore for the causative condition, remedy it, if possible, wipe an infected area, flush with gallons of hot salt solution, and drain. In *perforative* peritonitis operate; *do not* give cathartics; they will only increase the extravasation and prevent its limitation by lymph. In typhoid fever it may be possible to anticipate perforation by the occurrence of leukocytosis. As soon as the patient has reacted from the shock of the perforation perform a laparotomy, suture the perforation, wipe and flush out the belly, and drain. In cleansing, give special attention to Douglas's pouch, and to the space between the liver and diaphragm. In diffuse septic peritonitis open the abdomen in the middle line, explore for the source of trouble, and, if possible, remove it. Make

an additional incision in the suprapubic region or through the right kidney pouch, or in the opposite side of the abdomen. It is frequently advisable to leave the abdominal wounds open. Flush with hot salt solution and drain. Some surgeons eviscerate and wipe the intestines with moist gauze pads.

A circumscribed abscess is treated as follows: Open the abscess. It will be possible, if the abscess is adherent to the abdominal wall, to open the abscess directly without opening the peritoneal cavity. If this is not possible, after opening the abdominal cavity pack gauze pads in such a manner about the abscess as to prevent the diffusion of pus when the abscess is evacuated. After opening the abscess the primary lesion is sought for and, if possible, removed. The surgeon should not, in most cases, tear the lymph-barriers in an attempt to find the primary lesion, but should rather let it go undiscovered. Pack iodoform gauze against the intestines to reinforce the barrier of lymph and insert a tube. It is frequently advisable to leave the wound open and drain with iodoform gauze. Every patient with peritonitis requires stimulants and frequent feeding with liquid food.

Tuberculous Peritonitis.—Tuberculosis of the peritoneum is not very common. In 1170 autopsies in the Boston City Hospital, tubercle existed in some region in 197, and in 14 of these the peritoneum was involved.* Primary local peritoneal tuberculosis is occasionally, though very rarely, seen by the surgeon. In a great majority of cases of peritoneal tuberculosis other distant structures are involved. In about half of the cases the lungs are involved. In 28 cases reported by Bottomly,† not one was primary. In every one of these cases the diagnosis was confirmed by the microscope, by the tuberculin test, or by autopsy. In most supposed cases of primary peritoneal tuberculosis another focus of disease exists, but is not demonstrable by clinical methods or has been overlooked. The disease sometimes exists as a part of a general tuberculosis. Tuberculous peritonitis may be only a part of acute miliary tuberculosis. Peritoneal infection may follow a tuberculous lesion of the intestine, the bacteria may enter by way of the Fallopian tube, the initial lesion may be tuberculous appendicitis or tuberculosis of the mesenteric glands. The germ may lodge from the blood or lymph. The lymphatic form most commonly attacks the cecum. The disease is more common among women than men and most frequently attacks those between twenty and forty years of age, but I have seen it in a child of five and in a colored man of sixty. There are two groups of cases—the common chronic form and the rarer acute condition. The acute form begins suddenly, and such cases, as pointed out by Lejars, resemble acute appendicitis. In either the acute or chronic condition it is frequently the case that pulmonary phthisis exists. Cirrhosis of the liver is sometimes found with tuberculous peritonitis. There are three forms of chronic tuberculous peritonitis: the ascitic, the fibrinoplastic, and the caseous,‡ although as a matter of fact these so-called forms are only stages of the same disease. Tuberculous infection may exist for some time without causing symptoms, acute symptoms may suddenly arise, or intestinal obstruction may take place. Symptoms sometimes develop quickly after pregnancy. In

* Bottomly, in *Amer. Med.*, Feb. 15, 1902.

† *Amer. Med.*, Feb. 15, 1902.

‡ Parker Syms, in *Medical Record*, April 2, 1898.

other cases the symptoms appear gradually and progressively grow more positive.

Symptoms of the Chronic Form.—Usually the disease begins insidiously. The digestion is found to be disturbed, there is nausea, the bowels are out of order, the abdomen is distended and tender, there is occasional colicky pain, and the patient is weak, loses flesh rapidly, and becomes very anemic. Frequently pain is the symptom which leads the patient to seek advice. The pain may be present from the very beginning, it may arise after malaise and gastro-intestinal disorder have existed for some time, but sooner or later it will develop.

In many cases there is ascites, but the amount of fluid is rarely very great. In some cases the fluid is serous, in some seropurulent, in some purulent, and in some bloody. Chylous fluid occasionally exists because of fatty degeneration of tuberculous masses. Ascites may be either unconfined or sequestered by adhesions. In some cases, and especially in early youth, there is little or no ascites, and the condition is characterized by the production of a quantity of adhesions which bind coils of intestine to each other, to the omentum, to the stomach, liver, and other viscera. In this condition, which develops very slowly, small cavities are formed by adhesions and the spaces contain fluid and bacteria. This is the most chronic form of the disease. In any case of tuberculous peritonitis the mesenteric glands may enlarge. There is usually moderate fever, but there may be episodes of high fever and protracted periods of subnormal temperature, or the temperature may be slightly elevated in the evening and subnormal in the morning. When the temperature becomes markedly elevated, pain, tenderness, and distention notably increase. In some cases there is a continued fever resembling typhoid. Tumor-like formations may be detected. These formations may consist of indurated omentum, encysted exudate, or enlarged mesenteric glands. If diarrhea exists for a long period, there is probably tuberculous ulceration of the gut.

In every suspected case a bimanual examination should be made under ether, in order to discover if there are any matted masses of intestine (Thomson).

In many cases a careful examination will detect tuberculous disease of other regions of the body, particularly of the lungs. If tuberculous disease of the lungs or pleura is detected, if tuberculous glands exist or have been present, or if a nodule not due to gonorrhoeal inflammation is palpable in the epididymis, or if there are indurations in the prostate, the probability of the presence of tuberculous peritonitis is much enhanced. In many cases there is dilatation of the superficial abdominal veins. In some cases tuberculous peritonitis undergoes spontaneous cure. In the majority of instances death ensues from the tuberculous peritonitis directly or from associated or secondary disease in other organs.

If an intraperitoneal tuberculous area caseates, a large cold abscess may form, and such an abscess may break into the intestine or may be opened externally, and may be responsible for the formation of a fecal fistula.

In a case of tuberculous peritonitis intestinal obstruction may occur, the gut getting caught by bands or adhesions, or becoming a rigid tube because of the formation of tubercles.

Symptoms of the Acute Form.—This is sometimes mistaken for appen-

dicitis. It comes on rather suddenly, but a carefully elicited history will usually show the previous existence of malaise, gastro-intestinal disturbance, loss of flesh, and anemia. The symptoms are not so strictly localized to the right iliac fossa as in appendicitis. There is abdominal distention, a certain amount of rigidity, nausea and vomiting, colicky pain which may be very severe, general abdominal tenderness, fever, and exhaustion. It may be possible to palpate masses like tumors, or to feel nodules in the prostate or epididymis, or to detect tuberculosis in some other part.

Treatment.—In some cases there is a tendency to spontaneous cure, and in them medical treatment is of great service. The patient should be placed under proper hygienic conditions, nutritious food and tonics should be administered, the abdomen should be counter-irritated and massaged, and purgatives should be given frequently. Guaiacol applied daily to the abdomen is often of service. A mixture is made of 1 part of guaiacol and 5 parts of olive oil; 3j of this mixture is rubbed into the abdomen, and the part is covered with a piece of flannel held in place by means of a binder. If the medical treatment is not soon productive of benefit, the advisability of operating must be considered. It is a curious fact, but one confirmed by ample evidence, that after simple abdominal section, without the introduction of germicides and without drainage, at least 30 per cent. of the cases recover from the disease in from six months to one year. Some surgeons doubt the curative effect of operation. For instance, the late Prof. Fenger was strongly of the opinion that many patients recover after operation, but not as a result of operation. In his opinion they recover because they were strong, free from fever, and well nourished, and because the disease tended to spontaneous cure. He further believed that some died from operation because the traumatism lessens the already lowered tissue resistance. The majority of surgeons, however, believe that operation in many cases tends to cure. It is uncertain how an operation tends to cure. It has been thought that the ascitic fluid is a culture-medium for bacilli, and when it is withdrawn the bacilli die, but opposed to this view is the fact that aspiration is rarely curative. It has been suggested that the operation brings numerous phagocytes to the peritoneum; that it stimulates vital resistance; that it leads to the exudation of antitoxic serum. The entrance of air seems to play a definite and important part in effecting a cure.

The ascitic cases are most frequently benefited by operation. In encysted fluid operation often cures.

In cases in which there are numerous adhesions operation is not so likely to produce a cure. Great care should be exercised in separating adhesions, because the bowel is apt to be torn and a fecal fistula may result. It may be necessary to separate adhesions or short-circuit a portion of gut to relieve obstruction. Drainage should not be used unless a cold abscess exists. Not only is drainage of no service, but it is dangerous; death is more apt to ensue in a drained case and a fecal fistula will arise in nearly one-fourth of the cases. If operation is performed for cold abscess, tube-drainage must be used for some days. In a very advanced case, in a case with notably high temperature, or in a case with marked and advancing tuberculosis in another region, an operation should not be performed except to relieve obstruction or drain an abscess. If a patient does not die within a few months after the opera-

tion, he will probably recover, and in most cases operation secures at least temporary improvement (Bottomly). The mortality from operation is 1 or 2 per cent. (Fenger).

Subphrenic Abscess.—A subphrenic abscess is a collection of pus beneath the diaphragm. The pus, as a rule, occupies a part of the lesser peritoneal cavity; in rare instances it is extraperitoneal (when it is of renal origin); in some cases it is contained in the area between the diaphragm, cardiac end of the stomach, and liver or spleen. It is an unusual thing for such an abscess to break into the general cavity of the peritoneum, but it may break into the pleural sac (Maydl).

Causes.—Perforation of a gastric ulcer, perforation of the gall-bladder or gall-ducts, ulceration of the duodenum, disease of the liver, spleen, pancreas, intestine, appendix, or kidney, hydatid disease, internal injury, metastasis, external injury, caries of rib, or disease of the pleura may be responsible for a subphrenic abscess (Maydl). Charles A. Elsberg* has collected 73 cases of subphrenic abscess after appendicitis. He points out that the condition may arise from direct extension or by way of the lymph-channels, and may be either intraperitoneal or extraperitoneal; although in the majority of cases it is intraperitoneal. In all but seven of these cases there was suppuration about the appendix. The pus was thick and foul in all the cases. In 15 per cent. of them gas was also present, and in 25 per cent. of these cases the diaphragm was perforated. In one case in which I operated the abscess developed after cholecystitis.

Symptoms.—A patient with subphrenic abscess usually complains of pain in the lower part of the chest on the right side. The area of liver-dulness is distinctly enlarged, and there is tenderness in the lower part of the right chest when pressure is made through one or through several intercostal spaces. Frequently friction-sounds may be heard about the region of the dome of the liver. Sometimes the symptoms are obscure or indefinite, and not accompanied with particular pain. If the abscess happens to contain a considerable amount of gas, and about one-half of such abscesses do contain gas, not only will there be no increase in the area of liver-dulness, but the normal area of dulness may be diminished or obliterated. The presence of gas is due to some connection with an organ which contains gas. It is very common for a pleural effusion to be associated with a subphrenic abscess. A pleural effusion will be preceded by or accompanied with symptoms pointing to the lung or pleura; and it is to be remembered that the area of percussion-dulness found in the pleural effusion shifts its position whenever the position of the patient is changed, which is not true of the area of dulness found in subphrenic abscess. When the abscess breaks through the diaphragm, the patient develops collapse, cough and other thoracic symptoms; and if the abscess breaks into a bronchus, the patient will expectorate pus. In subphrenic abscess, the diaphragm of the diseased side is paralyzed—a condition rarely met with in liver-abscess. There are general symptoms of suppuration and a swelling in the subdiaphragmatic region following some recognized causative condition. The history of chills with recurrent fever and sweats is rather indicative of abscess of the liver; but in abscess of the liver there is usually pain in the shoulder-blade of the right side, and this is rarely en-

* Annals of Surgery, Dec., 1901.

countered in subphrenic abscess. The proof of the diagnosis is not, however, obtained until an exploratory incision has been made and the purulent matter has been examined. In many cases the abscess-cavity contains gas as well as fluid. Empyema and subphrenic abscess resemble each other. In empyema the upper limit of the fluid is concave; in subphrenic abscess it is convex. In empyema the flow of pus through an aspirating-needle will be most marked during expiration; in abscess, during inspiration. The same is true of the rush of gas. In empyema the needle does not oscillate; in abscess it does.* If an abscess contains gas percussion elicits a tympanitic note over a part of the cavity and there is an alteration in the area of tympany with an alteration in the position of the patient. An abscess of the liver does not contain gas and decidedly changes the outlines of the organ.

Treatment.—Incision and drainage. The incision in some cases may be made in the lumbar region, in some cases through the abdominal wall (epigastric region, iliac region, hypochondrium). In other cases the chest-wall is incised, the ninth or tenth rib is resected, and the abscess is opened below the pleura or the pleura is opened, and the diaphragm is incised. If appendicitis is the cause, be sure the appendicitis is well; and if not, open and drain freely (Elsberg). If it is necessary to open the pleural sac, try to stitch the parietal to the visceral layer of the pleura, or, if this is impossible, protect the cavity with iodoform gauze to prevent infection.

THE LIVER, GALL-BLADDER, AND BILE-DUCTS.

Rupture and Wounds of the Liver.—Rupture of the liver is due to very great force, and is usually accompanied by injury of other viscera. It may be produced by a blow, by a fall, or by the end of a broken rib. The superior surface or margin most often suffers. It is a very fatal accident. Out of 543 reported cases, over one-half died of hemorrhage within twenty-four hours of the accident.† Wilms ‡ collected 19 cases, and only 3 recovered after operation. An attempt should be made to save the patient by opening the abdomen and arresting hemorrhage, and in a suspected case an exploratory operation should be performed. A wound of the liver causes violent hemorrhage which is usually rapidly fatal. Such a wound is apt to divide bile-ducts and allow bile to escape into the peritoneal cavity. Bile if sterile will do little harm, but if it contains bacteria it will produce diffuse peritonitis. The symptoms of a rupture or wound of the liver are those of severe intra-abdominal hemorrhage, with collapse and hepatic tenderness. Soon after the injury the abdomen is soft and flat, but it quickly becomes rigid and ultimately distended. The diagnosis becomes more probable when it is known that violence was applied in the hepatic region. Usually there is abdominal pain and often pain in the back. Sugar may appear in the urine. Jaundice seldom arises. The area of liver-dulness is usually increased. Patients do not always die from a serious traumatism of the liver. Some recover because operation has been performed. Some few recover without operation. This last fact is proved by reports of autopsies in which scars were found in the liver-parenchyma (Nussbaum). The fatality which usually

* Wharton and Curtis, "Practice of Surgery."

† Mercade, in *Rev. de Chir.*, Jan. 10, 1902.

‡ *Deut. med. Woch.*, Nos. 34 and 35, 1901.