

CHAPTER IX.

INJURIES OF THE PERITONEUM.

THE peritoneum bears injuries well provided the wound does not become infected. Rents due to overstretching of its tissue, contusions, burns by heat and caustics, are quickly recovered from, provided no pathogenic bacteria find their way into the peritoneal cavity. They may enter it from outside through the wound, or more frequently from some internal organ that has been injured. Pus-producing cocci are the most dangerous invaders. Saprophytic bacteria are more easily overcome by the living tissues.

Traumatic rupture of intra-abdominal organs, like an ulcerative perforation, in the great majority of cases produces infectious peritonitis. In traumatic perforation the patient has these advantages: the ruptured organ is usually healthy, and the perforation is more or less closed by muscular contraction. In rare instances it happens that this muscular contraction is sufficient to prevent escape of infectious material into the peritoneal cavity. Injury of an abdominal organ carries it with a second danger, that of intra-abdominal hemorrhage. The bloody-supply of the abdominal organs is abundant, the vessels are poorly protected by thin membranes, and if they are torn an alarming hemorrhage takes place in a short time.

OPEN WOUNDS OF THE ABDOMEN.

The most important question in connection with abdominal wounds is the possible injury of some abdominal organ. A penetrating wound of the abdomen may exist without such complication, but this is the exception, especially in gunshot-wounds. If the penetrating wound is made with a blunt object, the abdominal organ which lies in its way may be pushed aside without injury. Penetrating wounds of the epigastrium are less regularly accompanied by injury of some abdominal organ than those of the lower portion of the abdomen.

Internal hemorrhage is marked by progressive anæmia, a small quick pulse, weakness, and cold perspiration. Frequently there are also symptoms referable to irritation of the peritoneum. It is often difficult to say whether the abdominal organs have escaped injury, since the signs of peritonitis may not manifest themselves for some hours. Senn's proposal to inject hydrogen gas into the rectum in order to reveal the presence of intestinal perforation is an unwise procedure, since it may result in forcing the intestinal contents into the peritoneal cavity. Tension of the abdominal muscles, continuous ab-

dominal pain, nausea, and the passage of hemorrhagic material from the mouth or from the rectum are early signs of serious intra-abdominal injury. If one waits for more positive evidence, he will miss the most favorable opportunity for the operative repair of the injury.

Two lines of treatment are possible. The advice given by Reclus, Stimson, and others is to wait in the hope that penetrating wounds of the intestine may heal spontaneously. While this possibility is not disputed, it is of rare occurrence, and to most surgeons it seems unsafe to trust to such a fortunate result, especially as more than one wound may exist.

Statistics published by Postemski in 1891 showed that from 60 to 70 per cent. of 645 cases of penetrating wounds of the abdomen treated in the ten years previously terminated fatally, while the mortality of penetrating wounds complicated by injury of some abdominal organ was 100 per cent. There were 36 patients with uncomplicated wounds operated upon, all of whom recovered; and 22 patients with penetrating wounds complicated with intra-abdominal injury, of whom 12 recovered. Lühe collected 322 cases of penetrating abdominal wounds of all sorts treated by operation, the mortality of which was 49.4 per cent.

In view of the great risk due to possible injury of some intra-abdominal organ and intra-abdominal hemorrhage it seems advisable to explore as soon as possible every penetrating wound of the abdomen in which the nature of the injury or the early symptoms point to the possibility of internal damage. This should certainly be the rule when the conditions are such that an operation of this magnitude can be aseptically carried out. If this treatment is followed, it will doubtless happen that the abdomen is sometimes opened although no serious intra-abdominal injury exists. This will not, however, add greatly to the risk if the operation is properly performed, and this rule of operating early in all suspicious cases will save many patients from peritonitis and intra-abdominal hemorrhage.

The incision should usually be made through the wound. If the peritoneal cavity contains blood, the ruptured vessel should be sought for and ligated either directly, or in the case of the liver or spleen by passing a ligature through the tissue around the vessel. If the hemorrhage cannot be checked in this way, the wound in the organ should be tamponed.

In examining an intestine it should be remembered that bullets especially are apt to wound the intestine in several places, each one of which must be carefully sutured after resection of any badly injured tissue. The peritoneal cavity should be cleansed with hot saline solution and gauze in the manner hereafter described, and the wound in the abdominal wall sutured exactly. If tamponade is necessary, a portion of the wound is left unsutured to permit withdrawal of the gauze.

Subcutaneous Injury of the Abdomen.—A blow or bruise of the abdomen may injure the organs within while the elastic abdominal wall

escapes. This is especially true of such solid organs as the liver, spleen, and kidneys, which may suffer partial or complete rupture. A fall from a height may produce a similar injury. The stomach, urinary bladder, or gall-bladder, if distended with fluid, may be ruptured by a blow or a fall. The intestine usually escapes without injury unless the force is so directed as to press the intestine against the spinal column or the pelvic brim. Under such circumstances a portion of intestine may be torn off from its mesentery. Such an injury is followed by gangrene of the affected portion. On account of the deep situation of the pancreas it usually escapes injury, but in a few cases it has been torn across by pressure directed backward against the spinal column.

The serious effects of spontaneous injury are hemorrhage and rupture of a hollow organ, with discharge of infectious material into the peritoneal cavity. Sometimes a severe shock follows the injury. If the shock is due to hemorrhage and not to the injury itself, it will not decrease as time goes on, but will rather increase, and the patient will further exhibit the symptoms of increasing anæmia, a pulse growing weaker and faster, exhaustion, and restlessness. The effects of rupture of an intestinal organ are usually seen within six, or at the latest twelve, hours after the injury, the symptoms being intense abdominal pain, rigidity of the abdomen, nausea, hiccough, and vomiting. A few hours later the abdomen becomes distended and other symptoms of peritonitis develop. If the intestine is not torn, but is separated from its mesentery, or if necrosis follows a bruise of the intestinal wall, the immediate symptoms of shock may pass over and the patient be comparatively comfortable for a time until necrosis of the intestinal wall leads to peritonitis. Under such circumstances adhesions may form about the injured part, so that after perforation takes place intestinal contents are discharged not into the general peritoneal cavity, but into a walled-off space.

It is even more difficult to decide upon the necessity for operative treatment in case of subcutaneous abdominal injury than when there is an open abdominal wound. Shock is to be abated by a dorsal position of the patient and external heat, and if necessary subcutaneous injection of stimulants. If the general condition does not improve and the injuries of other portions of the body will not explain the lack of improvement, it must be assumed that there is intra-abdominal injury.

The diagnosis of internal hemorrhage is usually not difficult to make; but it is impossible to say from what organ the blood comes unless it is revealed by the character of the injury. The object of a laparotomy under such circumstances is to control the hemorrhage and repair the abdominal injury provided the general condition of the patient warrants such a step. The incision should be in the median line. Blood-clots should be sponged out and torn vessels ligated. Wounds of the liver may be closed by deep sutures or drained with iodoform gauze. A badly torn spleen should be removed. Irrigation with hot saline solution will not only cleanse the peritoneal cavity, but will also act as a stimulant to the patient.

It is not so easy to determine the presence of intra-abdominal injury which is likely to give rise to peritonitis. The following symptoms are present under such circumstances: repeated or continuous vomiting of bilious or bloody material, extreme contraction of the abdominal muscles, especially of the recti muscles, paralysis of the intestine, a part of which is contracted and a part dilated. If such symptoms are present after a severe contusion, the abdomen should be opened if the operation can be properly performed. Even the practised surgeon will sometimes be in doubt as to the existence of intra-abdominal injury since the first period of shock is frequently followed by a period of comparative ease. In such cases it is necessary to wait, keeping the patient under close observation until renewed exudation or vomiting, contraction of the abdominal muscles, slowly increasing distention, and rise of the pulse make it advisable to operate. If one waits until the symptoms of peritonitis are well established, the most favorable time for operation has gone by. It is therefore advisable to withhold morphine and similar drugs from such a patient lest they benumb his consciousness and mask the symptoms of his condition. It should be remembered that a gradually increasing retro-peritoneal hemorrhage, such as occurs with fracture of the spine or pelvis, may bring about a general increasing intestinal paralysis likely to be confounded with injury of the intestine.

If one follows the principle of early operation in these cases, he will sometimes needlessly open the abdomen. The risk thus caused is far less on the whole than the danger of postponing operation in case the intestine is ruptured. For the technic of operations upon the different abdominal organs the reader is referred to subsequent sections of this volume.

A late result of severe abdominal contusion is the formation of adhesions between serous surfaces which may cause the patient great pain and lead to stenosis of the intestine. Fecal abscesses may form in the vicinity of a bruise of the intestinal wall which will require opening or other treatment.

The discharge of aseptic bile as a result of rupture of the liver or biliary vessels brings about an aseptic chronic peritonitis with the formation of abundant bile-stained exudate, which should be drawn off by puncture or incision if it is not resorbed spontaneously in a short time.

Normal urine irritates the peritoneum, but is not capable of setting up an infectious peritonitis. It is easy, however, for germs to make their way through the ruptured bladder into the peritoneal cavity, usually as the result of catheterization. Hence it is better to operate as soon as the diagnosis of rupture of the bladder is made.

A moderate-size hemorrhage may become encapsulated, forming an intraperitoneal blood-cyst. Cure of this condition will sometimes follow simple puncture. At other times it is necessary to incise the cyst and drain it for a time. Such a collection of blood is occasionally seen in the neighborhood of the pancreas, or in the omentum or mesentery, or in the neighborhood of the spleen.