

2. When profuse serous transudation is probable, as after the removal of a large adherent ovarian tumour.

3. When localised collections of pus are found, as in a case of appendicial abscess.

4. When acute general peritonitis exists, as in a case of perforating ulcer of typhoid.

5. When protective adhesions are desired, as in drainage of the gall-bladder.

6. When secondary infection is feared, as in some cases of intestinal lesions.

In fact, whenever in doubt as to the possibility of the collection of fluids in the abdominal cavity, or the development of sepsis from infection either before, during, or after an operation.

Drainage of the abdominal cavity may be effected in three ways—by natural drainage, by indirect drainage, and by direct drainage.

Natural drainage is dependent on the absorptive power of the peritoneum and the phagocytic action of the leucocytes, and should be maintained by offering as little surgical insult to the tissues as possible. Rough manipulation during the operation should be avoided, every step should be executed rapidly, and the aseptic technique should be simple and uncomplicated, or, in other words, "preserve the absorptive power of the peritoneum," as advised by Senn; "get in quick and out quick," as directed by Morris; and "avoid fuss, feathers, and foolishness," as told by Price.

Indirect drainage is merely an artificial increase of natural drainage, and it may be effected either by saline purgation, which was first introduced by Tait; or by postural drainage, which was first suggested by Clark.

Saline purgatives act by causing a rapid and profuse exosmosis of serum from the intestinal vessels, and the consequent absorption of fluid and septic material from the abdominal cavity. They should be given in concentrated form, and in large and repeated doses, and may often be made more effective by the use of enemata.

Postural drainage consists in the elevation of the foot of the bed some 18 in., thus by gravity carrying any free fluid in the abdomen to the underside of the diaphragm, where its absorption has been proven both theoretically and practically to be much more rapid than from other portions of the peritoneum.

Direct drainage is the abstraction of fluid from the cavity by tubes or gauze or wicks, which are introduced either through the primary wound or through secondary incisions. Drainage by means of a tube was first introduced by Kœberle. The tube consists of a straight glass cylinder from 4 to 6 in. in length, and from $\frac{1}{4}$ to $\frac{1}{2}$ in. in diameter. It is open at both ends, and has its lower third perforated with small openings, and its upper end surrounded by a small rim collar. It is introduced

through the abdominal incision, the lower end going to the bottom of Douglas's *cul-de-sac*, and the upper end emerging at the inferior angle of the wound. In a strict sense it is not a drain, as it cannot empty itself, but the fluid has to be removed either with a syringe or by the insertion of a strip of gauze in its lumen. At one time Kœberle's drain was used in a large number of cases, and in the day when hæmostasis and asepsis were imperfect it undoubtedly saved many lives. At present it is employed only when pus, colloid, or semi-solid material has to be removed.

Drainage by means of gauze strips was first introduced by Bordenheuer, and this method—with the modifications to be mentioned—has largely superseded the use of the tube. Gauze not only effects drainage by capillary action, thus removing fluid from the abdominal cavity and lessening the danger of sepsis, but may also be employed to arrest hæmorrhage by pressure in the form of a tampon; to isolate an infected region from the general peritoneal cavity by acting as a wall or barrier, and to promote the formation of adhesions in cases where they are essential to safety.

Mikulicz, Penrose, and Fowler have each suggested special forms of gauze drains, and the writer wishes to present for the first time a fourth modification, which—while it contains no new principle—is at least a new combination of old ideas.

Mikulicz's drain consists of a square of gauze with a string fastened to its centre. If it is taken by the four corners it forms a pouch or bag with the string coming through its mouth. This bag is introduced into the abdominal cavity and then packed with strips of gauze. It effects both drainage and hæmostasis, and is especially valuable where there is oozing from large raw surfaces. The advantages possessed over ordinary drainage strips are that there is no danger of a piece of gauze being left in the cavity, and the fact that its removal is facilitated by traction on the string, which inverts the pouch and frees it from adhesions.

Penrose's drain consists of a number of strips of gauze passed through a decapitated condom, the ends of the strip projecting several inches beyond the rubber protective, and the absorptive surface being increased, if necessary, by cutting fenestræ in it. The object of this novel use of the condom is to prevent the gauze adhering to the abdominal wound or other portion of its track not requiring drainage. In many cases the drain acts effectively, and its removal is easy and painless.

Fowler's drain consists of a number of parallel strands of "cordine" in a casing of Lister's protective silk. Cordine has a much greater capillary power than gauze, consequently the diameter of the drain is small. A Fowler drain, the size of a lead pencil, will rid the cavity of a large quantity of

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