Closed versus open peritoneal drainage for the management of septic peritonitis

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Key Points:

- Closed peritoneal drainage is indicated if the source of peritonitis can be identified and surgically corrected.
- Open peritoneal drainage is indicated in cases where the source of contamination cannot be identified, contamination is severe or longstanding or the virulence of organisms is high.
- Vacuum assisted closure is a relatively new concept in veterinary medicine that can be adopted for use in cases with septic peritonitis.

Several surgical methods are described for the treatment of generalized septic peritonitis in veterinary medicine, yet controversy exists as to what method is most effective. In general, treatment of septic peritonitis is directed toward the correction of fluid and electrolyte abnormalities, appropriate antimicrobial therapy and exploratory celiotomy to determine and surgically correct the underlying cause of the peritonitis. Most authors advocate some form of postoperative peritoneal drainage. Abdominal drains utilizing intermittent or continuous drainage systems or various open peritoneal drainage techniques are most frequently mentioned. Drains vary in their effectiveness, but none are shown to effectively drain the abdominal cavity. Peritoneal drains have several other disadvantages, including early occlusion of the drain by the omentum, fibrin or exudate, and mechanical irritation of the peritoneum. Lastly, drains may facilitate migration of bacteria into the peritoneal cavity. Pancreatic abscesses or focal abscesses can effectively be managed with either Jackson Pratt or Synder hemovac drain. The suction reservoir is emptied at 4- or 6-hour intervals and the volume and character of the fluid that was collected is recorded. The decision to remove drains is based on a continuous decrease in fluid production and cytologic evidence that the fluid contains only nondegenerative neutrophils without any evidence of intracellular bacteria.

Open peritoneal drainage is a process by which the linea alba and skin are left partially or completely open and covered with sterile dressings, which are changed at frequent intervals. The main advantages of open peritoneal drainage is that it allows unimpeded drainage of fluid and exudate from the peritoneal cavity and at the same time alters the anaerobic environment of the peritoneum. Many surgeons advocate open peritoneal drainage as the optimal treatment for generalized septic peritonitis. The mortality rate associated with open peritoneal drainage for the management of septic peritonitis in the dog and cat ranges between 21% and 48%. In humans managed for septic peritonitis with open peritoneal drainage the mortality rate varies widely. In one human study, there was actually a lower mortality in patients having their abdomen closed (31% mortality) than those treated with either mesh zipper or gauze-packed open-abdomen drainage techniques (44% mortality). Although this difference was not statistically significant, the differences suggested that abdominal re-exploration was favored over open drainage by many human surgeons for septic abdomen in that study.4

The necessity of open versus closed peritoneal drainage in the treatment of septic peritonitis is still unclear in the veterinary literature and varies with experience. Open peritoneal drainage is
recommended if contamination is diffuse and not readily removed during the initial exploratory celiotomy. Open abdominal drainage is a more effective technique for achieving peritoneal drainage than tube drainage. Large volumes of abdominal fluid and exudate can be removed from the abdomen and the bacterial environment can be favorably altered, therefore decreasing the number of anaerobic microorganisms. In humans it is reported that open abdominal drainage can improve a patient’s metabolic condition, reduce abdominal adhesion formation and leave access for repeated exploration and inspection of the abdomen. Reported human complications include massive fluid and protein loss through the open abdomen, increased nursing care, increased cost, additional anesthetic episodes, enteric fistula formation, incisional hernia, evisceration, small bowel obstruction secondary to adhesion formation, and nosocomial infection. Final closure of the abdomen is based on cytological absence of bacteria and degenerative neutrophils in abdominal fluid as well as subjective assessment by the surgeon of gross abdominal contamination.

In general, cases where the source of contamination cannot be identified, contamination is severe or longstanding or the virulence of organisms is high, such as that seen with fecal contamination, open peritoneal drainage is advocated. In these situations open peritoneal drainage with re-exploration and subsequent lavage is thought to offer patients the best chance for survival. On the other hand if the source of contamination can be successfully eliminated and peritoneal lavage is effective at removing residual debris, the abdomen may be closed with good results in a majority of the cases and open peritoneal drainage is not indicated.

Vacuum assisted closure is a relatively new concept in veterinary medicine that can be adopted for use in cases with septic peritonitis. The V.A.C.® abdominal drainage system is specifically designed for the temporary closure of the open abdomen. It consists of polyurethane foam encapsulated in a perforated, non-adherent polyethylene sheet and a second separate foam with adhesive sheets and a suction device. The vacuum applied may be used intermittently or continuously and ranges between 75 mmHg to 125 mmHg. All the cells in the open cell foam communicate so the vacuum is evenly applied to all wound surfaces in contact with the sponge. A plastic adhesive drape (Ioban) is placed around the abdomen to create an air tight seal. Some of the reported advantages of using the VAC system for temporary abdominal wound closure include containment of the intra-abdominal viscera, protection of the viscera from mechanical injury and desiccation, controlled egress of peritoneal fluid and extended periods between bandages changes (48 to 72 hrs. depending on the degree of contamination). Enterocutaneous fistula formation (20%) and intestinal dehiscence (20%) are reported human complications of V.A.C. therapy when used for the treatment of abdominal sepsis. The author has managed 5 cases of generalized septic peritonitis with the V.A.C.® abdominal dressing system with promising results. In the majority of these cases the interval between bandage changes was 48 hours with one case dying within 24 hours of surgery. Conclusion

Dogs and cats with septic peritonitis have a high mortality rate despite surgical intervention and most studies conclude that gastrointestinal leakage is the most common cause of septic peritonitis. With proper case selection, the mortality rate in dogs managed without abdominal drainage in conjunction with surgical correction of the etiology, aggressive peritoneal lavage and appropriate postoperative antimicrobial, plasma and other supportive therapy modalities is similar to mortality rates of dogs managed with open peritoneal drainage. This suggests that if the inciting cause of septic peritonitis is identified and surgically corrected in conjunction with aggressive supportive care open peritoneal drainage may not be necessary in many dogs with septic peritonitis. However, in dogs with severe contamination or those with anaerobic infections it may be desirable
to provide open drainage. Lastly, V.A.C. therapy may offer an alternative to traditional open peritoneal drainage techniques with fewer complications.

References:


