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Should Peritoneal Lavage Be Used with Suction During Laparoscopic Appendectomy for Perforated Appendicitis?

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• Peritoneal lavage • Laparoscopic appendectomy • Perforated appendicitis

Key points

- Historical operative standards included irrigation for peritoneal contamination.
- Abundant laboratory findings suggest irrigation may not be helpful for peritoneal cleansing.
- Few directly comparative studies have been conducted in a controlled model.
- Recent prospective, randomized data suggest no difference between irrigation versus suction alone during laparoscopic appendectomy for perforated appendicitis.

HISTORICAL DEBATE

The debate over the efficacy of peritoneal irrigation or lavage to treat enteric contamination has persisted for at least a century. Lavage was initially advocated in 1906 when Frank Torek described pouring salt water into all peritoneal recesses and "the hand, by some gentle to-and-fro motions, assists it in washing all parts."[1] Furthermore, he advocated that purulent material should be "dipped out, rather than wiped out, as the latter procedure would be more likely to injure the peritoneum." Surgeons in this era seem to have been working under the assumption that cleansing the peritoneum with fluid was important for controlling contamination. As might be expected, reports followed with the suggestion that antibiotics should be added to the irrigant [2]. The pro-irrigation group of surgeons has long held the mantra that "dilution is

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the solution to pollution." Although this phrase is entrenched in debates on environmental pollution, trainees are unlikely to complete their surgical residency without hearing it in reference to contamination in the peritoneal cavity, usually when a surgeon is irrigating the abdomen with fervency. This group sees contamination as a simple mechanical problem that can be cleansed like dishes.

On the other side of the debate, many surgeons think the peritoneal cavity is a clever organ that has the capacity to wall off and control contamination [3]. If this is true, normal saline irrigation may also spread contamination to uncontaminated portions of the peritoneal cavity and cause abscesses to form. As early as 1910, Deaver stated, "abdominal irrigation I avoid… it is most important not to spread infection beyond the limit at which we find it."[4] Later, near the middle of the last century, Rodney Maingot stated in a textbook that, "Irrigation of the peritoneal cavity for cleansing purposes is, in my opinion, never justified, even in the presence of gross fecal contamination."[5]

These previously described thoughts were in the setting of contamination from any source. Regarding appendicitis, publications purporting the benefits of peritoneal irrigation during appendectomy for perforated appendicitis began appearing in the literature more than 3 decades ago [6–8]. The early era of this debate was based largely on anecdotal, philosophic, and noncomparative data. Representing the lowest level of evidence, even a large number of publications in favor of one camp or the other should not be used to form an impression without sound comparative evidence. Due to the paucity of such data, the debate continues today with strong arguments coming from both sides of this issue.

BASIC SCIENCE OF IRRIGATION

The premise of irrigation is based on the idea of mobilizing the microbiological pathogens into a solution that can be suctioned out, which results in a more complete cleansing than would be achieved with suction alone or with manual removal. In order for this concept to be plausible, the organisms need to be quite soluble. If that were the case, the peritoneal cavity should be cleansable like any inanimate object that is soiled with particulate matter. However, microorganisms have been shown to adhere to the peritoneal lining by attaching to mesothelial cells [9]. Others have shown that fecal contamination is resistant to intraperitoneal lavage as it results in only brief reductions in microbial density followed by rapid bacterial recovery [10]. Thus, antimicrobial lavage produces only transitory decreases in the number of bacteria bound to the mesothelial cells. In addition to demonstrating inadequate local control of bacteria with irrigation, others have shown irrigation can cause diffuse or remote inoculation after local contamination [11]. These findings in animal models provide data that counter the logic of irrigation. The microbes may not be able to be washed off mesothelial surfaces with irrigation and the impact of decreasing the population density of microbes may be transient and therefore not clinically meaningful.