Journal of Pediatric Surgery (2012) **47**, 1886–1890

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Journal of Pediatric Surgery

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Advantages of abandoning abdominal cavity irrigation and drainage in operations performed on children with perforated appendicitis

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Received 17 January 2012; revised 9 March 2012; accepted 14 March 2012

Key words:
Perforated appendicitis;
Irrigation;
Drainage;
Children;
Wound infection

Abstract

Purpose: This study evaluates the effect of peritoneal irrigation and drainage on postoperative morbidity when used together for perforated appendicitis.

Material and methods: This study was conducted on children undergoing open appendectomy for perforated appendicitis. Sixty-one children with perforated appendicitis operated on with irrigation and drainage between July 1998 and September 2001 (group DI) and 173 children with perforated appendicitis who underwent surgery without irrigation and drainage (group NDI) between October 2001 and November 2011 were retrospectively evaluated (a total of 234 patients). All patients were treated and followed up by the same pediatric surgeon using the same protocol. Both groups were compared in respect to postoperative complications, including wound infection, wound dehiscence, intraabdominal abscess, prolonged ileus, the presence of small bowel obstruction requiring surgery, operative time, and length of postoperative hospital stay.

Results: Of the total 234 patients, 151 were male and 83 were female with a mean age of 8.9 ± 3.7 years (range, 1.5-15 years). The wound infection rates were 4.9% in group DI and 1.7% in group NDI ($P = .184$). Wound dehiscence was seen in 1.6% vs 0%, prolonged ileus in 8% vs 2.3%, intraabdominal abscess in 4.9% vs 1.7%, and small bowel obstruction requiring surgery in 1.6% vs 0.6% of the patients ($P = .261$, $P = .054$, $P = .184$, and $P = .454$, respectively). No statistically significant difference in postoperative infectious complications was found between both groups. The length of postoperative hospital stay was 9.9 ± 4.1 days in group DI vs 6.3 ± 2.4 days in group NDI ($P < .001$). The operation times were 39 ± 8 and 31 ± 11 minutes, respectively ($P < .001$).

Conclusion: This study demonstrates that peritoneal irrigation and drainage in children with perforated appendicitis is not required, and in fact, these procedures cause an increase in operative time.

Appendicitis is the most common disease of childhood requiring abdominal surgery. Approximately 390,000 children undergo surgery for appendicitis in the United States annually, and nearly 36% of cases have perforated at the time of

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http://dx.doi.org/10.1016/j.jpedsurg.2012.03.049

diagnosis. Perforated appendicitis is still a cause of significant postoperative morbidity [1,2]. Although there is some consensus concerning etiology, diagnosis, and treatment of appendicitis, some aspects of the disease are still controversial. One is the necessity for abdominal drainage in perforated cases. However, the need for peritoneal irrigation has rarely been discussed. These 2 procedures, performed to reduce infectious complications during the postoperative period, are used by many pediatric and general surgeons. The objective of our study is to evaluate whether peritoneal irrigation and drainage are useful in the treatment of perforated appendicitis by comparing 2 groups of patients with and without irrigation and drainage. Patients were compared for postoperative complications, including wound infection, wound dehiscence, prolonged ileus, intraabdominal abscess, small bowel obstruction (SBO) requiring surgery, operative time, and length of postoperative hospital stay.

1. Material and methods

This study was conducted in children undergoing open appendectomies for perforated appendicitis at the pediatric surgery clinic. Sixty-one pediatric patients operated on for perforated appendicitis with drainage and irrigation between July 1998 and September 2001 (group DI) and 173 pediatric patients who underwent surgery between October 2001 and November 2011 without drainage and irrigation (group NDI) were retrospectively evaluated (a total of 234 patients). Gross perforation of the appendix was confirmed by pathologic examination in all patients. Patients with gangrenous appendicitis and microscopic perforation were excluded from the study. The patients with perforated appendicitis who underwent an interval appendectomy after ultrasonography-assisted percutaneous abscess drainage or laparoscopic appendectomy were also excluded from the study (15 cases).

All patients were treated and followed up by the same pediatric surgeon (IA) using the same protocol. All patients received preoperative and postoperative aggressive intravenous fluid replacement, triple antibiotic treatment (cephalosporin + aminoglycoside + antianaerobic), and nasogastric decompression. In patients with signs of electrolyte imbalance, dehydration and sepsis, operation was delayed until laboratory and clinical findings improved. Operation was performed under general anesthesia via a right paramedian incision below the umbilicus. Cases included patients with a large palpable mass in the right lower abdominal quadrant, those with a very long history of abdominal pain, and those with significant abdominal distension. The standard right lower quadrant (RLQ) transverse muscle-splitting incision was preferred in patients with smaller masses or in patients with a shorter history and without severe abdominal findings. All patients underwent appendectomy. The appendiceal stump was doubly ligated but not inverted. The wounds were primarily closed. All purulent fluid was aspirated, and debris and fibrin clots were removed in all patients. Adhesions between the bowel loops were cleared, and if present, interloop abscesses were drained and aspirated. In the 61 patients in group DI, the peritoneal cavity was repeatedly washed with warm 0.9% NaCl solution until the aspirated fluid was clear, the solution was aspirated, and a drain was placed into the pelvis and/or right pericolic region and exited the abdomen through a separate incision. Neither peritoneal cavity irrigation nor drainage was used in group NDI.

If, during the postoperative period, there was no abnormal distension, the findings on abdominal examination resolved, there was passage of gas and/or stool and/or a marked decrease in the amount of nasogastric tube (NG) drainage, and/or if the drainage was nonbilious, the NG was removed. The patient was started with a clear diet 8 to 12 hours later in the absence of vomiting and abdominal pain. The patients were discharged with a prescription for oral antibiotic treatment if they were afebrile for at least 24 hours, had normal bowel movements, and had no signs of complications.

In case of fever, vomiting, and abdominal pain lasting for more than 5 days, in the absence or cessation of feces output, in the presence of abdominal distension, or if the abdominal radiographs showed air-fluid levels, an abdominal ultrasound scan was performed, and the detection of abscess was considered an intraabdominal abscess. The presence of these findings without an abscess was considered a prolonged ileus.

A modification of Centers for Disease Control definition of surgical wound infections criteria published in 1992 was used to define a wound infection [3]. Based on these criteria, purulent discharge from the incision and growth of microorganisms from the wound discharge were considered a wound infection. The presence of at least 1 of the findings of hyperemia, swelling, increased warmth, and excessive tenderness and the presence of infection in the wound according to the judgment of the surgeon were considered a wound infection.

Both groups were compared for the following operative findings: age, white blood cell (WBC) count, time of admittance, incision type, localized free pus, appendiceal mass, generalized peritonitis, and operative time. Both groups were compared for the following postoperative findings: wound dehiscence, prolonged ileus, intraabdominal abscess, SBO requiring surgery, and length of hospitalization. In both groups, the t test in independent groups was used to compare the mean values, and χ^2 test and Fisher's Exact χ^2 test were used for the comparison of percentages. $P < .05$ was accepted as statistically significant.

2. Results

Two hundred thirty-four children who underwent appendectomy for perforated appendicitis between July 1998 and October 2011 were included in the study. Among 234 patients, 151 were male and 83 were female with a mean age