ORIGINAL RESEARCH

Surgical Management of Secondary Peritonitis: An Experience of 212 Cases in 5 Years

Salah Mansor[1], Ahmad Zarour[2], Salahaldeen Dawdi[3], Idress Suliman[4], Abdulhameed Ali[5], Hatim Aljumaili[6], Mohamed Said Ghali[7]

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Abstract

Aim: Secondary peritonitis is a common serious surgical condition that has a significant rate of morbidity and mortality. Postoperative abdominal abscesses are considered a common complication. The purpose of this study is to analyze how the type of peritonitis, whether general or localized, can influence the formation of postoperative abdominal abscesses and the use of surgical drains to minimize the development of this complication.

Materials and methods: A retrospective study was conducted on patients who presented with secondary peritonitis and had surgical treatment over a 5-year period in the acute care surgery section, Hamad Medical Corporation, Doha, Qatar. Patients' age, gender, indications for surgery, intraoperative findings, surgical procedure, antibiotic used, postoperative complications, postoperative intervention, surgical reexploration, and hospital stays were among the data collected.

Results: A total of 212 patients were admitted with secondary peritonitis during the study period. Around 112 (52.8%) patients with localized and 100 (47%) with generalized peritonitis. The average age was 37. Perforated appendicitis was the cause of secondary peritonitis in 150 (70.8%) patients, perforated peptic ulcers in 45 (21.2%), perforated colon in nine (4.3%), perforated small bowel in five (2.4%), perforated gallbladder in two (0.9%), and perforated gastric ulcer in one patient (0.5%). A postoperative abdominal abscess was diagnosed in 25% of the patients with generalized peritonitis and 22.3% of those with localized peritonitis. Surgical drains were placed in 152 (71.6%) patients, and 38 (25%) of them developed a postoperative abdominal abscess.

Conclusion: Postoperative abdominal abscess is common in patients operated on for secondary peritonitis, and whether the peritonitis was localized or diffused, or a drain was placed at the initial surgery had no measurable significance on the postoperative abdominal abscess formation.

Keywords: Emergency, Perforation, Peritonitis, Sepsis.

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Introduction

Despite advancements in surgical and critical care management, peritonitis remains a major problem and real challenge for surgeons due to its high morbidity and mortality rate.[1] Peritonitis can be classified as primary, secondary, or tertiary. Secondary peritonitis, which is the focus of the present study, results from diverse pathologies causing perforation of hollow viscera and intra-abdominal contamination with bowel contents, which may result in septic shock and death. Ischemic bowel also causes secondary peritonitis but is less common than hollow viscus perforation. Secondary peritonitis often manifests clinically as an acute abdomen and is among the most common reasons for emergency surgeries.[2]

Secondary peritonitis affects all populations regardless of age, gender, or geographic distribution, accounts for around 1% of all hospital visits and is the second leading cause of sepsis worldwide. Mortality rates have been reported as high as 20%, particularly if not appropriately managed. Therefore, its accurate diagnosis and prompt management are challenging, and surgery remains the gold standard for care.[3,4]

Many scoring systems based on clinical and laboratory data have been created to determine the prognosis and severity of peritonitis. The Sepsis Severity Score, the Acute Physiology and Chronic Health Evaluation II score, the Simplified Acute Physiology Score, the Ranson score, and the Mannheim Peritonitis Index (MPI) are some of the scores.[5–9] MPI is the most commonly used in emergency settings due to its specificity, accuracy, and easy use, allowing for outcome assessment, prognosis prediction, and family counseling.[10] MPI is based on eight key prognostic components (Table 1) and is divided into low, intermediate, and high-risk groups for mortality.[9,11,12] Patients with an MPI score >26 are regarded as high mortality risk.

[1]Department of Acute Care Surgery, Hamad Medical Corporation (HMC), Doha, Qatar; Department of General, Trauma and Acute Care Surgery, Al-Jalla Teaching Hospital, Benghazi University, Benghazi, Libya

[2–6]Department of Acute Care Surgery, Hamad Medical Corporation (HMC), Doha, Qatar

[7]Department of Acute Care Surgery, Hamad Medical Corporation (HMC), Doha, Qatar; Department of General Surgery, Ain Shams University, Cairo, Egypt

Corresponding Author: Salah Mansor, Department of Acute Care Surgery, Hamad Medical Corporation (HMC), Doha, Qatar; Department of General, Trauma and Acute Care Surgery, Al-Jalla Teaching Hospital, Benghazi University, Benghazi, Libya, Phone: +974 55633006, e-mails: salah72ly@yahoo.com; smansor@hamad.qa

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The aim of this study was to assess the impact of localized or generalized secondary peritonitis on the development of postoperative abdominal abscesses, as well as the effectiveness of surgical drains in reducing the risk of postoperative abdominal abscess formation.

Materials and Methods

A retrospective study was conducted on 212 patients with secondary peritonitis due to hollow viscus perforation over a 5-year period (January 2015–December 2020) in the acute care surgery section, Al-Khor Hospital, Hamad Medical Corporation, Qatar.

Patients' age, gender, etiology of perforation, indications for surgery, intraoperative findings, surgical procedure, antibiotic used, postoperative complications, postoperative interventions, surgical reexploration, and hospital stay were collected.

An initial preoperative workup and resuscitation with intravenous fluids, antibiotics, analgesics, and nasogastric decompression were performed in all cases. Surgical control of the contamination, peritoneal cavity irrigation, and insertion of drains, followed by admission to the intensive care unit. Patients with primary peritonitis and patients who were treated conservatively were excluded from the study.

Statistical Package for the Social Sciences (SPSS) statistics software was used for the statistical analysis (SPSS for Windows, release 15.0, SPSS). For continuous variables, descriptive statistics are reported as mean values with standard deviations. The chi-squared test and Fisher's exact test are used to assess categorical data, which is expressed as absolute numbers with percentages. A *p*-value of 0.05 was considered statistically significant in all tests.

Informed consent was obtained from all patients or legally authorized representatives, and the study was approved by the Institutional Review Board.

Results

A total of 212 patients were admitted with secondary peritonitis due to hollow viscus perforation during the 5-year study period (January 2015 to December 2020). About 112 (52.8%) had localized and 100 (47%) had generalized peritonitis. The average age was 37 years (±11.7). Most, that is, 189 (89.2%) patients were men and 23 (10.8%) were women. Perforated appendicitis was the cause of secondary peritonitis in 150 (70.8%) patients, perforated peptic ulcers in 45 (21.2%), perforated colon in nine (4.3%), perforated small bowel in five (2.4%), perforated gallbladder in two (0.9%), and perforated gastric ulcer in one patient (0.5%). A postoperative abdominal abscess was diagnosed in 25% of the patients with generalized peritonitis and 22.3% of those with localized peritonitis. Complications are shown in Table 2.

Overall, 16 (7.5%) patients required the postoperative abdominal abscess drained under radiological guidance. Reoperation was required in eight (3.7%) cases, and an exploratory laparotomy and peritoneal lavage were used to treat two (0.94%) cases of postoperative collections after perforated appendicitis. Four (1.8%) cases of perforated peptic ulcers were reexplored, three for a postoperative leak from the omental patch, which was managed by peritoneal lavage. Another postoperative collection was treated by reexploration and peritoneal lavage, while a patient with a small bowel perforation and the anastomotic leak was reexplored, and a new anastomosis was made. Finally, one patient had a wound abscess managed with delayed wound closure.

In 152 (71.6%) patients, drains were placed during the initial surgery. The drains were removed on average for 6.1 days (range 2–31) (Fig. 1). A total of 38 (25%) patients that had a surgical drain inserted during the initial surgery developed a postoperative abdominal abscess. In our analysis, there was no significant statistical difference in the rate of intra-abdominal abscesses between patients with or without surgical drains (*p* 0.439). In 100 generalized peritonitis patients, 25 (25%) developed a postoperative abdominal abscess, vs 25 out of 112 with localized peritonitis. Thus, no significant statistical difference was observed between localized and diffused peritonitis in the development of postoperative abdominal abscess (*p* 0.646).

Table 1: Mannheim peritonitis index

Risk factors	*Points*
Age >50 years	5
Gender, female	5
Organ's failure	7
Malignancy	4
Source of infection not colonic	4
Type of peritonitis, Generalized	6
Preoperative duration of peritonitis >24	4
Intraperitoneal exudate	0
Clear	6
Purulent	12
Fecal	

Discussion

Secondary peritonitis is among the most serious surgical emergency presentations, carrying high morbidity and mortality. Secondary peritonitis due to hollow viscus perforation has long been regarded as a critical illness characterized by viscero-somatic pain, reflex abdominal muscle guarding, and rigidity. Most patients with secondary peritonitis present in septic shock, mandating urgent care.[13] Secondary peritonitis is frequently categorized as either localized or generalized. The site of disease and perforation in localized peritonitis is usually contained by neighboring organs, whereas generalized peritonitis affects the entire peritoneal cavity. Peritonitis is diagnosed using a combination of history and clinical signs, as well as diagnostic laboratory tests and radiographic

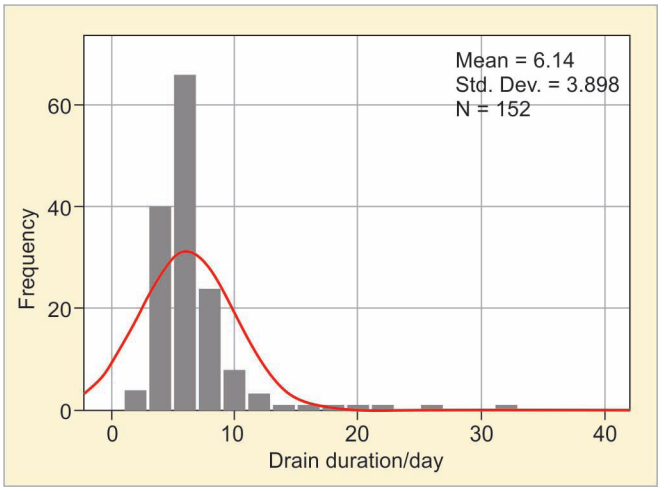

Fig. 1: The duration of inserted surgical drain per day

Table 2: Type and rate of complication in each diagnosis

Complication	*Type of peritonitis*	*No.*	*Total (%)*
Perforated appendicitis			
Postoperative collection	General	9	26 (12.2%)
	Local	17	
Postoperative ileus	General	3	7 (3.3%)
	Local	4	
Wound infection	General	2	5 (2.3%)
	Local	3	
Septic shock	General	1	1 (0.4%)
Port-site bleeding	Local	1	1 (0.4%)
Pneumonia	Local	1	1 (0.4%)
Chronic RIF pain	Local	1	1 (0.4%)
Perforated peptic ulcer			
Postoperative collection	General	2	3 (1.4%)
	Local	1	
Bile leak	General	3	3 (1.4%)
Wound infection	General	1	1 (0.4%)
Wound dehiscence	General	1	1 (0.4%)
Aspiration pneumonia	General	1	1 (0.4%)
Hypokalemia	General	1	1 (0.4%)
IVC thrombosis	General	1	1 (0.4%)
Perforated colon			
Postoperative collection	General	2	2 (0.9%)
Septic shock	Local	1	1 (0.4%)
Perforated small bowel			
Postoperative collection	General	3	3 (1.4%)
Wound infection	General	2	2 (0.9%)
Postoperative ileus	General	1	1 (0.4%)
Anastomosis leak	General	1	1 (0.4%)
Total		63	63 (29.7%)

imaging. Controlling the source of infection, wash out of the peritoneal cavity, and decompression of the gastrointestinal tract to reverse the negative consequences of increasing intra-abdominal pressure are the mainstay of surgical treatment. Patient's age, gender, perforation location, and type of contamination, whether gastric, small bowel, or colon perforation, duration of inflammation, associated diseases, including malignancy, and treatment delay, all have a significant impact on morbidity and mortality.[10] The mortality rate remains high despite advances in surgery, intensive care, and the use of appropriate antibiotics.[14]

Secondary peritonitis frequently causes a postoperative abdominal abscess, which can be fatal or result in significant morbidity and protracted hospital stay.[15] Many factors, including failure to manage the source, treatment delay, improper antibiotic, and surgical technique, can increase the likelihood of postoperative abscess formation. Diabetes, obesity, and age have all been identified as additional risk factors[16,17] that contribute to the production of granulocyte-rich exudate, which can be contained or widespread. In terms of clinical manifestations, symptoms may range from asymptomatic to severe abdominal pain and sepsis. The most common complication following appendectomy is an intraperitoneal abscess.[18–20]

It can be single or multiple, confined by adhesions, omentum, or adjacent viscera. Abdominal abscesses invariably contain a polymicrobial collection of both aerobic and anaerobic bacteria from the gastrointestinal tract. The septic shock from untreated abdominal abscesses carries a significant fatality rate.[21–23] Small collections may be treated conservatively with antibiotics; however, symptomatic cases require additional interventions, such as percutaneous drainage under radiologic guidance, with a high success rate.[15] Some abscesses may necessitate surgical treatment and have a high rate of morbidity and mortality.[23] Growing data suggests that peritoneal washout is ineffective and does not provide significant benefits over suction alone in terms of abdominal abscess formation, wound infection, or length of hospital stay.[24,25] To date, most surgeons consider abdominal surgical drains as the final and essential step in surgery for secondary peritonitis.[26,27] In general, the surgical drain is inserted to prevent liquid accumulation while removing fluids and/or air. Drain output characteristics may help surgeons to diagnose postoperative bleeding, anastomotic leakage, or abscess formation.[28,29] Surgical drains, on the contrary, can cause complications, delaying recovery, and lengthening hospital stays.[30] Therefore, its usage in modern surgery is disputed and its use should be done judiciously.[30–32]

The safety and efficacy of drains in preventing intraperitoneal abscesses after appendectomy and the optimal time for removal have been extensively studied.[33] Drains have been shown to increase the incidence of fecal fistula formation[34] and prolonged hospital stay.[32,35] Thus, there is currently little evidence of benefit for abdominal drains in secondary peritonitis, but controversy remains.

The number of drains dropped in recent years due to the many studies showing that drain does not adequately drain the peritoneal cavity.[36]

The authors' opinion and most of the literature is that routine insertion of abdominal drains is not necessary[37,38] and may be harmful. In our hospital, however, many surgeons still place surgical drains for secondary peritonitis in the hope of reducing postoperative complications. Drains are often left for up to 30 days. In the present analysis (Fig. 1), we found the rate of postoperative abdominal abscess in patients with surgical drains was the same rate as in those without. There was no statistically significant difference between surgical drain insertion in reducing postoperative abdominal abscess formation (*p* 0.439), suggesting that drains do not reduce postoperative abscess.

Conclusion

The postoperative abdominal abscess is common in patients operated on for secondary peritonitis, and whether the peritonitis was localized or diffused, or a drain was placed at the initial surgery had no measurable significance on the postoperative abdominal abscess formation.

Orcid

Salah Mansor https://orcid.org/0000-0001-9878-4277
Ahmad Zarour https://orcid.org/0000-0002-7399-5497
Mohamed Said Ghali https://orcid.org/0000-0002-3892-1273

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