International Journal of Life Sciences, Biotechnology and Pharma Research Vol. 13, No. 7, July 2024 Online ISSN: 2250-3137
Print ISSN: 2977-0122

DOI: 10.69605/ijlbpr_13.7.2024.103

ORIGINAL RESEARCH

To investigate the incidence of intra-abdominal sepsis after emergency abdominal surgery

Rajendrakumar Natvarlal Nayak

Assistant Professor, Department of Surgery, Swaminarayan Institute of Medical Sciences and Research, Kalol, Gandhinagar, Gujarat, India

Corresponding Author
Rajendrakumar Natvarlal Nayak
Assistant Professor, Department of Surgery, Swaminarayan Institute of Medical Sciences and Research, Kalol, Gandhinagar, Gujarat, India

Received Date: 26 July, 2024 Accepted Date: 31 July, 2024

ABSTRACT

Aim: To investigate the incidence of intra-abdominal sepsis after emergency abdominal surgery. **Material and methods**: A total of 100 patients who underwent emergency abdominal surgery were enrolled. The inclusion criteria were: patients aged 18 years and older, those who underwent surgery for conditions such as perforated viscus, bowel obstruction, or traumatic abdominal injury, and patients who provided informed consent. Demographic and clinical data were meticulously collected for each patient, including age, gender, underlying medical conditions, indication for surgery, type of surgery performed, duration of surgery, and intraoperative findings. Postoperative data included the length of hospital stay, the requirement for ICU admission, and the occurrence of postoperative complications.Intra-abdominal sepsis was diagnosed based on clinical, radiological, and microbiological criteria. **Results**: Among the 100 patients, the most common indication was perforated viscus (40%), followed by bowel obstruction (35%) and traumatic abdominal injury (25%). Regarding the type of surgery, a majority (70%) underwent laparotomy, while the remaining 30% had laparoscopic surgery. The duration of surgery was less than 2 hours for 60% of the patients and 2 hours or more for 40%, indicating that a substantial number of surgeries were relatively lengthy, which can impact the recovery and risk of complications. The length of hospital stay was evenly split, with 50% of patients staying less than 7 days and the other 50% staying 7 days or more. ICU admission was required for 40% of the patients, reflecting the severity of their conditions and the need for intensive postoperative care. Postoperative complications occurred in 35% of the patients, while 65% had no complications. The analysis of risk factors for sepsis revealed that the duration of surgery (≥2 hours) significantly increased the odds of developing sepsis (odds ratio 2.5, p-value 0.01). ICU admission was another significant risk factor, with an odds ratio of 3.0 (p-value 0.002). The presence of comorbidities also contributed to the risk, with an odds ratio of 2.0 (p-value 0.03). **Conclusion**: The study highlights significant demographic, clinical, and postoperative findings in patients undergoing emergency abdominal surgery. Middle-aged males predominated, with common comorbidities including diabetes and hypertension.

Keywords: Abdominal surgery, sepsis

INTRODUCTION

Intra-abdominal sepsis is a significant cause of morbidity and mortality following emergency abdominal surgery. It encompasses a spectrum of conditions ranging from localized infections to severe systemic responses that can culminate in septic shock and multi-organ failure. The pathophysiology of intra-abdominal sepsis involves a complex interplay of microbial invasion, immune response, and resultant tissue damage. Emergency abdominal surgeries, often performed under urgent and suboptimal conditions, present a higher risk for postoperative complications, including intra-abdominal sepsis .[1-3] The incidence of intra-abdominal sepsis varies widely, influenced by factors such as the nature of the surgical procedure, the patient's underlying health status, and the presence of comorbidities.[4] Conditions like perforated peptic ulcers, bowel ischemia, and acute intestinal obstruction are particularly prone to post-surgical infectious complications due to the high bacterial load and potential for extensive tissue injury. Early identification and management of intra-abdominal sepsis are crucial, as delays in diagnosis can significantly worsen the prognosis. Surgical site infections (SSIs) are the most common form of intra-abdominal sepsis, often originating from contamination during surgery or postoperative wound care. These infections can extend to peritonitis, drain

DOI: 10.69605/ijlbpr_13.7.2024.103

site infections, and anastomotic dehiscence, further complicating the patient's recovery. The presence of intra-abdominal sepsis often necessitates additional surgical interventions, prolonged hospital stays, and intensive antibiotic therapy, thereby increasing the healthcare burden.[5,6] Microbial pathogens responsible for intra-abdominal sepsis typically include gram-negative bacilli, such as Escherichia coli and Klebsiella species, as well as gram-positive organisms like Staphylococcus aureus. The polymicrobial nature of these infections complicates treatment regimens and underscores the need for accurate microbial identification and susceptibility testing.[7,8] The management of intra-abdominal sepsis requires a multifaceted approach, combining prompt surgical intervention to remove the source of infection, adequate drainage, and broad-spectrum antibiotic therapy. Advances in surgical techniques and perioperative care have improved outcomes, but intra-abdominal sepsis remains a formidable challenge. Recent studies have emphasized the role of early diagnostic markers and the implementation of evidence-based protocols to reduce the incidence and improve the prognosis of intra-abdominal sepsis following emergency abdominal surgeries

MATERIAL AND METHODS

This study was designed as a prospective observational study to investigate the incidence of intra-abdominal sepsis following emergency abdominal surgery. Conducted at a tertiary care hospital specializing in emergency and critical care, the study aimed to provide comprehensive insights into the occurrence and risk factors associated with postoperative intra-abdominal sepsis.

A total of 100 patients who underwent emergency abdominal surgery were enrolled. The inclusion criteria were: patients aged 18 years and older, those who underwent surgery for conditions such as perforated viscus, bowel obstruction, or traumatic abdominal injury, and patients who provided informed consent. Exclusion criteria included patients with pre-existing sepsis, immunocompromised conditions such as HIV/AIDS or those undergoing chemotherapy, and patients with incomplete medical records.

METHODOLOGY

Demographic and clinical data were meticulously collected for each patient, including age, gender, underlying medical conditions, indication for surgery, type of surgery performed, duration of surgery, and intraoperative findings. Postoperative data included the length of hospital stay, the requirement for ICU admission, and the occurrence of postoperative complications.

Diagnosis of Intra-Abdominal Sepsis

Intra-abdominal sepsis was diagnosed based on clinical, radiological, and microbiological criteria:

- **Clinical Criteria:** Fever, tachycardia, hypotension, abdominal pain, and signs of peritonitis.
- **Radiological Criteria:** Evidence of intra-abdominal infection or abscess on imaging studies such as ultrasound, CT scan, or MRI.
- **Microbiological Criteria:** Positive culture from intra-abdominal fluid or tissue samples obtained during surgery or through percutaneous drainage.

Patients were monitored daily for signs and symptoms of sepsis until discharge. Those who developed sepsis were managed according to standard hospital protocols, which included broad-spectrum antibiotics, fluid resuscitation, and surgical intervention if required.The primary outcome measure was the incidence of intra-abdominal sepsis post-emergency abdominal surgery. Secondary outcome measures included the identification of risk factors associated with sepsis, length of ICU stay, overall length of hospital stay, and mortality rate.

Statistical Analysis

Data were analyzed using SPSS version 25.0. Descriptive statistics summarized the demographic and clinical characteristics of the patients. Continuous variables were expressed as mean ± standard deviation (SD), and categorical variables as frequencies and percentages. Risk factors for sepsis were identified using logistic regression analysis, with a p-value of less than 0.05 considered statistically significant.

RESULTS

Table 1: Demographic Characteristics of Patients

The demographic data of the 100 patients show a varied distribution of age and gender, which provides a comprehensive overview of the study population. The age range was divided into five groups: 18-30 years (25%), 31-40 years (30%), 41-50 years (20%), 51-60 years (15%), and over 60 years (10%). This distribution indicates a higher concentration of patients in the middle age groups, particularly those aged 31-40 years. The gender distribution was skewed towards males, who comprised 60% of the participants, while females accounted for 40%. Additionally, 20% of the patients had diabetes, 30% had hypertension, and 50% had no underlying conditions. This demographic spread helps in understanding the patient profile and the potential influence of age, gender, and comorbidities on postoperative outcomes.

Table 2: Clinical Data and Surgical Indications

The clinical data highlight the indications for emergency abdominal surgery and the types of surgeries performed. Among the 100 patients, the most common indication was perforated viscus (40%), followed by bowel obstruction (35%) and traumatic abdominal injury (25%). This suggests that a significant proportion of emergency abdominal

DOI: 10.69605/ijlbpr_13.7.2024.103

surgeries were due to acute, severe conditions requiring immediate intervention. Regarding the type of surgery, a majority (70%) underwent laparotomy, while the remaining 30% had laparoscopic surgery. The duration of surgery was less than 2 hours for 60% of the patients and 2 hours or more for 40%, indicating that a substantial number of surgeries were relatively lengthy, which can impact the recovery and risk of complications.

Table 3: Postoperative Outcomes

Postoperative outcomes were evaluated in terms of length of hospital stay, ICU admission, and postoperative complications. The length of hospital stay was evenly split, with 50% of patients staying less than 7 days and the other 50% staying 7 days or more. ICU admission was required for 40% of the patients, reflecting the severity of their conditions and the need for intensive postoperative care. Postoperative complications occurred in 35% of the patients, while 65% had no complications. These outcomes underscore the significant postoperative care and monitoring needed for patients undergoing emergency abdominal surgery, with a notable portion experiencing complications and extended hospital stays.

Table 4: Diagnosis of Intra-Abdominal Sepsis

Among the 35 patients diagnosed with intra-abdominal sepsis, the diagnostic criteria were based on clinical, radiological, and microbiological evidence. Clinically, the most common signs were abdominal pain or peritonitis (85.7%), fever (71.4%), tachycardia (57.1%), and hypotension (42.9%). Radiological confirmation through ultrasound, CT scan, or MRI was present in 80% of the cases, while positive microbiological cultures were found in 71.4%. These findings highlight the importance of a multifaceted diagnostic approach to accurately identify intra-abdominal sepsis, combining clinical symptoms with radiological and microbiological evidence.

Table 5: Outcome Measures

The outcome measures for the 35 patients with intra-abdominal sepsis included the length of ICU stay, overall hospital stay, and mortality rate. A significant majority (71.4%) required an ICU stay of 5 days or more, while 28.6% stayed less than 5 days. The overall length of hospital stay was 10 days or more for 57.1% of the patients, and less than 10 days for 42.9%. The mortality rate among these patients was 14.3%, with 85.7% surviving. These results emphasize the serious nature of intra-abdominal sepsis, necessitating prolonged intensive care and hospital stays, with a notable impact on patient survival.

Table 6: Risk Factors for Sepsis

The analysis of risk factors for sepsis revealed that the duration of surgery (≥2 hours) significantly increased the odds of developing sepsis (odds ratio 2.5, p-value 0.01). ICU admission was another significant risk factor, with an odds ratio of 3.0 (p-value 0.002). The presence of comorbidities also contributed to the risk, with an odds ratio of 2.0 (p-value 0.03). These findings indicate that longer surgeries, ICU admission, and pre-existing health conditions are significant predictors of intra-abdominal sepsis, underscoring the need for vigilant postoperative monitoring and tailored management strategies to mitigate these risks.

Table 1: Demographic Characteristics of Patients

Variable	Frequency (n=100)	Percentage (%)
Age (years)		
18-30	25	25%
31-40	30	30%
41-50	20	20%
51-60	15	15%
>60	10	10%
Gender		
Male	60	60%
Female	40	40%
Underlying Conditions		
Diabetes	20	20%
Hypertension	30	30%
None	50	50%

Table 2: Clinical Data and Surgical Indications

Variable	Frequency (n=100)	Percentage (%)
Indication for Surgery		
Perforated viscus	40	40%
Bowel obstruction	35	35%
Traumatic abdominal injury	25	25%

DOI: 10.69605/ijlbpr_13.7.2024.103

Type of Surgery		
Laparotomy	70	70%
Laparoscopic surgery	30	30%
Duration of Surgery		
<2 hours	60	60%
≥2 hours	40	40%

Table 3: Postoperative Outcomes

Variable	Frequency (n=100)	Percentage (%)
Length of Hospital Stay		
<7 days	50	50%
≥7 days	50	50%
ICU Admission		
Yes	40	40%
No	60	60%
Postoperative Complications		
Yes	35	35%
No	65	65%

Table 4: Diagnosis of Intra-Abdominal Sepsis

Diagnostic Criteria	Frequency (n=35)	Percentage (%)
Clinical Criteria		
Fever	25	71.43%
Tachycardia	20	57.14%
Hypotension	15	42.86%
Abdominal Pain/Peritonitis	30	85%
Radiological Criteria		
Ultrasound/CT/MRI Confirmation	28	80%
Microbiological Criteria		
Positive Culture	25	71.43%

Table 5: Outcome Measures

Variable	Frequency (n=35)	Percentage (%)
Length of ICU Stay		
<5 days	10	28.57%
≥5 days	25	71.43%
Overall Length of Stay		
<10 days	15	42.86%
≥10 days	20	57.14%
Mortality Rate		
Survived	30	85%
Deceased	5	14.29%

Table 6: Risk Factors for Sepsis

Risk Factor	Odds Ratio	95% CI	p-value
Duration of Surgery ≥2 hrs	2.5	1.3-4.7	0.01
ICU Admission	3.0	1.5-6.0	0.002
Presence of Comorbidities	2.0	1.1-3.8	0.03

DISCUSSION

The demographic distribution in this study shows a balanced representation of different age groups and a male predominance, with 60% of the patients being male. This gender distribution aligns with previous studies indicating a higher incidence of emergency abdominal surgeries among males. For instance, Chowdhury et al[9] reported a similar male predominance in their study on emergency laparotomies. The age distribution, with a higher concentration in the middle age groups (31-40 years), is consistent with the findings of Schein et al[10], who noted that individuals in this age range are more prone to conditions necessitating emergency abdominal surgery. The presence of comorbid conditions such as diabetes (20%) and hypertension (30%) highlights the need to consider these factors when planning postoperative care, as these comorbidities can

DOI: 10.69605/ijlbpr_13.7.2024.103

influence recovery and complication rates (Boey et al[11]).

The indications for surgery in this study were primarily perforated viscus (40%), bowel obstruction (35%), and traumatic abdominal injury (25%). This distribution is reflective of the urgent nature of these conditions, which often necessitate immediate surgical intervention. The predominance of laparotomies (70%) over laparoscopic surgeries (30%) is indicative of the severity and complexity of the cases managed. Studies such as those by Bickell et al.[12]have shown that open surgical approaches are often preferred in emergency settings due to better access and visibility. The duration of surgery, with 40% lasting 2 hours or more, aligns with the observations by Moor et al.[13], who noted that prolonged surgeries are often required in complicated cases, increasing the risk of postoperative complications.

Postoperative outcomes revealed that 50% of the patients had a hospital stay of 7 days or more, and 40% required ICU admission. This reflects the critical nature of the cases and the intensive care needed post-surgery. The 35% complication rate observed in this study is consistent with findings from Meakins et al.[14], who reported similar rates of postoperative complications in emergency abdominal surgeries. The need for extended hospital stays and ICU admissions underscores the importance of vigilant postoperative monitoring and the provision of adequate resources for patient care.

The diagnosis of intra-abdominal sepsis in 35 patients was based on a combination of clinical, radiological, and microbiological criteria. The high prevalence of abdominal pain or peritonitis (85%) and fever (71.43%) as clinical signs is consistent with the diagnostic criteria outlined by Schein et al.[10] Radiological confirmation in 80% of the cases highlights the critical role of imaging in diagnosing intra-abdominal infections, as supported by the study by Levison and Bush.[15] Positive microbiological cultures in 71.43% of the cases further emphasize the importance of microbiological analysis in confirming the presence of sepsis.

The outcome measures for patients with intra-abdominal sepsis indicated that 71.43% required an ICU stay of 5 days or more, with 57.14% having an overall hospital stay of 10 days or more. The mortality rate of 14.29% observed in this study is lower than the rates reported by Fry[16] , who noted mortality rates of up to 25% in patients with intra-abdominal sepsis. This difference could be attributed to advancements in surgical techniques, perioperative care, and the early implementation of evidence-based sepsis management protocols.

The analysis identified the duration of surgery (≥2 hours), ICU admission, and the presence of comorbidities as significant risk factors for developing sepsis. These findings are consistent with previous studies. For instance, the study by Bailey et al.[17] highlighted the increased risk of sepsis with prolonged surgical procedures. The need for ICU admission as a risk factor is supported by the work of Schein et al.[10], who noted that patients requiring intensive postoperative care are at higher risk of sepsis. The impact of comorbidities on the risk of sepsis is well-documented, with studies such as those by Boey et al.[11] emphasizing the need for comprehensive preoperative assessment and optimization of underlying conditions to mitigate the risk of postoperative sepsis.

CONCLUSION

The study highlights significant demographic, clinical, and postoperative findings in patients undergoing emergency abdominal surgery. Middle-aged males predominated, with common comorbidities including diabetes and hypertension. The primary surgical indications were perforated viscus and bowel obstruction, with a majority undergoing laparotomy. Postoperative outcomes indicated substantial ICU admissions and complications, particularly in patients diagnosed with intra-abdominal sepsis, who required prolonged ICU and hospital stays, and had a notable mortality rate.

REFERENCES

1. Nathens AB, Rotstein OD. Therapeutic options in the management of intra-abdominal sepsis: Focus on adjunctive therapies. Crit Care Med. 1994;22(6):946-59. doi:10.1097/00003246-199406000-00025.
2. Sartelli M, Catena F, Ansaloni L, et al. Complicated intra-abdominal infections worldwide: The definitive data of the CIAOW Study. World J Emerg Surg. 2013;8(1):37. doi:10.1186/1749-7922-8-37.
3. Schein M, Wittmann DH, Holzheimer RE, Condon RE. Intra-abdominal sepsis: new therapeutic perspectives. Dig Surg. 1994;11(4):217-25. doi:10.1159/000172273.
4. Malangoni MA, Inui T. Peritonitis—the Western experience. World J Emerg Surg. 2006;1:25. doi:10.1186/1749-7922-1-25.
5. Solomkin JS, Mazuski JE, Bradley JS, et al. Diagnosis and Management of Complicated Intra-abdominal Infection in Adults and Children: Guidelines by the Surgical Infection Society and the Infectious Diseases Society of America. Clin Infect Dis. 2010;50(2):133-64. doi:10.1086/649554.
6. Taylor MD, Napolitano LM. Infectious complications of critical illness. Surg Clin North Am. 2012;92(6):1519-53. doi:10.1016/j.suc.2012.08.017.
7. Dellinger RP, Levy MM, Rhodes A, et al. Surviving Sepsis Campaign: International Guidelines for Management of Severe Sepsis and Septic Shock: 2012. Crit Care Med. 2013;41(2):580-637. doi:10.1097/CCM.0b013e31827e83af.
8. Wacha H, Haase G, Bieri W, et al. Risk factors associated with intra-abdominal infections: A prospective multicenter study on 1203 patients in 28 European centers. Intensive Care Med. 1999;25(8):827-35. doi:10.1007/s001340050971.
9. Chowdhury A, Coats J, Quiney N. Emergency laparotomy for intra-abdominal sepsis: A 5-year study. J R Coll Surg Edinb. 2002;47(5):652-8.

DOI: 10.69605/ijlbpr_13.7.2024.103

10. Schein M, Wittmann DH, Holzheimer RE. Intra-abdominal sepsis: Physiologic principles and clinical practice. Lippincott-Raven; 1995. p. 230-46.
11. Boey J, Wong J, Ong GB. Risk stratification in patients with perforated peptic ulcer. Ann Surg. 1982;195(3):265-9.
12. Bickell NA, Wall MJ Jr, Pepe PE, et al. Immediate versus delayed fluid resuscitation for hypotensive patients with penetrating torso injuries. N Engl J Med. 1994;331(17):1105-9.
13. Moor JW, Lecky FE, Bouamra O, et al. Postoperative complications following emergency abdominal surgery. Br J Surg. 1996;83(8):1111-5.
14. Meakins JL, McLean AP, Gallinger S, et al. Early postoperative sepsis: A major determinant of late survival and quality of life after major surgery. Ann Surg. 1986;203(2):222-5.
15. Levison ME, Bush LM. Peritonitis and intraperitoneal abscesses. Infect Dis Clin North Am. 1996;10(2):489-500.
16. Fry DE. The importance of antibiotic pharmacokinetics in surgical infections. Am J Surg. 1991;162(5):58S-63S.
17. Bailey IS, Karran SE, Toyn K, et al. Community surveillance of complications after hernia surgery. BMJ. 1992;304(6825):469-71.