

Magnitude, Pattern and Management Outcome of Intestinal Obstruction among Non-Traumatic Acute Abdomen Surgical Admissions in Arba Minch General Hospital, Southern Ethiopia

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Abstract

Background: Intestinal obstruction is defined as a blockage or partial blockage of the passage of the intestinal contents. It is a potentially risky surgical emergency associated with high morbidity and mortality. Its pattern differs from country to country and even from place to place within a country. Therefore, this study aimed to find out the magnitude, pattern and management outcome of intestinal obstruction in Arba Minch General Hospital.

Methods: A retrospective Cross-Sectional study was conducted in Arba Minch General hospital from January 09, 2015, to November 09, 2018. The data collection period was from December 15, 2018, to February 09, 2019. Simple random technique was applied to select 801 study participants. Then, the required data entered into Epi Info version 7.2.1.0 and exported to the statistical package for the social sciences software package version 20 for analysis.

Result: This study revealed that the overall magnitude of intestinal obstruction was 40.60% with 95% CI (34.95 - 45.95). The magnitude of unfavorable management outcomes and deaths during the study period were 22.3% with 95% CI (18.00-27.00) and 7.1 % with 95% CI (4.00-10.00) respectively. Small bowel volvulus, sigmoid volvulus and adhesion (bands) accounted for 45.30%, 21.35% and 11.97% of all patterns of intestinal obstructions respectively. Dehydration ($p<0.001$), persistent tachycardia ($p<0.001$) and perforated bowl ($p<0.001$) were highly significantly associated with the management outcome of intestinal obstruction.

Conclusion and recommendation: Intestinal obstruction was the most common among all acute abdomen cases and its management outcome highly associated with dehydration. Early resuscitation is recommended to decrease unfavorable management outcomes.

Background

Intestinal obstruction (IO) is defined as a blockage or partial blockage of the passage of the intestinal contents. It is a potentially risky surgical emergency associated with high morbidity and mortality (1). It is a frequently encountered surgical emergency that requires prompt diagnosis as well as immediate, rational and effective therapy (2). It constitutes a major cause of death and financial expense in hospitals around the world and a major cause of admissions to emergency surgical units (3-5).

In a global based report of the world health organization, about 3.2 million cases of bowel obstruction occurred in 2015 which resulted in 264, 000 deaths (6). Both sexes are equally affected and the condition can occur at any age (7). In most of the countries of Africa, it accounts for a significant proportion of morbidity and mortality which varies from region to region. For example, in South-western Nigeria, obstructed hernia (8), in Kenya, sigmoid volvulus (9), in Benin mechanical bowel obstruction (10) and strangulated hernia (particularly inguinal hernia) remains the most common cause of intestinal obstruction in tropical African populations (11).

Studies conducted in Ethiopia showed that the death rate after the management of intestinal obstruction cases were 13.6 %, 9.2 %, and 2.5% in South, East and Central Ethiopia respectively (12-14). In studies conducted in Debre Birhan (15), in Gondar (16) and Mekele (17) showed that the magnitude of intestinal obstruction was higher than other non-traumatic acute abdominal surgical cases.

Aetiologies of bowel obstruction include sigmoid volvulus, small bowel volvulus, adhesions, hernias, inflammatory bowel disease, appendicitis, tumours, diverticulitis, ischemic bowel, tuberculosis and intussusception (18). The causes of obstruction are different depending on the site of obstruction and between different areas (19). A study was done in Uganda (20), Nigeria (21) and Ethiopia (22) shows that hernia (40.2%), Adhesions (51.6%) and small bowel volvulus(48.6%) were the leading causes of intestinal obstruction respectively.

Analysis of cases based on the specific causes of the acute abdomen has great value for early diagnosis and prompt treatment in clinical practice (23). Despite the high prevalence of intestinal obstruction, there is a paucity of data concerning the magnitude and management outcome in Ethiopia (13, 16, 22, 24). This study fills a gap of information on the magnitude and management of intestinal obstructions.

Methods And Materials

Study design, setting and population

Hospital-based retrospective cross-sectional study was conducted in Arba Minch General Hospital from January 09, 2015, to November 09, 2018. All patients with the diagnosis of non-traumatic acute abdomen cases who were admitted to the surgical ward of Arba Minch General hospital were included and patients who went home before completion of treatment, with lost cards and cards with incomplete data were excluded.

Sample size determination and sampling producer

The sample size was determined by the single population proportion formula. The assumptions considered to calculate the sample size was from the previous study in Ethiopia using a prevalence of 21.8% (13), Considering the precision 3% and 95% confidence level. Using the above assumptions, we arrived at a sample size of 728 and by adding 10% for loss of data; the final sample size becomes 801.

Data were collected by using a structured checklist. The checklist was adapted from previous studies to enable us to collect important information. A checklist was developed in the English language to collect important information such as age, sex, ethnicity, admission clinical diagnosis, intraoperative findings, intra-operative procedures, duration of the presentation, causes of IO, postoperative complications and management outcome. For data collection, two clinical nurses were recruited.

Operational Definitions

Acute abdomen: a patient's case which is labelled in their discharge diagnosis as one of the patterns of acute abdomen. **Intestinal obstruction:** a patient with acute abdomen who has abdominal pain, abdominal distension, vomiting, not passing gas and feces (obstipation) completely, not passing feces (constipation), with imaging diagnosis having obstructed dilated bowel loops and labelled in their discharge diagnosis note as intestinal obstruction. **Management outcome:** the condition of the patient after treatment has been carried out, after conservative or operative procedure that means whether discharged alive or died in the hospital or end up with complications. **Favorable management outcome:** discharged live and with no complication after management. **Unfavorable management outcome:** death and complications after management carried out.

Data management and statistical analysis

Data were cleaned, coded and entered into Epi-info version 7.2.1.0 and was exported to SPSS version 20 for analysis. Descriptive statistics were conducted and results have been presented using frequency tables, graphs and percentages. The binary logistic regression analysis has been done to determine crude statistical associations between independent variables and dependent variables. Linearity between independent and dependent variables was checked by scatter plot. Multivariate normality between variables was checked by a Q-Q plot. And, multicollinearity was checked. Variables with a p-value of less than 0.25 in the binary logistic regression analysis were considered as a candidate to be entered into multivariable logistic regression. Multivariable analyses have isolated independent predictors of IO management outcome. Statistical significance factors were identified based on a p-value of <0.05 with a 95% confidence interval.

Results

From the total study participants of 801 only 761 cards have a complete data with response rate of 95.12% where 507(66.6%) cases were male, 478(62.80%) were from a rural area (out of Arba Minch city) and 680(85.42%) were less than 50 years old age. Among these 309 (40.60%) cases were found to have an intestinal obstruction which is the most common condition followed by Appendicitis 207(27.20%), Hernia 200 (26.28%), ill determined acute abdomen conditions 9(1.18%), urologic emergencies 8(1.05%), peritonitis 7(0.91%), intussusceptions, 6(0.79%), cholecystitis 6(0.78%), acute pancreatitis 5(0.65%) and PPUD 4(0.52%) respectively. Most of the cases from each were males (Figure 1).

5.2. Socio-demographic characteristics of intestinal obstruction cases

From 309 cases with intestinal obstruction, 248 (80.25%) of them were males and 61(19.74 %) of them were females. The male: female ratio was 4:1. Among these, 243(78.6%) of them were from a rural area (out of Arba Minch city), 64 (20.7%) of them were from urban (Arba Minch city) and 2(0.6%) were with no information of residence. The age of patients ranged from 2 months to 100 years with a mean and standard deviation of (40.68±17.88). Among these study participants, 195(63.1%) were Protestants and 249(80.9%) were Gamo in ethnicity (Table 1).

Table 1: Socio-demographic characteristics of patients with intestinal obstruction from January 09, 2015, to November 09, 2018, in Arba Minch General Hospital

Variables		Frequencies	Percent
Sex	Male	248	80.25 %
	Female	61	19.74%
Age	< 50 years	208	67.31%
	≥ 50 years	101	32.68%
Residence	Rural	243	78.64%
	Urban	64	20.71%
	Not known	2	0.64%
Religion	Protestant	195	63.10%
	Orthodox	108	34.95%
	Muslim	3	0.97%
	Others	3	0.97%
Ethnicity	Gamo	249	80.58%
	Konso	27	8.73%
	Amhara	23	7.44%
	Oromo	8	2.58%
	Others	2	0.67%

Magnitude and types of intestinal obstructions

The magnitude of intestinal obstruction was 40.45% with 95% CI (34.95 - 45.95) among non-traumatic acute abdominal cases. From the total 309 intestinal obstructions, 302 (97.7%) of them were mechanical intestinal obstructions and the remaining 7 (2.3%) were a dynamic ileus /functional intestinal obstruction. According to the site of obstruction, 198 (64.1%) were small bowel obstructions, 108 (35.0 %) were large bowel obstructions and the rest 3(1.0%) of them were undetermined.

Clinical presentation and Diagnosis

The common clinical presentations were abdominal pain (95.8%), abdominal distension (88.0%), obstipation (78.3%), constipation (69.6%), vomiting (62.1%), rectal bleeding (2.6%) and history of abdominal surgery (7.1%). Dehydration, Persistent tachycardia, fever and shock were also seen in 5.8%, 10.7%, 12.6% and 2.6% of patients respectively. Hypertension, known cardiac disease, diabetic, CLD and

CKD found in 4.9%, 1.3%, 1.9%, 1.3% and 1.3% of patients respectively. By laboratory diagnoses: hypokalaemia, leucocytosis, elevated serum urea, hyperkalaemia and elevated serum creatinine were found in 1.0%, 21.0%, 2.6%, 0.3% and 3.9% of patients respectively.

Duration of symptom, hospital stay and management approach

The time of arrival since the onset of disease was greater than 24 hours for 253 (81.9%) of patients and less than or equal to 24 hours for 56 (18.1%) of patients. The total hospital stays recorded was > 7 days for 170 (55.0%), < 7 days for 134 (43.41%) and equal to 7 days for 5 (1.6%) of patients. 63(20.4%) of patients were managed only conservatively and 246 (79.6 %) were managed surgically.

Operative procedures, operative findings and complications

From the operative procedure undertaken resection and anastomosis 118 (38.2%) were the most common procedure done (Table 2).

Table 2: Procedures done for intestinal obstruction patients in Arba Minch General hospital from January 09, 2015, to November 09, 2018

Procedures done		Frequency	Percent
Not operated		62	20.06%
Operated	Resection and anastomosis	118	38.18 %
	Derotation	60	19.41%
	Adhesion release	29	9.38%
	Reduction	25	8.09 %
	Diversion/stoma	15	4.85 %

Among the operative findings supposed to cause intestinal obstruction, small bowel volvulus was the most common followed by sigmoid volvulus, adhesion and bands, intussusceptions, appendicitis, hernia and tumour obstruction respectively (Table 3).

Table 3: Operative findings and their percentage among intestinal obstruction cases in Arba Minch General hospital from January 09, 2015, to November 09, 2018

Variable	Frequency	Percent
Perforated bowel	54	17.47 %
Ischemic bowel	44	14.23 %
Gangrenous SV	34	11.00 %
Gangrenous SBV	103	33.33 %
Appendicitis	14	4.53 %
Intussusceptions	15	4.85 %
Strangulated hernia	10	3.23 %
Viable hernia	3	0.97 %
Viable SV	32	10.35 %
Viable SBV	37	11.97 %
Adhesion and bands	37	11.97 %
Tumour obstructions	11	3.55 %

Among operatively managed patients, 22.3% were developed complications and 7.1% deaths occur throughout the study period. Sepsis and septic shock 29 (9.4%) were the most common complications. Surgical site infections 25(8.1%), acute respiratory conditions 12(3.9%), enter cutaneous fistula 9 (2.9%), anastomotic leakage 7 (2.3%) and wound dehiscence 4(1.3%) were the remaining common complication types found respectively (Figure 2).

Association between factors and management outcome of intestinal obstruction

Binary and multivariable logistic regression was done to determine the factors that are significantly associated with the management outcome of IO. Among many factors entered into binary and multivariable logistic regression dehydration, persistent tachycardia, elevated serum creatinine, gangrenous SBV, ischemic bowel and perforated bowel were significantly associated with the management outcome of intestinal obstruction (Table 4).

Table 4: Factors associated with management outcome of intestinal obstruction in Arba Minch General hospital from January 09, 2015, to November 09, 2018.

Variables	Category	Frequency	Favorable management Outcome.	Unfavorable management outcome.	COR 95% confidence interval.	AOR 95% confidence interval.
Persistent tachycardia	Yes	33	9 (27.27%)	24 (72.72%)	1	1
	No	276	231 (83.69%)	45 (16.30%)	13.68(5.96-31.39) **	10.31(3.28-32.42) **
Dehydration	Yes	18	5 (27.77%)	13 (72.22%)	1	1
	No	291	235 (80.75%)	56 (19.24%)	10.91(3.73-31.86) **	13.73(3.34-56.56) **
Elevated serum creatinine	Yes	12	3 (25.00%)	9 (75.00%)	1	1
	No	297	237 (79.79%)	60 (20.2%)	11.85(3.11-45.12) **	10.19(1.89-54.94) *
Gangrenous SBV	Yes	103	60 (58.25%)	43 (41.74%)	1	1
	No	206	180 (86.53%)	26 (12.62%)	4.96(2.81-8.75) **	2.72(1.27-5.84) *
Ischemic bowel	Yes	44	15 (34.09%)	29 (65.90%)	1	1
	No	265	225 (84.90) %	40 (15.09%)	10.87(5.36-22.08) **	3.39(1.17-9.81) *
Perforated bowel	Yes	54	16 (29.62%)	38 (70.37%)	1	1
	No	255	224 (87.84%)	31 (12.15%)	17.16(8.57-34.36) **	7.68(2.96-19.93) **

** = $p < 0.001$, * = $p < 0.05$, SBV = small bowel volvulus.

Discussion

The magnitude of intestinal obstruction in this study is 40.45% at 95% CI (34.95 - 45.95) which is consistent with a result of a study at Gonder University Hospital (43.4 %) (16). But it is less than from the

study conducted in Debre Birhan referral hospital (50.7 % (15) and higher than from the studies of Nigeria (10%), Adama (21.8%) and Mekele (20.4%) respectively (13, 17, 25). This discrepancy may be due to the difference in socio-cultural, economic and lifestyle patterns between countries or due to differences in statistical parameters including sample size.

The majority of intestinal obstruction cases were small bowel obstruction (64.1%) which is similar to the studies conducted in eastern and central Ethiopia (12, 13, 15, 22, 24). Abdominal pain (95.8%), abdominal distension (88.0%) and obstipation (78.3%) are most common clinical symptoms in our study. But this result is different from other studies in Ethiopia, where abdominal pain and abdominal distension covered 100% of cases in studies in eastern Ethiopia through (12, 13, 15, 22, 24). The difference may be due to the small sample size.

The commonest causes of intestinal obstruction found from intraoperative findings were small bowel volvulus 45.30%, sigmoid volvulus 21.35%, adhesion and bands 12.0% and intussusceptions 4.9%. This result is similar to studies conducted in Gelemso and Chiro General Hospital (12, 24). But, different from the study done in Adama Medical College Hospital and Debre Birhan Referral Hospital where intussusceptions (30.9%) and sigmoid volvulus were the leading finding respectively (13, 15).. These discrepancies may be due to the socio-demographic form of patient flow difference.

The magnitude of post-management complication in this study is 22.0% with 95% CI (18.0 – 27.0). This result is consistent with the studies conducted in Nigeria (20.77%), Kenya (23.6%) and Adama (24.6%) in Adama (19, 25, 26). The magnitude of death over the study period is 7.11 % with 95% CI (4.0-10.0). This result is almost similar to most of the findings of studies in other areas in Ethiopia (22, 24).

Sepsis and septic shock were the most common pattern of complication after management in the current study. This is different from the study in Gelemso General Hospital which found surgical site infection as the most common complication and Jogla General Hospital which found pneumonia as the most common complication type and septic shock next to it (12, 22). This may be due to low care of the patient after management and longer hospital stay time.

In this study, Patients without dehydration were 13.73 times more likely to have favourable management outcome, [AOR with 95% CI (13.73(3.34-56.56))], than those with dehydration which is a similar with study conducted in Nigeria

Persistent tachycardia is significantly associated with management outcome of intestinal obstruction, [AOR with 95% CI (10.31(3.28-32.42))], in which patients without persistent tachycardia are 10.31 times more likely to have favourable management outcome than those with persistent tachycardia which is supported by a study conducted in Nigeria (27). Elevated serum creatinine is significantly associated with management outcome of intestinal obstruction, [AOR with 95 % CI (10.19(1.89-54.94))], in which patients without elevated serum creatinine are 10.19 times more likely to have favourable management outcome when compared with those patients who have elevated serum creatinine. This may be due to the fact that patients with renal function impairment creatinine level may increase (28).

Perforated bowel, ischemic bowel and gangrenous small bowel volvulus are also significantly associated with management outcome of intestinal, [AOR with 95 % CI (7.68(2.96 -19.93), 3.39(1.17-9.81) and 2.72(1.27- 5.84))] respectively, in which patients without perforated bowel, ischemic bowel and gangrenous small bowel volvulus are 7.68, 3.39 and 2.72 times more likely to have favourable management outcome than their counterparts respectively. This result is similar to study findings conducted in East Ethiopia. (22, 24)

Limitations:

Since this study was from secondary data, Limitations was incomplete documentation, including missing charts and difficulty interpreting information found in patients' cards.

Conclusions And Recommendations

In conclusion, intestinal obstruction was the most common pattern of non-traumatic acute abdomen conditions during the study period. Males were affected more than females. Intestinal obstruction was more common in rural residents. Small intestinal obstruction was more dominant than large bowel obstruction. Small bowel volvulus, sigmoid volvulus and adhesion and bands were the commonest patterns of intestinal obstruction respectively. Resection and anastomosis, derotation and adhesion removal were commonest procedures done respectively. Dehydration, persistent tachycardia, elevated serum creatinine, gangrenous SBV, ischemic bowel and perforated bowel were significantly associated with the management outcome of intestinal obstruction.

List Of Abbreviations

ABO: Acute Bowel Obstruction, DALYs: Disability Adjusted Life Years, GBDs: Global Burden of Diseases, HICs: High-Income Countries, IO: Intestinal Obstruction, IV: Intra Venous, LMICs: Low and Middle-Income Countries, LBO: Large Bowel Obstruction, PID: Pelvic Inflammatory Disease, PPUD: Perforated Pelvic Ulcer Disease, SBO: Small Bowel Obstruction, SBV: Small Bowl Volvulus, SV: Sigmoid Volvulus, YLL: Years of Life Lost

Declarations

The need for the informed consent was waived by Arba Minch University ethics committee/IRB. To review each patient's card, permission letters were obtained from Arba Minch General Hospital. Privacy and confidentiality of information were properly kept. All methods were carried out in accordance with relevant guidelines and regulations.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Availability of data and materials

All relevant data are included in the article. The dataset of this study is available from the corresponding authors upon reasonable request.

Authors' contributions

MA conceptualize and designed the study, conducted the analysis, interpret and write the first draft of the paper for publication. SD and YD were involved in the data analysis and interpret the data, and reviewed the manuscript for publication. AG supervises the data collection process. All authors read and approve the final manuscript before submission.

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Figures

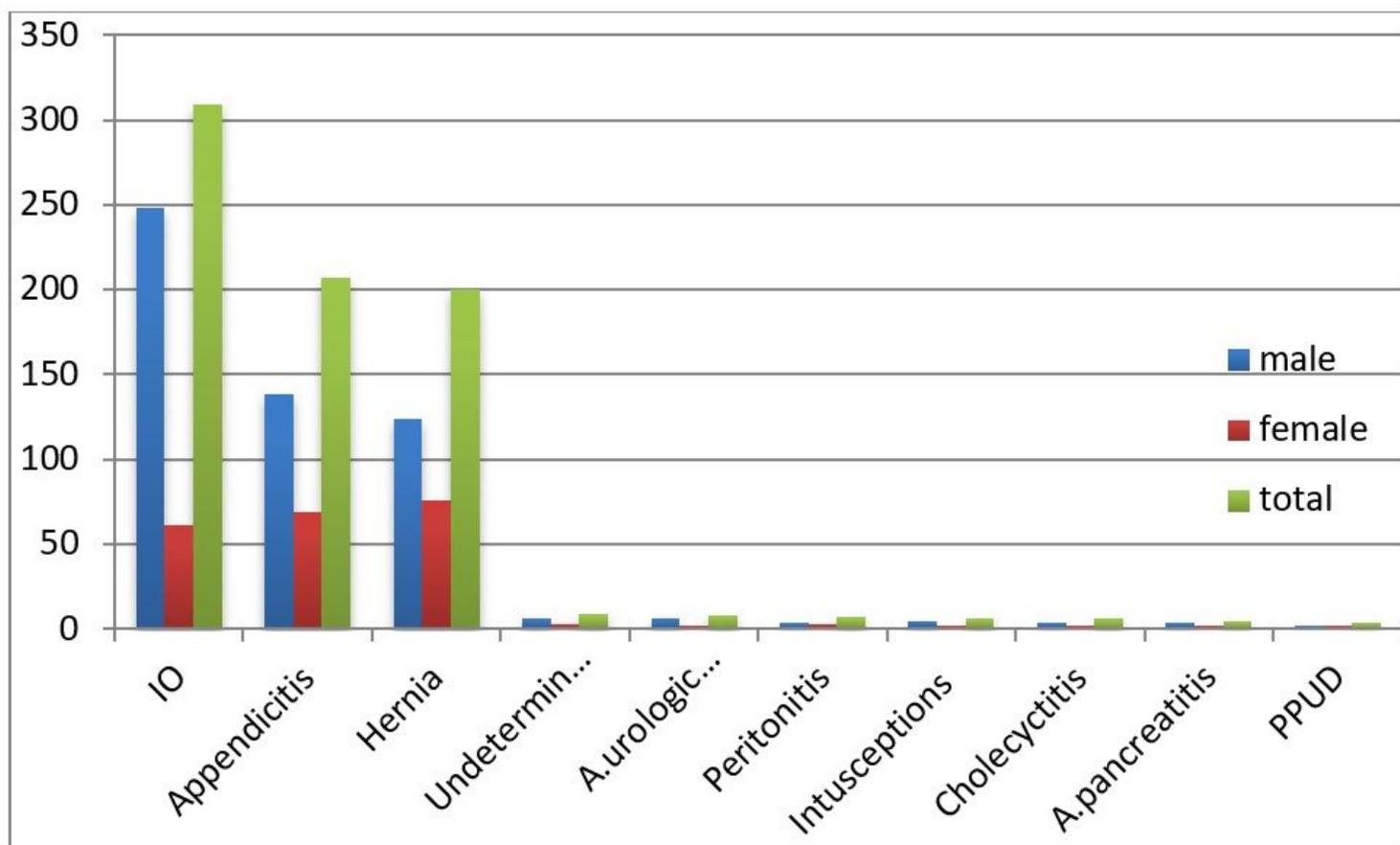


Figure 1

bar graph of the pattern of non-traumatic acute abdomen in Arba Minch General hospital from January 09, 2015 – November 09, 2018

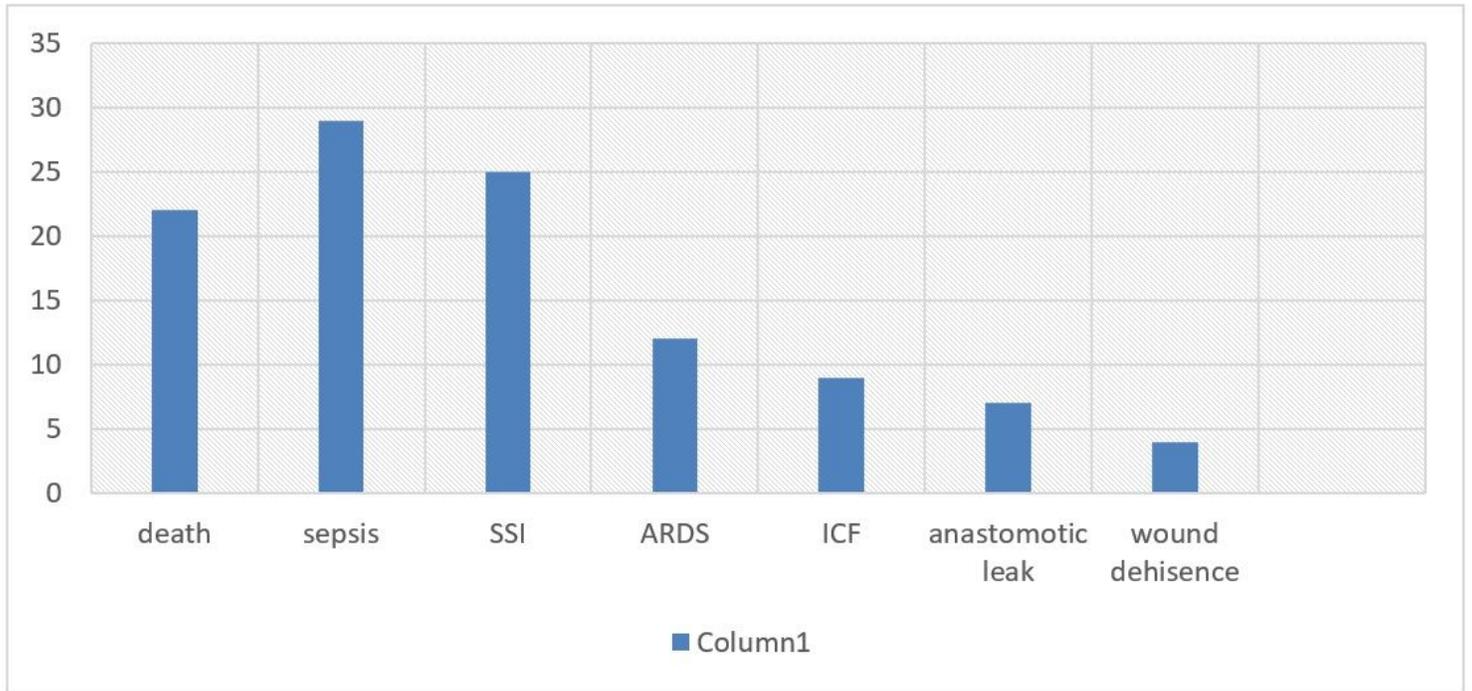


Figure 2

Bar graph of the pattern of complications after the management of intestinal obstruction from January 9, 2015, to November 9, 2018