

Etiology of Intestinal Obstruction - Correlation between Pre-operative and Per-operative Findings with Histopathology

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Abstract

Original Research Article

Background: Intestinal obstruction is one of the most common causes of acute abdomen and often requires surgical intervention. However, pre-operative and per-operative diagnosis often do not correlate with postoperative histopathology done in suspected cases. Therefore, the study was designed to identify the etiology of intestinal obstruction correlating to pre-operative and per-operative findings with postoperative histopathological findings in suspected cases. **Methods:** A cross sectional study was conducted at the department of General Surgery, Mymensingh Medical College & Hospital, Mymensingh for 18 months following ethical approval from Institutional Review Board (IRB) of Mymensingh Medical College. During the study period, all patients with suspected intestinal obstruction admitted in Department of Surgery were included based on selection criteria. Total 103 patients were assessed in pre-operative and per-operatively. Histopathological examination was done in suspected cases where diagnosis could not be confirmed without histopathology. Data collection was done with a data collection form. After collection of all the required data, final analysis was carried out by using the SPSS version 21.0. **Results:** Among 103 cases of intestinal obstruction, mean age was 45.50 ± 14.37 SD (years) with male female ratio-1.78:1. About 66% came from rural areas and 34% were from urban areas. Abdominal pain was the commonest symptom present among the cases which was observed in 91.3% cases. Others common symptoms were vomiting, abdominal distension absolute and relative constipation in 72.8%, 69.9%, 12.6% and 63.1% cases respectively, while abdominal tenderness was the commonest sign present in all cases. Among study population, 68.9% was small bowel obstruction and 31.1% was obstruction in large bowel. According to per-operative findings 22.3% cases were suspected as malignant. Finally 24.3% cases were proved as malignant in subsequent histopathological examination and 75.7% cases were non-malignant. Adenocarcinoma was the most common carcinoma and was found in 13.6% cases. Among the non-malignant cases postoperative adhesion 40.8%, hernia 8.7%, inflammatory bowel disease (IBD) 9.7%, intussusception 3.9%, volvulus 7.8% and intestinal TB 4.9% were found. The sensitivity, specificity and overall accuracy of per-operative diagnosis to diagnose malignant causes of intestinal obstruction was 76.00%, 94.87% and 90.00%. **Conclusion:** Postoperative adhesion and malignancy were the most prominent causes of intestinal obstruction in our settings.

Keywords: Etiology, Intestinal Obstruction, Findings with Histopathology.

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INTRODUCTION

Intestinal obstruction occurs due to the failure of propagation of intestinal contents, and may be due to a mechanical or functional pathology. Acute mechanical intestinal obstruction is one of the leading causes of surgical admissions in most emergency departments world wide and is a significant cause of morbidity and mortality [1]. There are many causes of intestinal obstruction which are either mechanical or functional (paralytic ileus). Each cause of intestinal

obstruction needs different approach and management. Common mechanical causes are post-operative adhesions, benign or malignant intestinal tumors, hernias, foreign bodies, impacted stool, intussusception and rarely gallstones. Functional obstruction may be secondary to intestinal infections, electrolyte imbalances (such as decreased potassium levels), decreased blood supply to the intestines (mesenteric ischemia), intra-abdominal infection (appendicitis), or as a complication of abdominal surgery. Clinically, intestinal obstruction is classified as small bowel and

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large bowel obstruction. Large bowel becomes obstructed 3-4 times less frequently than the small bowel [2]. Of all intestinal obstruction, mechanical intestinal obstruction forms an important part of pathologies that necessitate emergency surgical interventions in parts of Asia, including India, Iran and Pakistan. There are four cardinal features of intestinal obstruction: colicky abdominal pain, distension, vomiting, and constipation. The presentation of these symptoms is affected by the site and type of obstruction [3]. As etiological factors varies, clinical features varies and site of obstruction varies, so all these factors making a difference in outcome of any operative procedure in relation to morbidity and mortality [4].

METHODS AND MATERIALS

Study Design: Cross sectional study.

Place of Study: Department of Surgery, Mymensingh Medical College Hospital, Mymensingh, Bangladesh.

Period of Study: From September 2017 to February 2019. The Ethical Review Committee (ERC) of Mymensingh Medical College approved the protocol prior to commencement of the study in November, 2017. After commencement of Institutional Review Board (IRB) in Mymensingh Medical College, the IRB again approved the protocol and give certificate in 24th June 2018 (Appendix D).

Study Population: Patients above 18 years of age with intestinal obstruction admitted in Department of Surgery, Mymensingh Medical College Hospital were included during the study period were assigned in the study.

Sample Size: For this study, sample size calculation was done by following statistical formula. $n = P(1-P)Z^2/(\text{error})^2$ But due to time limitation and lack of patient availability, total 103 cases were considered for final analysis.

Inclusion Criteria:

All patients above 18 years of age with intestinal obstruction admitted into Department of Surgery of MMCH.

- Patients with intestinal obstruction need surgical intervention.

Exclusion Criteria:

- Patient below age of 18 years.
- Patients with intestinal obstruction managed by conservative treatment.
- Patients who refused to do surgical treatment and histopathological study in suspected cases.

Study Procedure: This was a cross sectional study of patients operated for intestinal obstruction at MMCH for eighteen months of duration following approval of the protocol. Sampling technique was purposive. 103 patients who were operated for intestinal obstruction in MMCH were selected for this study according to the inclusion and exclusion criteria. Following admission all patients were resuscitated with nothing per oral, intravenous fluids to correct fluid and electrolyte deficit, nasogastric suction, urethral catheterization and broad-spectrum antibiotic coverage. Diagnosis was made by clinical assessment and radiological investigation including X-ray abdomen AP view in erect posture. Preoperative investigations including complete blood count, serum electrolytes, urine analysis, serum creatinine, random blood sugar, chest X-ray P/A view, blood grouping and cross- matching were done. After resuscitation all patients were subjected to laparotomy. Intraoperative findings were noted, tissue biopsy was taken in suspected cases and sent for histopathology for further assessment. Final diagnosis and postoperative treatment were dependent on the operative findings and histopathological confirmation. Histopathological reports were collected and recorded into the data collection form. All data collection were done by the myself and the pre-structured data collection form were filled up by face to face interview. Data entry and analysis were done by using SPSS 21.

Data Management and Analysis: Continuous parameters were expressed as mean \pm SD and categorical parameters as frequency and percentage. The significance of the results as determined in 95.0% confidence interval. p value $<$ 0.05 was considered as significant. All data were presented in suitable tables, figures, charts, diagrams and textual summaries according to their affinity. A description of each table and graph were given to understand them clearly. All statistical analysis were performed using the statistical package for social science (SPSS) program, version 21 for Windows 7.

RESULTS

This study was performed in the Department of General Surgery, Mymensingh Medical College Hospital. Total 103 patients of intestinal obstruction were included in the study by using the inclusion and exclusion criteria. Clinical features of patients, per-operative findings and histopathological findings in suspected cases were collected.

Table 1: Demographic characteristics of the patients (N=103)

Age group (years)	Number of patients	Percentage (%)
18-20	0	0
21-30	16	15.5
31-40	31	30.1
41-50	23	22.3
51-60	15	14.6

Age group (years)	Number of patients	Percentage (%)
61-70	12	11.7
>70	6	5.8
Mean age (Years)	45.50±14.37	
Sex		
Male	66	64.1
Female	37	35.9
Residence		
Urban	68	66.0
Rural	35	34.0
Occupation		
Service holder	5	4.9
Business	18	17.5
Farmer	29	28.2
Student	6	5.8
Housewife	33	32.0
Others	12	11.7
Total	103	100%
Socioeconomic		
Upper	8	7.8
Middle	34	33.0
Lower	61	59.2

Among the 103 study cases maximum 30.1% patients were in 31-40 years age group. Among the cases 15.5% patients were in 21-30 years age group, 22.3% patients were in 41-50 years age group, 14.6% were in 51-60 years age group, 11.7% were in 61-70 years age group and 5.8% were in >70 years age group. The mean age of the patients was 45.50±14.37 years. Among 103 intestinal obstruction cases 64.1% were male and 35.9% were female. Male female ratio was

1.78:1. Among the 103 study cases 66% came from rural and 34% came from urban areas. Among the 103 study cases maximum 32.0% patients were housewife followed by service holder (4.9%) were businessman (17.5%), farmer (28.2%), student (5.8%) and 11.7% had other occupation which include rickshaw puller, day labour etc. Among 103 intestinal obstruction cases 59.2% came from lower class family. 33.0% of patients from middle class and 7.8% from upper class family.

Table 2: Clinical features (symptoms) present in the patients (N=103)

Symptoms and sign		Number	Percentage (%)
Abdominal pain		94	91.3
Vomiting		75	72.8
Abdominal Distension		72	69.9
Constipation	Absolute	13	12.6
	Relative	52	50.5

Abdominal pain was the commonest symptom present among the cases which was present in 91.3% cases. Vomiting, distension absolute constipation and

relative constipation were present in 72.8%, 69.9%, 12.6% and 50.5% cases respectively.

Table 3: Clinical features (sign) present in the patients (N=103)

Sign		Number	Percentage (%)
Abdominal tenderness		103	100
Bowel sound	Increased	50	48.5
	Decreased	28	27.2
	Absent	25	24.3
Muscle guard		22	21.4
Rigidity		22	21.4
Palpable mass		18	17.5

Among the signs, abdominal tenderness was present in all (100%) cases. Bowel sound was increased in 48.5% cases, decreased in 27.2% of cases and absent

in 24.3% of cases. Muscle guard and rigidity were present in 21.4% of cases and palpable mass was present in 17.5% of cases.

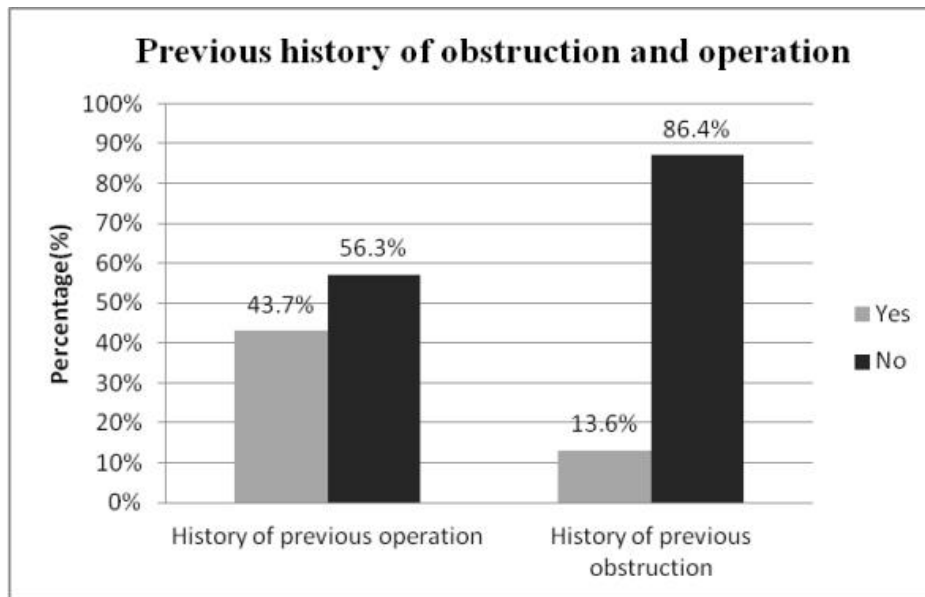


Figure 1: Previous history of operation and obstruction (N=103)

Among the study cases 43.7% had previous history of abdominal operation and 13.6% had previous history of obstruction.

Table 4: Cross tabulation of different age groups with previous history of operation of the study population (N=103)

Age group (years)	Previous history of operation		Total
	Yes	No	
21-30	10	6	16
31-40	12	19	31
41-50	10	13	23
51-60	4	11	15
61-70	6	6	12
71-80	3	3	6
Total	45	58	103

This cross tabulation shows the previous history of operation among the different age groups.

Table 5: Previous history of operation among the study population (N=103)

Previous operation	Number	Percentage (%)	Total (%)
Appendicectomy	13	12.62	
LUCS	11	10.68	
DU perforation	8	7.76	
Abdominal trauma	4	3.88	43.7
Hysterectomy	4	3.88	
Ileal perforation	3	2.91	
Gastrojejunostomy	2	1.94	

Previous history of operation was present in 43.7% (45) cases. Among them 12.62% had history of appendicectomy, 10.68% LUCS, 7.76% due to DU

perforation, 3.88% due to abdominal trauma, 3.88% hysterectomy, 2.91% due to ileal perforation and 1.94% had gastrojejunostomy.

Table 6: Site of obstruction according to radiological finding (N=103)

Site of obstruction	Number of patients	Percentage (%)
Small bowel	53	51.4
Large bowel	29	28.2
Both small and large bowel	21	20.4
Total	103	100

According to radiology 51.4% cases had small bowel obstruction, 28.2% had large bowel obstruction

and 20.4% had both small and large bowel obstruction.

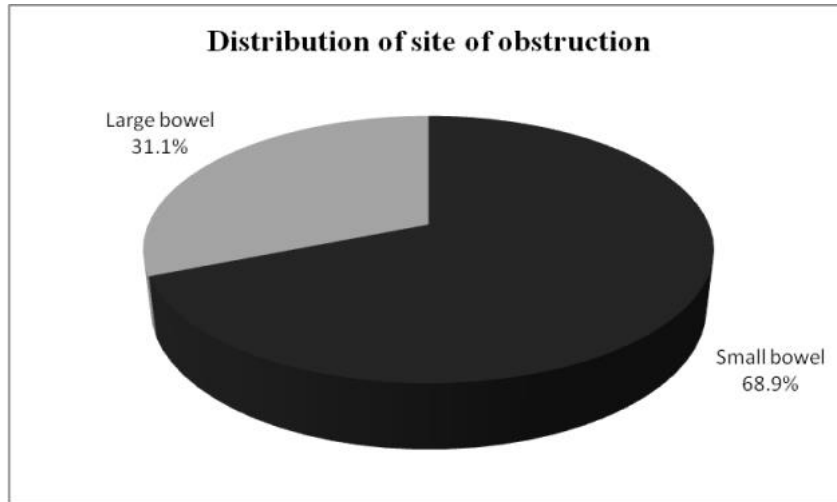


Figure 2: Site of obstruction found during operation (N=103)

Out of 103 study cases 68.9% had small bowel obstruction and 31.1% had large bowel obstruction.

Table 7: Specific site of obstruction according to per-operative findings (N=103)

Site of obstruction	Number of patients	Percentage (%)
Small Bowel Jejunum	31	30.1
Ileum	40	38.8
Large bowel Caecum	6	5.8
Ascending colon	7	6.8
Transverse colon	7	6.8
Descending colon	3	2.9
Sigmoid colon	9	8.7

According to per operative finding maximum intestinal obstruction was found in small bowel, 38.8% in ileum and 30.1% in the jejunum. Among the large bowel obstructions, 5.8% was found in caecum, 6.8% in

both ascending colon and transverse colon, 8.7% in sigmoid colon and 2.9% was found in descending colon.

Table 8: Viability of gut according to per-operative findings (N=103)

Viability of gut	Number	Percentage (%)
Viable (simple obstruction)	89	86.4
Gangrenous	14	13.6

According to per-operative finding viable gut was found in 86.4% cases and in 13.6% cases gut found gangrenous.

Table 9: Suspected causes of obstruction according to per-operative findings (N=103).

Causes		Number	Percentage (%)	Total
Suspected malignant		23	22.3	22.3
Suspected nonmalignant	Adhesion	48	46.6	77.7
	Hernia	09	8.7	
	IBD	11	10.7	
	Intussusception	04	3.9	
	Volvulus	08	7.8	

According to per-operative findings 22.3% cases were suspected as malignant and 77.7% cases were suspected as non-malignant. Among the suspected

non-malignant cases 46.6% adhesion, 8.7% hernia, 10.7% inflammatory bowel disease, 3.9% intussusceptions and 7.8% were suspected as volvulus.

Table 10: Final diagnosis according to histopathology and clinical findings (N=103).

Diagnosis		Number of patients	Percentage (%)	Total (%)
Malignant	Adenocarcinoma	14	13.6	24.3
	Non-Hodgkin lymphoma	04	3.9	
	Mucoid carcinoma	01	1.0	
	Metastatic adenocarcinoma	02	1.9	
	Undifferentiated carcinoma	02	1.9	
	Carcinoid	02	1.9	
Non-malignant	Adhesion	42	40.8	75.7
	Hernia	09	8.7	
	IBD	10	9.7	
	Intussusception	04	3.9	
	Volvulus	08	7.8	
	Intestinal TB	05	4.9	

According to clinical findings and histopathology 24.3% cases were finally diagnosed as malignant. Adenocarcinoma was the most common carcinoma and was found in 13.6% cases. 75.7% cases

were finally diagnosed as non-malignant. Among the non-malignant cases maximum 40.8% cases were diagnosed as postoperative adhesion.

Table 11: Cross tabulation showing the diagnosis by pre-operative and per-operative findings with histopathology (N=103)

Test result	Histopathological diagnosis in suspected cases (Standard diagnosis)		Total
Malignant	Suspected malignant & histopathologically malignant 19	Suspected non-malignant but histopathologically malignant 06	Patients with true malignant cause 25
Non-malignant	Suspected malignant but histopathologically non-malignant 04	Suspected non-malignant & histopathologically (to confirm diagnosis) non-malignant 74	Patients with true benign cause 78
Total	Patients with suspected malignant diagnosis according to preoperative and per-operative findings 23	Patient with suspected non-malignant disease according to preoperative and per-operative findings 80	103

Here p is <0.001. p value < 0.05 was considered as significant.

Out of 25 total truly malignant cases pre-operative and per-operative findings could detect 19 as malignant and the rest as benign. While, among the 78

benign lesions pre-operative and per-operative findings could detect 74 as non-malignant and 04 identified falsely as malignant lesions.

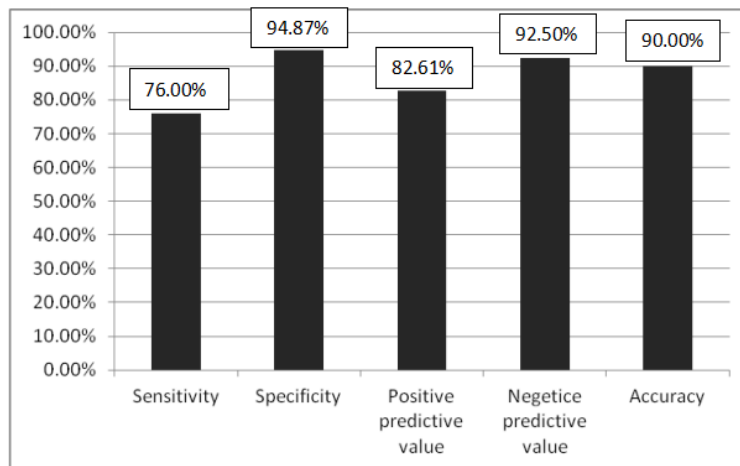


Figure 3: Bar diagram showing diagnostic potential of pre-operative and per-operative findings

Clinical diagnosis had 76% sensitivity to correctly diagnose malignant lesions as malignant ones but much greater specificity (94.87%) to differentiate benign as benign. Overall, the accuracy was 90.00%.

DISCUSSION

Intestinal obstruction is one of the most common surgical issues that have encountered in general surgery wards. It is a life-threatening emergency condition that requires emergency

management. It occurs when forward flow of intestinal content is interrupted at any point along the gastrointestinal (GI) tract Narayan *et al.*, [5]. There are so many causes of intestinal obstruction including postoperative adhesion, Volvulus, Intussusception, herniation, neoplasm, IBD, intestinal TB etc [6]. In this study, all patients were presented with acute or acute on chronic obstruction. This cross sectional study was conducted with a view to find out the etiology of intestinal obstruction according to pre-operative and per-operative findings and histopathology in suspected cases. This study was conducted in the Department of General Surgery, Mymensingh Medical College Hospital. Total 103 patients of intestinal obstruction were enrolled into the study. The mean age of the study cases was 45.50±14.37 years. Maximum 30.1% cases aged between 31-40 years. 15.5%, 22.3%, 14.6%, 11.7% and 5.8% cases aged between 21-30 years, 41-50 years, 51-60 years, 61-70 years and >70 years respectively. This finding is similar to the findings of Ojo and co-researcher [7]. In their study they found the mean age 42.5±15.5 years and among their cases 48.8% cases aged between 31-50 years which is consistent to our findings. Another study conducted by Akrami and associates found mean age 48.2±19.7 years in their 411 intestinal obstruction cases [8]. In a study conducted by Chitumalla and co-researcher also found maximum of their intestinal obstruction cases in 31-40 years age group [4]. Oko and co-researcher also found maximum of their cases in 31-40 years age group and mean age 40.6 years in their study Ooko *et al.*, [1]. In this study male female ratio was found 1.78:1. So, number of male patients was relatively more than the number of female patients. Among the study cases 63 were male and 37 were female. This finding is similar to the findings of Qureshi *et al.*, Ooko *et al.*, and Priscilla *et al.*, [1, 9, 10]. Priscilla *et al.*, found male female ratio 1.78: 1. Among their 100 study cases 64 were male and 36 were female. Qureshi *et al.*, found male female ratio 1.6: 1. Among their 118 cases 73(61.86%) were male and 45(38.14%) were female. Abdominal pain was the commonest symptom present in the cases. Abdominal pain was present in 91.3% cases. Vomiting was present in 72.8% cases, abdominal distension was present in 69.9% cases, and constipation was present in 63.1% cases in which 12.6% was absolute and 50.5% was relative constipation. Abdominal tenderness was found in 100% cases, bowel sound was increased in 48.5% cases, decreased in 27.2% cases and absent in 24.3% cases, muscle guard and rigidity were present in 21.4% cases and palpable mass was present in 17.5% cases. This finding is almost similar to the finding of Chitumulla *et al.*, Tiwary *et al.*, and Akrami *et al.*, [4, 8, 11]. According to Chitumulla and associates abdominal pain, vomiting, tenderness, distension and constipation were present in 90%, 70%, 100%, 68% and 60% respectively. Bowel sound was increased in 50%, decreased in 30% and was absent bowel in 20% cases. Muscle guard and rigidity and palpable swelling was present in 22% and 18% cases. Among the 103 study

cases previous history of abdominal operation was present in 43.7% cases, among them 12.62% had history of appendectomy, 10.68% LUCS, 7.76% due to DU perforation, 3.88% due to abdominal trauma, 3.88% hysterectomy, 2.91% due to ileal perforation and 1.94% had gastrojejunostomy. History of previous obstruction was present in 13.6% of cases. This finding is almost similar to the findings of Miller and his colleagues [12]. They studied 410 patients of intestinal obstruction. Among them 204 (49.76%) cases had previous history of operation. Another study conducted by Soressa and associates found history of previous obstruction among their 12.4% cases which is consistent to our findings [3]. In this study, radiological finding showed that in 51.4% cases there were small bowel, in 28.2% cases there were large bowel and in 20.4% cases there were both small and large bowel obstruction. Per-operatively small bowel obstruction was present in 68.9% of cases and large bowel obstruction was present in 31.1% of cases. Viable gut was found in 86.4% cases and in 13.6% cases gut found gangrenous. Ojo *et al.*, and Priscilla *et al.*, also found similar results in their study [7, 10]. According to Ojo *et al.*, small bowel was affected in 77.8% cases and according to Priscilla *et al.* small bowel was affected in 83% of cases. Another study conducted by Prasad and colleagues also found small intestine as the predominant site of intestinal obstruction in their study Prasad *et al.*, [13]. Among of their 41 intestinal obstruction patients 85% had small bowel obstruction and only 15% had large bowel obstruction. 19.5% cases presented with gangrene perforation and peritonitis were observed in 12.2% cases. Chandrashekaraiiah and his colleagues also found small bowel as the most frequent (70%) site of intestinal obstruction in their study [14]. Postoperative adhesion was the most common etiology that was found in 40.8% cases during the study. Malignancy, hernia, IBD, intussusceptions, volvulus and intestinal tuberculosis was present in 24.3%, 8.7%, 9.7%, 3.9%, 7.8% and 4.9% cases respectively. This finding is similar to the findings of Neri [15]. In his study adhesion, malignancy, volvulus and hernia was present in 42.3%, 24%, 9.6% and 13.4% cases. Qureshi *et al.*, also finally diagnosed their intestinal obstruction cases as adhesion in 39.83% of cases [9]. According to Ojo *et al.*, adhesion was present in 51.6% of cases, neoplasm was present in 18% of cases which is nearly consistent to this study findings [7]. Obstruction due to adhesion was increased due to increased abdominal and pelvic surgeries Narayan *et al.*, [5]. According to Chennakeshaviaiah adenocarcinoma is the most common (present in 49.06% cases) histological variety of intestinal neoplasm [16]. Consistent to their findings this study also reveals adenocarcinoma as the commonest variety of neoplasm that was present in the study cases. Adenocarcinoma, non-Hodgkin lymphoma, mucoid carcinoma, metastatic adenocarcinoma, undifferentiated carcinoma and carcinoid was present in 14(13.6%), 04(3.9%), 01(1.0%), 02(1.9%), 02(1.9%) and 02(1.9%) cases

respectively. This finding is also similar to the findings of Badary and co- researchers [17]. Among their 87 malignant cases maximum 50(57.47%) cases had adenocarcinoma and 13(14.94%) cases had non-Hodgkin lymphoma which is consistent to our findings. In this study 02 (1.9%) cases of carcinoid were found during the study period. The incidence of carcinoid is very low. As the previous four years hospital record shows no carcinoid so it might be considered as an incidental finding. Among the 25 truly malignant cases pre-operative and per-operative findings could detect 19 as malignant and the rest as benign. While, among the 78 truly benign lesions pre- operative and per-operative findings could detect 74 as non-malignant and, the rest 04 identify falsely as malignant lesions. The sensitivity, specificity and accuracy of clinical diagnosis were 76%, 94.87% and 90%. Histopathology is the gold standard for final diagnosis of intestinal obstruction in suspected malignant cases. Many studies used histopathology as the instrument of final diagnosis of benign and malignant causes of obstruction but very few studies used clinical findings as a instrument of final diagnosis of benign and malignant causes of obstruction. Ojo *et al.*, histopathologically diagnosed 18% of their intestinal obstruction cases as malignant and Neri also histopathologically diagnose 24% of his cases as malignant in their respective study [7, 15].

CONCLUSION

In conclusion, it was observed that postoperative adhesion and neoplasm were the two commonest causes of intestinal obstruction. Among neoplasm cases adenocarcinoma was predominant which was diagnosed by histopathological examination.

Limitations

- Short study period.
- All samples were collected from a single tertiary care center.

Recommendations

- Appropriate management of intestinal obstruction should be started immediately.

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