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Original Research Article

Predictor of early post-operative small bowel obstruction in patients undergoing emergency laparotomy and the role of computed tomography in detecting need for re-laparotomy

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ABSTRACT

Background: Early Post-Operative Small Bowel Obstruction (EP-SBO) is common complication following laparotomy. Pathophysiology of early post-operative small bowel obstruction is poorly understood.
Methods: This cross-sectional observational study was conducted over a period of 18 month on 180 patients who underwent emergency abdominal laparotomy.
Results: EP-SBO developed in 35.55% patients. History of previous surgery, location of disease, degree of peritonitis, operative procedure, wound dehiscence was found to be significantly related with occurrence of EP-SBO.
Conclusions: EP-SBO is more likely to develop if patient had history of previous surgery, peritonitis, some operative procedure, ostomy, wound dehiscence. We should have a preventive attitude towards any risk factor at any stage- Before, During and After surgery and CECT-Abdomen is a helpful tool in establishing need of re-laparotomy.

Keywords: Early post-operative small bowel obstruction (EP-SBO), Laparotomy, Peritonitis

INTRODUCTION

Early Post-Operative Small Bowel Obstruction (EP-SBO) is a relatively common disorder with a poorly understood pathophysiology. Small bowel obstruction developing in the early postoperative period puts the surgeon in a diagnostic and therapeutic dilemma and is associated with a particularly high mortality.[1-5]

It is a paradox that when small bowel obstruction occurs immediately after abdominal surgery and when the patient is still under the supervision of his attending surgeon, it carries a higher mortality than obstruction occurring many months or years after the initial operation (Sykes et al).[5] Early post-operative small bowel obstruction is defined as obstruction of small bowel occurring within 4 weeks of laparotomy. Overall incidence of early post-operative small bowel obstruction is highly variable and ranges from 2 to 30 percent. However, it may be as high as 50% in patients undergoing laparotomy for severe secondary peritonitis.[2,6-8]

Distinguishing between paralytic ileus and mechanical small bowel obstruction (SBO) in the immediate postoperative period is the first critical step which may sometimes be difficult and confusing.[5] CT has been advocated as a useful tool for making this distinction.[9-13]

Despite of the above controversy, diagnosis of the early small bowel obstruction is often made by clinical examination and confirmed by plain X-ray imaging. There is little information in the surgical literature regarding the reliability of these criteria in prediction of

clinical course of this entity.[14] The management of patients with early postoperative small bowel obstruction is controversial.

METHODS

This cross-sectional observational study was conducted in the Department of Surgery at Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi over a period of 18 months on 180 patients who underwent emergency abdominal laparotomy.

Inclusion criteria

All adult patients more than 12 years of age undergoing emergency laparotomy were included in the study for data collection as per the study protocol.

Exclusion criteria

- Previously operated
- Entero-cutaneous fistula.
- Patients with pregnancy
- Patients unable to undergo CT scanning for any reason
- Patients unwilling for re-laparotomy.

On admission detailed clinical history of the patient was noted, examination done, and all relevant investigation done. Patients diagnosed with EP-SBO were managed conservatively till 24 to 48 hours by Ryle's tube aspiration, intravenous fluid, electrolyte correction and clinical monitoring. Those patients who had not improved on above measures, underwent CECT-abdomen to make a distinction between presence of partial and complete/strangulation obstruction. Patient diagnosed on CECT scan with complete/strangulation obstruction were taken immediately for re-laparotomy. In patients with partial obstruction were continued on conservative management for another 24-48 hours. Patients in whom partial obstruction had not resolved with conservative management were taken up for re-laparotomy. Findings relevant on CT scan regarding location, cause and degree of obstruction and presence of bowel gangrene were confirmed during laparotomy.

RESULTS

Age distribution

Mean age of the patients who did not go into Early Postoperative SBO was 37.31 years (range 13 to 80 years) and the mean age of patients developing Early Postoperative SBO was 38.14 years (range 13 to 80 years). There was no significant difference in the mean age in both the groups.

Sex distribution

Out of 180 patients, who undergone emergency laparotomy 157 (87.2%) were male and 23 (12.8%) were female. A total of 64 patients went into EPSBO out of which 52 (81.3%) were male and 12 (18.8%) were female. The Chi Square Test for sex distribution was not significant. P- value = 0.0121.

History of previous surgery

In the total of 116 patients that had not gone into EPSBO, 110 (94.8%) patients had no history of previous surgery and 6 (5.2%) patients had history of previous surgery. The Chi Square Test was significant (P value = 0.04)

Table 1: Sex distribution.

			Early post OP. SBO		Total	P value
			No	Yes		
Sex	Male	Count % within early post OP. SBO	105 (90.5%)	52 (81.3%)	157 (87.2%)	0.0121 not significant
	Female	Count % within early post OP. SBO	11 (9.5%)	12 (18.8%)	23 (12.8%)	
Total		Count % within early post OP. SBO	116 (100.0%)	64 (100.0%)	180 (100.0%)	

Table 2: History of previous surgery.

			Early post op SBO		Total	P-value
			No	Yes		
History of previou surgery	No	Count % within early post OP SBO	110 (94.8%)	54 (84.4%)	164 (91.1%)	0.04; significant
	Yes	Count% within early post OP SBO	6 (5.2%)	10 (15.6%)	16 (8.9%)	
Total		Count% within early post OP SBO	116 (100.0%)	64 (100.0%)	180 (100.0%)	

Table 3: Etiology of index surgery.

			Early post op. SBO		Total
			No	Yes	
Etiology of index surgery	Ileal perf.	Count % within early post op. SBO	36 (31.0%)	33 (51.6%)	69 (38.3%)
	Duo. Perf	Count % within early post op. SBO	33 (28.4%)	6 (9.4%)	39 (21.7%)
	Acute intes. Obs	Count % within early post op. SBO	10 (8.6%)	10 (15.6%)	20 (11.1%)

Table 4: Location of disease.

			Early post op. SBO		Total	P value
			No	Yes		
Location of disease	Supracolic	Count % within early post op. SBO	51 (44.0%)	14 (21.9%)	65 (36.1%)	0.005 Significant
	Infracolic	Count % within early post op. SBO	65 (56.0%)	50 (78.1%)	115 (63.9%)	
Total		Count % within early post op. SBO	116 (100%)	64 (100 %)	180 (100 %)	

Table 5: Degree of peritonitis (distribution).

			Early post op. Sbo		Total	P value
			No	Yes		
Degree of peritonitis	No or localised	Count % within early post op. SBO	61 (52.6%)	13 (20.3%)	74 (41%)	0.0001 Significant
	Generalised	Count % within early post op. SBO	55 (47.4%)	51 (79.7%)	106 (58.9%)	
Total		Count % within early post op. SBO	116 (100%)	64 (100%)	180 (100%)	

Table 6: Degree of peritonitis (type of contamination).

			Early post op. SBO		Total	P value
			No	Yes		
Degree of peritonitis	Normal or Haemorrhagic or purulent	Count % within early post op. SBO	103 (88.8%)	44 (68.8%)	147 (81.7%)	P value 0.0002 Significant
	Faeculent	Count % within early post op. SBO	13 (11.2%)	20 (31.3%)	33 (18.3%)	
Total		Count % within early post op. SBO	116 (100%)	64 (100%)	180 (100%)	

For type of contamination P value = 0.002 was found to be significant.

Table 7: Operative procedure.

			Early post op. SBO		Total	P value
			No	Yes		
Operative procedure	Repair or resection	Count % within early post op. SBO	82 (70.7%)	25 (39.1%)	107 (59.4%)	0.0001 Significant
	No	Count % within early post op. SBO	34 (29.3%)	39 (60.9%)	73 (40.6%)	
Total		Count % within early post op. SBO	116 (100%)	64 (100%)	180 (100%)	

Table 8: Ostomy.

			Early post op. SBO		Total	P value
			No	Yes		
Ostomy	No	Count % within early post op. SBO	88 (75.9%)	32 (50.0%)	120 (66.7%)	0.0001 Significant
	Yes	Count % within early post op. SBO	28 (24.1%)	32 (50.0%)	60 (33.3%)	
Total		Count % within early post op. SBO	116 (100%)	64 (100%)	180 (100%)	

For development of EPSBO, the Chi Square Test was found to be significant in which ostomy was fashioned. (P-Value = 0.001)

Location of disease

Out of the 64 patients that went in to EPSBO 14 (21.9%) patients had supracolic disease and 50 (78.1%) patients had infracolic disease. Out of total 116 patients that did not go EPSBO 51 (44.0%) patients had supracolic disease and 65 (56.0%) patients had infracolic disease P value = 0.005 was significant.

Degree of peritonitis (distribution)

Out of 116 patients that had not undergone EPSBO 61 (52.6%) patients had no/localized peritonitis and 55 (47.4%) patients had generalized peritonitis. P value = 0.0001, significant.

Operative procedure

In 116 patients that did not go into EPSBO 82 (70.7%) patients undergo repair/resection and 34 (29.3%) patients did not undergo repair/resection. The Chi square test was significant in not undergo repair/ resection (P-value = 0.0001).

Abdominal wall closure

In patients with primary abdominal wall closure and in patients in whom abdomen was left open, in the development of EPSBO the Chi Square Test was insignificant (P Value = 0.152).

Table 9: Abdominal wall closure.

			Early post op. SBO		Total	P value
			No	Yes		
Abdominal closure	Closed	Count % within early post op. SBO	100 (86.2%)	49 (76.6%)	149 (82.8%)	0.152 Not significant
	Open	Count % within early post op. SBO	16 (13.8%)	15 (23.4%)	31 (17.2)	
Total		Count % within early post op. SBO	116 (100%)	64 (100%)	180 (100%)	Total

Table 10: Drain.

			Early post op. SBO		Total	P value
			No	Yes		
Drain	No	Count % within early post op. SBO	19 (16.4%)	15 (23.4%)	34 (18.9%)	Not significant
	Yes	Count % within early post op. SBO	97 (83.6%)	49 (76.6%)	146 (81.1%)	
Total		Count % within early post op. SBO	116 (100%)	64 (100%)	180 (100%)	Total

The Chi Square Test was not significant

Table 11: ICU care.

			Early post op. SBO		Total	P value
			No	Yes		
ICU care	No	Count % within early post op. SBO	88 (75.9%)	38 (59.4%)	126 (70.0%)	0.032 Significant
	Yes	Count % within early post op. SBO	28 (24.1%)	26 (40.6%)	54 (30.0%)	
Total		Count % within early post op. SBO	116 (100%)	64 (100%)	180 (100%)	Total

Chi Square Test was significant in patients receiving ICU care; P value = 0.032

Table 12: Wound dehiscence.

			Early post op. SBO		Total	P value–
			No	Yes		
Wound dehiscense	No	Count % within early post op. SBO	102 (87.9%)	56 (87.5%)	158 (87.8%)	0.933 Not significant
	Yes	Count % within early post op. SBO	14 (12.1%)	8 (12.5)	22 (12.2%)	
Total		Count % within early post op. SBO	116 (100%)	64 (100%)	180 (100%)	Total

The Chi Square Test was found not to be significant

Out of 13 probable risk factors studies, it is obvious from above tables that history of previous surgery, location of disease, degree of peritonitis (distribution), degree of peritonitis (type of contamination), operative procedure, ostomy, ICU care, wound dehiscence was found to be significantly related with occurrence of early postoperative SBO. In the present study of 180 patients (who underwent emergency abdominal laparotomy) - 64 (35.55%) patients developed early postoperatively SBO and 116 (64.45%) patients had not gone into obstruction. Out of 64 patients developing early postoperative SBO - 46 (71.87%) patients responded to conservative management and 18 (28.13%) patients not responding to conservative trial. CECT Abdomen was performed in 18 patients not responding to conservative trial out of which - 16 (88.9%) patients has complete/strangulated

obstruction which was confirmed during re-laparotomy. Two (11.1%) patients had partial obstruction out of which - 1 was confirmed during re-laparotomy and re-laparotomy was negative in other 1. CECT abdomen was able to tell complete/strangulated obstruction in 100% patients in our present study and in 50% patients with partial obstruction. The etiology of Early Postoperative SBO was abscess in 3 (16.7%) patients, inter bowel loops adhesions in 9 (50%) patients, multiple bands in 5 (27.8%) patients and negative in 1 (5.6%) patient.

Finally, out of 46 patients managed conservatively, re-laparotomy was done in 2 patients for perforation with conversion rate of 4.3% and mortality of 2 (4.3%) patients in this group. In the remaining 44 (95.7%) patients' course was uneventful. Mortality in patients not responding to conservative management was 2 (11.11%) out of 18 patients.

DISCUSSION

Some authors define it as any obstruction occurring after a surgical procedure, others include all cases occurring during the same hospitalization.[1,3,5,6] Steward et al defined it as a temporary return of bowel function followed by distension and obstipation within 4 weeks of laparotomy and subsequent verification of the same at operation.[15] Quatromoni et al insisted that small bowel obstruction with the onset of symptoms within 30 days of operation with confirmation by abdominal X-rays.[16]

Incidence of early post-operative small bowel obstruction is quite variable in different studies. This variation is basically due to differences in the definition of entity. Study by Frykberg et al suggested its incidence well within the range of 5% to 29% of all cases of bowel obstruction. Quan et al showed its incidence to be 2.2% of all surgical problems.[8] There is significant association between emergency surgical procedures and trauma and the subsequent development of early postoperative small bowel obstruction.[16]

The diagnosis of early postoperative SBO is based on clinical, radiological and laboratory findings. The features which usually lead to a diagnosis of mechanical SBO are the classic triad of colicky abdominal pain, vomiting and absolute constipation together with physical sign of abdominal distension. Plain films have proven to be the most reliable modality in diagnosing early postoperative small bowel obstruction.[1,4,5,8,16] Contrast studies have been reported as potentially dangerous in evaluation of early postoperative bowel obstruction, because they are less reliable than plain films and may mislead the clinician.[1,5,18] As many as 38% of patients in whom orally administered contrast material passes into colon still require operation. Previous studies have reported the value of CT in diagnosing complete mechanical obstruction of the small intestine.[9-13] Nonetheless, the traditional clinical and plain films suffice in approximately 50-80% of cases.[10] The immediately postoperative period, however, is different.

The plain films in this setting are difficult to interpret because bowel distension and paralytic ileus are so common. CT allows confident diagnosis of complete SBO and CT findings can suggest strangulation. Management in early post-operative small bowel obstruction depends on the level of obstruction, extent of obstruction and finally the vascularity of the small bowel following obstruction. It is generally asserted that most cases of early postoperative SBO will resolve with replacement of fluids and electrolytes and nasogastric de-compression.[2,6] Published reports indicate however, that many if not most of these patients require surgical management.[1,3,4,6-8,17,18]

CONCLUSION

History of previous surgery, location of disease, degree of peritonitis (distribution), degree of peritonitis (type of contamination), operative procedure, ostomy, ICU care, wound dehiscence are found to be significantly related with occurrence of Early Postoperative SBO. Besides, a preventive attitude towards any risk factors at any stage - before, during and after surgery; early suspicion based on risk stratification and prompt trial of conservative treatment and on its failure, a quick CT evaluation and re-intervention if indicated should go a long way in reducing the incidence morbidity and mortality of this complication.

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