

Original Research Article

TYPES, INDICATIONS, AND COMPLICATIONS OF INTESTINAL STOMAS AT A TERTIARY CARE CENTRE IN BARABANKI: A CROSS-SECTIONAL OBSERVATIONAL STUDY

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ABSTRACT

Background: Intestinal stoma construction is a common surgical procedure performed for faecal diversion, decompression, and protection of distal bowel segments in emergency and elective gastrointestinal surgery. Stoma-related complications remain an important cause of postoperative morbidity.

Materials and Methods: This cross-sectional observational study was conducted over 15 months in the Department of General Surgery, Hind Institute of Medical Sciences, Barabanki, Uttar Pradesh. Fifty patients up to 70 years of age undergoing elective or emergency intestinal stoma construction were included. Data regarding demographic profile, indications, stoma characteristics, operative details, early and late complications, management, and reversal outcomes were analysed using IBM SPSS version 27.0.

Results: The mean age was 43.6 ± 16.3 years, and 36 patients were male (72.0%). Emergency stoma construction was performed in 36 patients (72.0%). Ileostomy was the most common stoma type, performed in 30 patients (60.0%), followed by colostomy in 18 (36.0%) and jejunostomy in 2 (4.0%). Intestinal perforation was the most frequent indication, observed in 15 patients (30.0%). Early complications occurred in 29 patients (58.0%), with peristomal skin irritation being the most frequent event in 17 patients (34.0%). Late complications occurred in 14 patients (28.0%), most commonly parastomal hernia in 5 patients (10.0%). Stoma type was significantly associated with complications ($p = 0.04$). Hypoalbuminemia was also significantly associated with increased complications ($p = 0.03$). Emergency surgery ($p = 0.04$) and age >60 years ($p = 0.01$) were associated with higher complication rates.

Conclusion: Ileostomy was the most common intestinal stoma constructed, and intestinal perforation was the leading indication. Early complications were more frequent than late complications, with peristomal skin irritation and parastomal hernia being the predominant events. Advanced age, emergency surgery, hypoalbuminemia, and stoma type were associated with increased complication rates.

Keywords: Intestinal stoma; Ileostomy; Colostomy; Stoma complications; Peristomal skin irritation; Parastomal hernia

INTRODUCTION

An intestinal stoma is a surgically created opening of the bowel on the anterior abdominal wall that permits diversion of intestinal contents when the distal route is diseased, obstructed, protected, or surgically

excluded. Stomas are used in a wide range of general surgical conditions, including intestinal perforation, obstruction, colorectal malignancy, inflammatory bowel disease, trauma, and complex anorectal disease.^[1,2]

Intestinal stomas may be temporary or permanent and are commonly constructed as ileostomies or colostomies, with jejunostomies used less frequently. Technical configuration may include loop, end, or double-barrel stomas, depending on the indication, operative findings, and need for future bowel continuity restoration.^[2,3] Although stoma construction is often necessary and sometimes life-saving, it is associated with early and late complications that may require prolonged care, repeated intervention, and delayed reversal.^[3,4] Reported stoma complication rates vary widely because of differences in stoma type, indication, urgency of surgery, nutritional status, comorbidities, follow-up duration, and definitions used for complications.^[5] Early complications include peristomal skin irritation, wound infection, bleeding, retraction, necrosis, and obstruction, whereas late complications include parastomal hernia, prolapse, stenosis, and fistula formation. Identifying the local pattern of stoma construction and its complications is important for refining surgical planning, postoperative surveillance, and patient counselling. This study was conducted to identify the common types of intestinal stomas, their indications, early and late complications, management patterns, and factors associated with complications among patients undergoing stoma construction at a tertiary care centre in Barabanki.

MATERIALS AND METHODS

Study design and setting: This cross-sectional observational study was conducted in the Department of General Surgery, Hind Institute of Medical Sciences, Safedabad, Barabanki, Uttar Pradesh.

Study duration: The study duration was 15 months.

Participants: The study included patients up to 70 years of age who underwent intestinal stoma construction in elective or emergency settings and provided informed consent.

Inclusion criteria

Patients up to 70 years of age undergoing intestinal stoma construction were included. Elective and emergency cases requiring stoma construction were included after consent.

Exclusion criteria

Patients with abdominal complaints not requiring stoma construction were excluded.

Sample size: The sample size was calculated using the single-proportion formula. Using an estimated ileostomy proportion of 76%, 95% confidence level, and absolute margin of error of 12%, the calculated sample size was approximately 49. The final sample size was rounded to 50 patients.^[6]

Sampling method: A non-probability consecutive sampling method was used. All eligible patients who

underwent intestinal stoma construction in elective or emergency settings during the study period and fulfilled the inclusion criteria were enrolled after obtaining informed consent until the required sample size of 50 patients was achieved.

Data collection and variables: Data were collected for demographic variables, presenting complaints, comorbidities, body mass index, serum albumin level, indication for stoma construction, emergency or elective setting, stoma type, anatomical site, configuration, laterality, operative procedure, intraoperative complications, duration of surgery, duration of stoma presence, follow-up status, early complications, late complications, management of complications, stoma reversal, and post-reversal complications.

Outcome measures: The primary outcome was the occurrence of early and late stoma-related complications. Early complications were defined as complications occurring within 30 postoperative days. Late complications were defined as complications occurring after 30 postoperative days. Secondary outcomes included management of complications, factors associated with complications, and complications following stoma reversal.

Statistical analysis: Data were analysed using IBM SPSS version 27.0. Quantitative variables were summarized as mean $\pm$ standard deviation. Categorical variables were summarized as frequencies and percentages. The Chi-square test was used to assess associations between categorical variables. The independent samples t-test and Mann-Whitney U test were used for comparison of continuous variables according to data distribution. A p-value <0.05 was considered statistically significant: **Ethical considerations:** The study was approved by the Institutional Ethical Committee. Written informed consent was obtained from all participants. Patient confidentiality and anonymity were maintained.

RESULTS

Demographic and baseline clinical characteristics:

A total of 50 patients were included. The mean age was 43.6 ± 16.3 years, with ages ranging from 13 to 70 years. The largest age group was 41–60 years, comprising 20 patients (40.0%). There were 36 males (72.0%) and 14 females (28.0%). Diabetes mellitus was recorded in 8 patients (16.0%), hypertension in 7 (14.0%), chronic kidney disease in 2 (4.0%), and tuberculosis in 1 (2.0%). Thirty-two patients (64.0%) had no recorded comorbidity. The mean BMI was 22.5 ± 3.4 kg/m², and 8 patients (16.0%) were underweight. The mean serum albumin level was 3.8 ± 0.5 g/dl, and 10 patients (20.0%) had hypoalbuminemia.

Table 1: Baseline demographic and clinical characteristics of the study population

Variable	Number (n)	Percentage (%)
Age group (years)		
0–20	5	10.0

21–40	16	32.0
41–60	20	40.0
>60	9	18.0
Gender		
Male	36	72.0
Female	14	28.0
Comorbidity		
Diabetes mellitus	8	16.0
Hypertension	7	14.0
Chronic kidney disease	2	4.0
Tuberculosis	1	2.0
None	32	64.0
Parameter	Mean ± SD	Number below normal
BMI (kg/m ²)	22.5 ± 3.4	8 (16.0%) <18.5
Serum albumin (g/dl)	3.8 ± 0.5	10 (20.0%) <3.5

Clinical presentation, indications, and admission profile:

The most common presenting complaint was abdominal pain, reported by 41 patients (82.0%), followed by vomiting in 27 (54.0%), abdominal distension in 20 (40.0%), constipation in 16 (32.0%), and fever in 10 (20.0%). Intestinal perforation was the leading indication for stoma construction, observed in 15 patients (30.0%), followed by malignancy in 13 (26.0%) and intestinal obstruction in 10 (20.0%). Emergency stoma construction was performed in 36 patients (72.0%), while 14 patients (28.0%) underwent elective surgery.

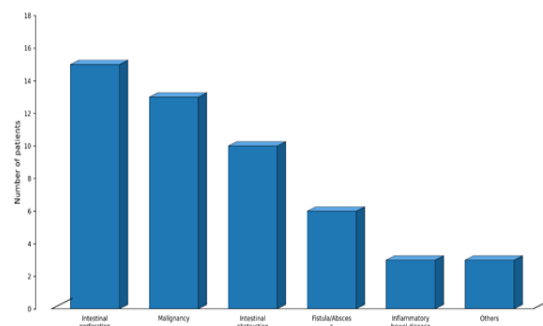


Figure 1: Indications for stoma construction.

Table 2: Clinical presentation, indications, and admission setting

Variable	Number (n)	Percentage (%)
Presenting complaint		
Abdominal pain	41	82.0
Vomiting	27	54.0
Abdominal distension	20	40.0
Constipation	16	32.0
Fever	10	20.0
Indication for stoma construction		
Intestinal perforation	15	30.0
Malignancy	13	26.0
Intestinal obstruction	10	20.0
Fistula/abscess	6	12.0
Inflammatory bowel disease	3	6.0
Others	3	6.0
Admission setting		
Emergency	36	72.0
Elective	14	28.0

Stoma characteristics and operative details:

Ileostomy was the most common stoma type, performed in 30 patients (60.0%), followed by colostomy in 18 (36.0%) and jejunostomy in 2 (4.0%). The terminal ileum was the most common anatomical site, used in 28 patients (56.0%), followed by the sigmoid colon in 14 (28.0%). Loop stomas were the most frequent configuration, constructed in 24 patients (48.0%), followed by double-barrel stomas in 18 (36.0%) and end stomas in 8 (16.0%). Right-sided stomas were constructed in 31 patients (62.0%). Exploratory laparotomy with stoma creation was the most common operative procedure,

performed in 28 patients (56.0%). The mean operative duration was 110 ± 30 minutes.

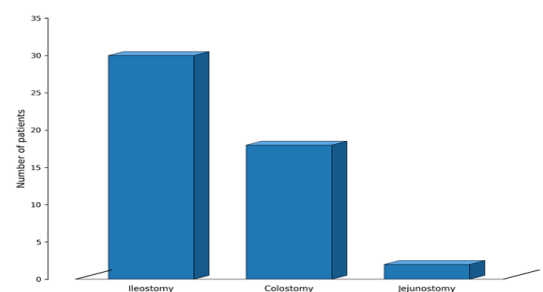


Figure 2: Distribution of intestinal stoma types.

Table 3: Stoma and operative characteristics

Variable	Number (n)	Percentage (%)
Type of stoma		
Ileostomy	30	60.0
Colostomy	18	36.0

Jejunostomy	2	4.0
Anatomical site		
Terminal ileum	28	56.0
Sigmoid colon	14	28.0
Transverse colon	4	8.0
Jejunum	2	4.0
Ascending colon	2	4.0
Configuration		
Loop	24	48.0
End	8	16.0
Double-barrel	18	36.0
Side of stoma		
Right	31	62.0
Left	19	38.0
Surgical procedure		
Exploratory laparotomy + stoma creation	28	56.0
Resection and anastomosis + stoma	12	24.0
Stoma only	7	14.0
Others	3	6.0
Intraoperative complication		
None	44	88.0
Bowel injury	2	4.0
Bleeding	2	4.0
Mesenteric injury	1	2.0
Others	1	2.0
Operative parameter	Mean $\pm$ SD	
Duration of surgery (minutes)	110 $\pm$ 30	

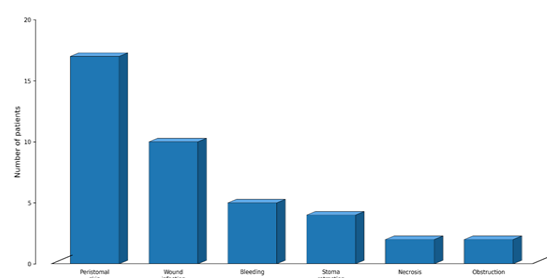


Figure 3: Early postoperative complications.

Follow-up and stoma-related complications: The mean duration of stoma presence was 8.5 ± 2.3 months. Follow-up of at least six months was completed in 42 patients (84.0%). Early complications occurred in 29 patients (58.0%). Peristomal skin irritation was the most frequent early complication, recorded in 17 patients (34.0%), followed by wound infection in 10 (20.0%), bleeding in 5 (10.0%), stoma retraction in 4 (8.0%), necrosis in 2 (4.0%), and obstruction in 2 (4.0%). Conservative management was used for 25 patients

(86.0%) with early complications, while 4 patients (14.0%) required surgical intervention.

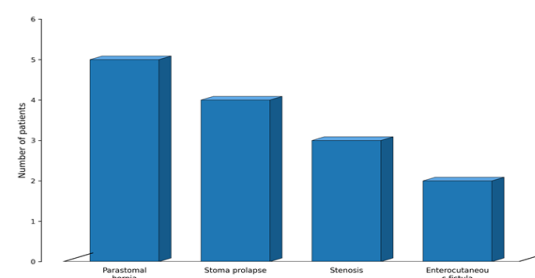


Figure 4: Late postoperative complications.

Late complications occurred in 14 patients (28.0%). Parastomal hernia was the most common late complication, observed in 5 patients (10.0%), followed by stoma prolapse in 4 (8.0%), stenosis in 3 (6.0%), and enterocutaneous fistula in 2 (4.0%). Supportive management was used in 12 patients (86.0%) with late complications, while 2 patients (14.0%) required surgical intervention.

Table 4: Early and late stoma-related complications and their management

Variable	Number (n)	Percentage (%)
Early complications		
Peristomal skin irritation	17	34.0
Wound infection	10	20.0
Bleeding	5	10.0
Stoma retraction	4	8.0
Necrosis	2	4.0
Obstruction	2	4.0
Management of early complications		
Conservative	25	86.0
Surgical intervention	4	14.0
Late complications		
Parastomal hernia	5	10.0
Stoma prolapse	4	8.0
Stenosis	3	6.0
Enterocutaneous fistula	2	4.0

Management of late complications		
Supportive	12	86.0
Surgical intervention	2	14.0

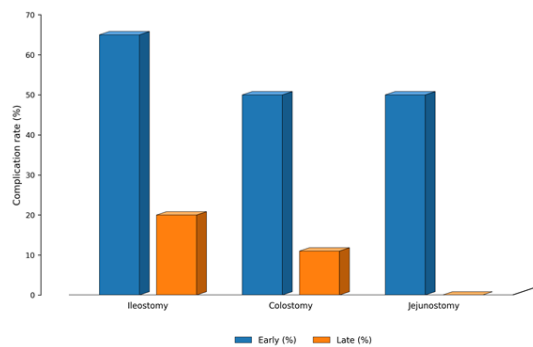


Figure 5: Early and late complications by stoma type.

Factors associated with complications:

Complication rates were higher among patients aged >60 years (78.0%) than among those aged 41–60 years (60.0%) and 0–40 years (40.0%). Males had a complication rate of 62.0%, compared with 50.0% among females. Emergency cases had a higher

complication rate (68.0%) than elective cases (42.0%). Patients with hypoalbuminemia had a complication rate of 70.0%, compared with 48.0% among those with normal serum albumin. Underweight patients had a complication rate of 62.0%, compared with 51.0% among normal or overweight patients. Ileostomy was associated with higher early and late complication rates than colostomy.

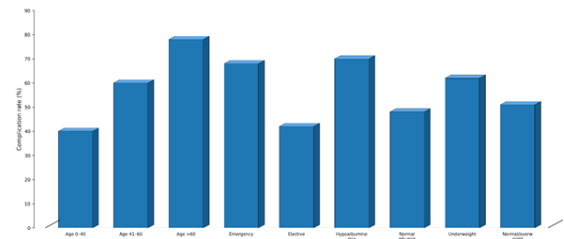


Figure 6: Complication rates across clinical risk categories.

Table 5: Factors associated with stoma-related complications

Variable	Complication rate (%)
Age group	
0–40 years	40.0
41–60 years	60.0
>60 years	78.0
Gender	
Male	62.0
Female	50.0
Admission setting	
Emergency	68.0
Elective	42.0
Serum albumin/BMI	
Hypoalbuminemia	70.0
Normal albumin	48.0
Underweight (BMI <18.5 kg/m ²)	62.0
Normal/overweight	51.0
Stoma type	Early complication rate (%)
Ileostomy	65.0
Colostomy	50.0
Jejunostomy	50.0

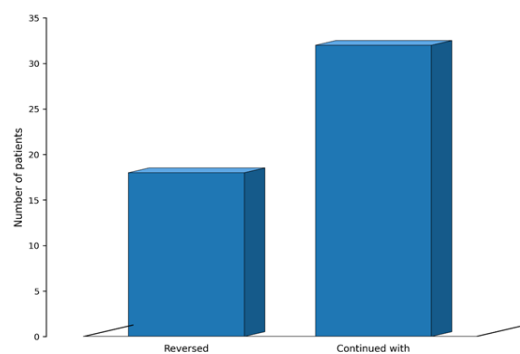


Figure 7: Stoma reversal status.

Statistical summary: The Chi-square test showed a statistically significant association between stoma type and complication incidence ($p = 0.04$). The independent samples t-test showed a statistically significant association between serum albumin level

and complications ($p = 0.03$). The Mann–Whitney U test did not show a statistically significant association between operative duration and complications ($p = 0.10$).

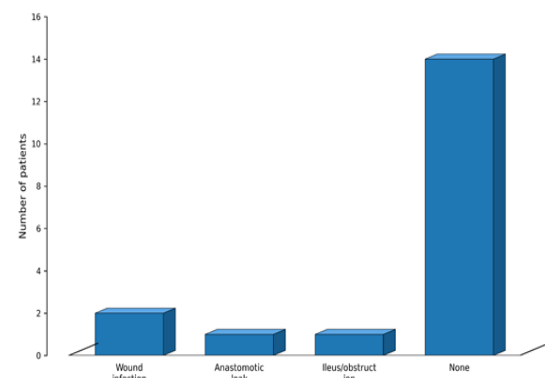


Figure 8: Complications following stoma reversal.

Stoma reversal outcomes: Stoma reversal was performed in 18 patients (36.0%), while 32 patients (64.0%) continued with a stoma at the end of the observation period. Among the 18 patients who underwent stoma reversal, post-reversal

complications occurred in 4 patients (22.0%). Wound infection occurred in 2 patients (11.0%), anastomotic leak in 1 patient (6.0%), and ileus/obstruction in 1 patient (6.0%). Fourteen patients (77.0%) had no recorded post-reversal complication.

Table 6: Stoma reversal outcomes

Variable	Number (n)	Percentage (%)
Stoma status		
Reversed	18	36.0
Continued with stoma	32	64.0
Complications following reversal		
Wound infection	2	11.0
Anastomotic leak	1	6.0
Ileus/obstruction	1	6.0
None	14	77.0

DISCUSSION

This cross-sectional observational study of 50 patients undergoing intestinal stoma construction found that ileostomy was the most common stoma type, intestinal perforation was the leading indication, and most stomas were constructed in emergency settings. Early complications were more frequent than late complications. Peristomal skin irritation was the most common early complication, while parastomal hernia was the most common late complication. Stoma type, hypoalbuminemia, emergency surgery, and age >60 years were associated with increased complication rates.

The predominance of ileostomy in This study is comparable with the findings of Pandiaraja et al., who reported ileostomy as the most common enteric stoma in their series.^[7] In contrast, Massenga et al. reported sigmoid colostomy as the most frequently used stoma site in their tertiary care experience, reflecting differences in patient population, indication profile, and paediatric-adult case mix.^[8] Engida et al. reported a predominance of emergency colostomy for gangrenous sigmoid volvulus, further demonstrating that the pattern of stoma construction is strongly influenced by regional disease burden and surgical presentation.^[9]

Intestinal perforation was the leading indication in this study. This pattern is consistent with Indian surgical series in which emergency abdominal pathology forms a major proportion of stoma indications.^[7,10] The high proportion of emergency stomas in the present cohort is clinically relevant because emergency surgery was significantly associated with complications. Similar associations between urgent surgery, poor physiological reserve, and increased stoma morbidity have been reported in previous studies.^[10,11]

Peristomal skin irritation was the most common early complication in This study. Similar findings have been reported by Pandiaraja et al., who identified skin excoriation as the most frequent complication following enteric stoma creation.^[7] Koc et al. also found that patient-related factors influence early stoma complications, with comorbidities and general condition contributing to postoperative morbidity.^[12]

The observed late complication pattern, particularly parastomal hernia and prolapse, is consistent with published reviews describing these events as important sources of long-term morbidity after stoma construction.^[13]

Jayarajah et al. reported that long-term enteral ostomy complications commonly include prolapse, skin excoriation, and parastomal hernia, and that perioperative stoma care support can reduce complication rates.^[14] Formijne Jonkers et al. also demonstrated that early complications after stoma formation are frequent and require structured follow-up.^[15] Bilali et al. reported ostomy-related complications in 38.5% of patients, supporting the observation that stoma morbidity remains clinically substantial across surgical settings.^[16] The association between hypoalbuminemia and complications in This study supports the role of nutritional status in postoperative healing. Patients with serum albumin <3.5 g/dl had a higher complication rate than those with normal albumin. This finding is clinically relevant in emergency surgery, where nutritional correction may be limited by disease severity and operative urgency.

Emergency surgery was also associated with increased complications. Patients requiring urgent stoma construction may have sepsis, bowel oedema, contamination, delayed presentation, and limited opportunity for preoperative stoma site planning. These factors may increase the risk of poor appliance fit, skin complications, retraction, infection, and delayed recovery.

The higher early and late complication rates observed with ileostomy may relate to liquid effluent, enzymatic output, and higher risk of peristomal skin injury. These findings indicate that ileostomy patients require close postoperative monitoring for skin complications, output-related problems, fluid status, and nutritional status.

Strengths and Limitations: The study provides direct clinical data on stoma indications, types, early and late complications, management, and reversal outcomes from a tertiary care surgical setting. The inclusion of emergency and elective cases reflects routine general surgical practice.

The study is limited by its single-centre design and modest sample size. Follow-up was completed in 42 patients, which may affect assessment of late complications. Quality-of-life outcomes were part of the clinical objective but were not assessed using a validated questionnaire. Some subgroup analyses were limited by small numbers, particularly for jejunostomy and post-reversal complications.

CONCLUSION

Ileostomy was the most common intestinal stoma constructed in this tertiary care setting, and intestinal perforation was the leading indication. Early complications occurred more frequently than late complications, with peristomal skin irritation being the predominant early event and parastomal hernia the most common late event. Advanced age, emergency surgery, hypoalbuminemia, and stoma type were associated with increased complication rates. Structured postoperative monitoring and timely management of stoma-related complications are important in patients undergoing intestinal stoma construction.

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