

**Early post operative morbidity of diversion stomas for benign and malignant diseases.**

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**Abstract**

A prospective study was conducted over a period of two years in the department of general and minimal invasive surgery and its colorectal division. A total of 63 cases were studied. Majority of the cases were males belonging to rural areas.

Constipation and pain abdomen were the most common presenting complaints of the patients. Most of cases had loop ileostomy (71.4%), followed by end ileostomy (9.5%), End Sigmoid Colostomy (7.93%), Loop sigmoid colostomy (7.93%), loop transverse colostomy (1.58%) and end transverse colostomy (1.58%). Skin Excoriation was the most common complication (36%), followed by mucosal necrosis (20.6%), retraction (14.2%), mucocutaneous separation (14.2%), Obstruction (12.6%), gangrene (11.00%), Prolapse (9.5%), Abscess (9.5%) etc. A statistically significant association was found between complications and operating surgeon, setting of surgery, serum albumin levels, nature of lesions and type of stoma.

**Keywords:** Stomas, complications, ileostomy, colostomy.

**Introduction**

The construction of an intestinal ostomy represents a major event for any patient, potentially worsening their quality of life. Despite the advances made in medicine, intestinal ostomies are an indispensable aspect of clinical practice [1,2,3]

**Classification of intestinal ostomies**

On the duration

1. Permanent
2. Temporary

On the basis on loop

1. Ileostomy
2. Colostomy

On the basis of morphology

1. End Stoma
2. Loop Stoma
3. Divided stoma

**Indication of ostomies**

The most common indications for stoma formation in the UK are colorectal cancer, diverticular disease and inflammatory bowel disease [4, 5, 6,7].

## Early complications of diversion stomas

Colostomy may be done for emergency or elective surgical conditions for the management of wide ranges of congenital and acquired benign or malignant gastrointestinal conditions for two main purposes: diversion of the colon or decompression of the colon [8,9]. Diversion is done to protect contamination of the distal large bowel segment by stool and its attending complications. Diversion is done commonly for trauma or distal rectal elective surgeries. Decompression is done to relieve obstructed large bowel. Examples include sigmoid volvulus and malignant left side tumors [10,11]. In the developing world, benign condition pre dominates, including abdominal tuberculosis adhesion obstruction sigmoid volvulus, trauma and ileosigmoid knotting. Colorectal cancers also take a good share (12,13,14).

Despite extensive surgical experience, complications of intestinal stomas still occur with relative frequency. These complications result in high morbidity and incur significant cost, from economic, physiologic, and psychological points of view. Complications of intestinal stomas may be subdivided into those occurring early in the post operative period (less than one month postoperatively) and those occurring late [14].

Reported rates of stomal complications vary widely in the literature. Several reports focus solely on ileostomies or colostomies, making it even more difficult to make definitive conclusions about the overall incidence.

Furthermore, conflicting data exists as to whether complication rates are equivalent with colostomies and ileostomies [15, 16, 17] or are higher with ileostomies [18]. Complication rates specific to loop ileostomies can be significant, ranging from 5.7% to 41%, [6–8] and reoperation rates for loop ileostomies vary widely [19, 20, 21, 22]. Complication rates obviously also vary depending on the circumstances surrounding stoma

creation. Although it seems intuitive that emergency operations with gross peri to Neal soiling, gangrenous or perforated intestine, and creation of stomas in debilitated or mal-nourished patients would be associated with increased postoperative morbidity, this has not been borne out in several studies [23-25]

## Improper Stoma Site Selection

Improper stoma site selection is one of the most common, and most preventable, early complications of abdominal stoma surgery. Improper siting leads to difficulties in self-care and interferes with the ability to maintain a secure stoma appliance.

## Vascular Compromise

Vascular compromise of intestinal stomas ranges from mild ischemia due to operative tissue trauma or Vaso spasm with mucosal sloughing to infarction and intestinal necrosis due to ligation of arterial supply or inadequate collateral arterial circulation. [27,28,29].

## Peristomal skin irritation

The reported incidence of peristomal skin irritation ranges from 3 to 42% [30, 31]. (1) Chemical dermatitis due to exposure to the stoma effluent, and (2) Desquamation of peristomal skin resulting from frequent appliance changes.

## Peristomal Infection, Abscess and Fistula Formation

In the early post operative period, parastomal infections and abscesses are relatively uncommon, with a reported incidence of 2 to 14.8%. Poor vascular supply that does not cause acute complications may also lead to delayed complications, such as stomal stenosis and/ or stricture [32].

## Retraction

Retraction of a stoma in the immediate postsurgical period is usually a result of tension on the bowel or its mesentery due to inadequate mobilization. Also, in Patients who are malnourished, obese, or on corticosteroid

therapy, the stoma may retract due to poor wound healing and gravity.

### Stomal prolapse

Stomal prolapse can occur in both end and loop stomas. Both the proximal and distal bowel segments can protrude, although prolapse appears to be more common in the distal segment [33]. The rate of stomal prolapse is 7%-11% [33].

### Obstruction

Stomal stricture can occur at the skin and/or fascial level. A stricture may be the result of scarring, inflammation, or technical error.

### Peristomal varices/bleeding

Peristomal varices can be seen in patients with stomas and any cause of portal hypertension.

### Dehydration/Electrolyte Abnormalities

The incidence ranges from 0.8 to 16.7% [34]. Ileostomies can be expected to begin function between 1- and 3-days post operatively Hypokalemia, hypomagnesemia, and Hypocalcemia are common findings and renal impairment is a reported complication [35].

### Aims and Objectives

To evaluate the early post operative morbidity associated with diversion stomas for elective as well as emergency cases.

### Materials and methods

#### Study setting

This study was conducted in Department of general and minimal invasive surgery and colorectal division of general and minimal invasive surgery skims soura.

#### Study design

This study was a prospective observational study.

#### Study duration

The study was conducted over a period of two years (1<sup>st</sup> June 2020 to 31<sup>st</sup> May 2022)

### Study Tool

Complications after surgery were studied in patients undergoing stoma formation using predesigned and pretested checklist.

The data related to demographics (like age, gender, domicile etc.), surgical procedures, comorbidities and complications arising was collected from the patient records and by interviewing the patients/attendants.

### Inclusion criteria

- Patients with diversion stomas for benign and malignant diseases with age > 18 years.
- All elective as well as emergency cases undergoing intestinal stoma formation

### Exclusion criteria

- Diversion stomas for Gynecological diseases
- Diversion stomas for metastatic cancers
- Stoma done for urinary diversion

### Statistical analysis

Data was collected was plotted in MS excel sheets. SPSS 2.0 software was used to analyze the data. The data was represented in the form of tables and charts. Frequencies and Percentages were drawn whenever necessary.

### Observations

A total of 63 patients who were operated in emergency operation theatre and main operation theatre were studied. The total duration of study was two years.

### Age group of patients

A total of 63 patients were studied. Majority of the patients belonged to the age group of 46-60 (38.09 %). (Table 1)

Table 1: Age group of patients

Age group	Frequency	Percentage
<30	7	11.1%
31-45	15	23.8%
46 -60	24	38.09

61-75	14	22.2%
>75	2	3.17%
Total	63	100.0%

**Gender wise distribution of cases**

Out of 63 cases studied majority of the cases were males (68.6%) Only 31.4% of the cases were females. (Table 2)

Table 2: Showing the Gender wise distribution of cases.

Gender	Frequency	Percentage
Male	43	68.6%
Female	20	31.4%
Total	63	100.0%

**Domicile**

Out of 63 cases studied majority of the cases were from rural areas (68.6%). (Table 3)

Table 3: Showing the Domicile distribution of cases.

Domicile	Frequency	Percentage
Rural	38	68.6%
Urban	25	31.4%
Total	63	100.0%

**Symptoms at presentation**

Majority of patients presented with constipation (95.0%), followed by pain abdomen (76.67), Bleeding PR (68.33 %) besides other complaints. (Table 4)

Table 4: Showing symptoms at presentation.

Symptoms	Frequency	Percentage
Pain	46	76.67%
Vomiting	21	35.00%
Constipation	57	95.00%
Bleeding PR	41	68.33%
Abdominal tenderness	32	53.33%
Lump	13	21.67%

**Outcome of patients**

Out of total 63 patients, 2 patients expired. (Table 5)

Table 5: Showing outcome of Patients

Status	Frequency	Percentage
Expired	2	3.2
Survived	61	96.8
Total	63	100.0%

**Co morbidity**

Out of 63 patients studied, 13 were hyper tensive (20.6%), 12 were diabetic (19.04%), 6 (9.52%) were having both hypertension and diabetes and 1 (1.58%) was hypothyroid. A total of 31 cases (49.20%) had no associated comorbidity (Table 6).

Table 6: Distribution of Cases according to comorbidity

Co morbidity	Frequency	Percentage
Hypertension	13	20.6%
Diabetes mellitus	12	19%
Both HTN and T2DM	6	9.5%
Hypothyroid	1	1.5%
Nil	31	49.2%
Total	63	100.0%

**Serum Albumin levels**

Most of the patients had albumin levels of more than 3.5g /dl. Only 3 cases had albumin levels less than 2.5 gm/dl. (Table 7)

Table 7: Serum Albumin levels

Serum Albumin level(g/dl)	Frequency	Percentage
2-2.5	3	4.7%
2.5-3.0	7	11.1%
3.0-3.5	22	34.9%
>3.5	31	49.3%

**Setting of surgery**

Majority of the cases (76.2%) were operated electively. In elective cases 40 (n = 48, 83.0%) cases were preoperatively marked (Table 8)

Table 8: Setting of Surgery

Setting	Frequency	Percentage
Emergency	15	23.8%
Elective	48	76.2%
Total	63	100.0

**Malignant and benign**

Out of 63 cases, 50 cases (79.4%) were malignant and 13(20.6%) were benign. (Table 9)

Table 9: Benign and malignant diseases

Lesion	Frequency	Percentage
Malignant	50	79.4%
Benign	13	20.6%
Total	63	100.0%

**Neoadjuvant therapy**

Out of 50 malignant cases, 38 cases (76.0%) received neoadjuvant therapy. (Table 10)

Table 10: Neoadjuvant therapy

Neoadjuvant	Frequency	Percentage
Yes	38	76.0%
No	12	24.0%
Total	50	100.0%

**Operating Surgeon**

Out of total number of 63 cases, 14 (22.2%) were operated by trainee under supervision and 49 (77.8%) were operated by consultants (Table 10)

Table 10: Operating Surgeon

Surgeon	Frequency	Percentage
Trainee under supervision	14	22.2%
Consultant	49	77.8%
Total	63	100.0%

**Type of Stoma**

Majority of cases had loop ileostomy (71.4%), followed by end ileostomy (9.5%), End Sigmoid Colostomy (7.93%), Loop sigmoid colostomy (7.93%), loop transverse

colostomy (1.58%) and end transverse colostomy (1.58%). (Table 11)

Table 11: Different types of stomas

Type of stomas	Frequency	Percentage
End ileostomy with mucous fistula	6	9.5%
Loop ileostomy	45	71.4%
End sigmoid colostomy	5	7.93%
Loop sigmoid colostomy	5	7.93%
Loop transverse colostomy	1	1.58%
End transverse colostomy	1	1.58%
Caecostomy	Nil	00
Total	63	100.0%

**Early post operative complications**

Skin Excoriation was the most common complication (36%), followed by mucosal necrosis (20.6%), retraction (14.2%), mucocutaneous separation (14.2%), Obstruction (12.6%), gangrene (11.00%), Prolapse (9.5%), Abscess (9.5%) etc.11 (10.5%) cases needed reexploration. (Table 12)

Table 12: Early post operative complications.

Sn.	Complication	Frequency	Percentage
1.	Skin Excoriation	23	36%
2.	Obstruction	8	12.6%
3.	Retraction	9	14.2%
4.	Stenosis	2	3.0%
5.	Prolapse	6	9.5%
6	Acute Kidney Injury	2	3.0%
7.	Parastomal Hernia	2	3.0%
8,	Gangrene	7	11.0%
9.	Mucosal Necrosis	13	20.6%
10.	Mucocutaneous separation	9	14.2%
11.	Abscess	6	9.5%
12.	Others	3	3.0%

13.	Reexploration	11	10.5%
14	More than one complication	10	9.6%

**Type of Stomas and Complications**

It was observed that loop ileostomy has maximum number of complications. Ileostomy had more complications than colostomies. (Table 14)

Table 14: Type of Stomas and Complications

Stoma	Complications	Percentage
End ileostomy with mucous fistula	11	10.57%
Loop ileostomy	67	64.4%
End sigmoid colostomy	10	9.6%
Loop sigmoid colostomy	12	11.53%
Loop transverse colostomy	2	1.9%
End transverse colostomy	2	1.9%

**Correlation Gender and complications**

On correlating gender with complications, no significant association was found. (Table 15)

Table 15: Correlation Gender and complications

Gender	Complications		P value
	Yes	No	
Male (n=43)	30	13	0.131
Female (n=20)	13	7	

(P value of less than 0.05 is considered to be significant, chi square test)

**Correlation between operative setting and complications**

A statistical significant association was found between setting of surgery and complications. (Table 16)

Table 16: Correlation between operative setting and complications

Operative setting	Complications		P value
	Yes	No	
Elective (n=48)	19	29	<0.05
Emergency (n=15)	12	3	

(P value of less than 0.05 is considered to be significant, chi square test)

**Correlation between nature of disease and complications**

A statistically significant association was found between nature of disease and complications. (Table 17)

Table 17: Correlation between nature of disease and complications

Nature of disease	Complications		P value
	Yes	No	
Benign (n=13)	5	8	<0.05
Malignant (n=50)	38	12	

(P value of less than 0.05 is considered to be significant, chi square test)

**Correlation between operating surgeon and complications**

A statistically significant association was found between operating surgeon and complications. (Table 18)

Table 18: Correlation between operating surgeon and complications

Operating Surgeon	Complications		P value
	Yes	No	
Resident (n=14)	11	3	<0.05
Consultant (n=49)	18	31	

(P value of less than 0.05 is considered to be significant, chi square test)

**Correlation between serum albumin levels and complications**



A statistical significant association was found between serum albumin levels and complications. (Table 19)

Table 19: Correlation between serum albumin levels and complications

Serum albumin levels	Complications		P value
	Yes	No	
<3 (n=10)	7	3	<0.05
>3 (n=53)	19	34	

(P value of less than 0.05 is considered to be significant chi square test,)

**Correlation between comorbidities and complications**

A statistical significant association was found between presence of comorbidities and complications. (Table 20)

Table 20: Correlation between comorbidities and complications

Co morbidity	Complications		P value
	Yes	No	
Yes (n=32)	27	5	0.651
No (n=31)	7	24	

(P value of less than 0.05 is considered to be significant)

**Correlation between type of stoma and complications**

A statistical significant association was found between type of stoma and complications. (Table 21)

Table 21: Correlation between type of stoma and complications

Type of stoma	Complications		P value
	Yes	No	
ileostomy (n=51)	39	12	<0.05
colostomy (n=12)	5	7	

(P value of less than 0.05 is considered to be significant, chi square test)

**Specific complications of each stoma type**

In our study, we found that peristomal skin excoriation, stomal stenosis, mucosal necrosis, acute kidney injury , para stomal hernia and gangrene was mostly associated

with ileostomies than colostomies whereas obstruction ,stomal retraction and stomal prolapse was frequently associated with colostomies than ileostomies(Table 22)

Table 22: Specific complications of ileostomy vs colostomy

Complication	ileostomy	Colostomy
Skin Excoriation (n=23)	19	4
Obstruction (n=8)	5	3
Retraction (n=9)	6	3
Stenosis (n=2)	2	0
Prolapse (n=6)	3	3
Acute Kidney Injury (n=2)	2	0
Parastomal Hernia (n=2)	2	0
Gangrene (n=7)	7	0
Mucosal Necrosis (n=13)	10	3
Mucocutaneous separation (n=9)	7	2
Abscess (n=6)	5	1
More than complication (n=14)	10	4
Others (n=3)	2	1
<b>Total (104)</b>	<b>80</b>	<b>24</b>

**Discussion**

A total of 63 patients who were operated in emergency operation theatre and main operation theatre were studied. The total duration of study was two years and it was a prospective study conducted from 1<sup>st</sup> July 2020 to 30<sup>th</sup> June 2022.

**Total complications**

A total of 68.2% (n=43) patients out of 63 had a complication. The similar results were obtained in other studies.<sup>24,38,41,42,43</sup>

Saghir et al reported a stoma-specific complication rate of 67.5% in 121 patients with intestinal stomas, though only 26% of these were considered “major.”

Arumagam et al reported complications in 50.5% of 97 intestinal stomas.

### **Malignant vs benign**

Among the study sample 79.36% (n=50) patients had malignancy. A significant association was found between the nature of the disease and early post operative complications. Our findings were similar to the results of Engida A et al<sup>37</sup> and Kocu et al<sup>38</sup> who observed that malignant patients had higher rates of stoma complications

### **Comorbidity**

Out of 63 patients studied, 13 were hypertensive (20.6%), 12 were diabetic (19.04%), 6 (9.52%) were having both hypertension and diabetes and 1 (1.58%) was hypothyroid. The study did not see any difference in complications between patients with comorbidity and without comorbidity and were consistent with findings observed by Dany Sunny et al<sup>36</sup> who found no significant relation between comorbidity and stoma complications.

### **Serum Albumin levels**

84.13% (n=53) patients had albumin levels of more than 3g/dl. Only 10 cases had albumin levels less than 3 gm/dl. 15.87% (n=10) of the patients had low albumin levels. Significant association was found between low albumin levels and complications, this is in contrast to the study conducted by Dany Sunny et al<sup>36</sup> who observed albumin levels had no relation with stoma complications

### **Operating Surgeon**

Surgery conducted by consultants had lower complications (n=18) as compared to the surgeries done by trainees under supervision (n=11).

The observations are similar to the studies conducted by Whitehead A et al<sup>39</sup> and Qureshi A et al<sup>40</sup> who noted that patients operated by senior surgeons had lesser number of complications following stoma surgery.

### **Nature of procedure and complications**

In our study emergency surgery resulted in higher stoma complications (n=19, 30.15%) than an elective surgery (19.04%, n=12) and a significantly higher morbidity for the patient.

Our findings are consistent with those by Stothert et al<sup>41</sup> who reported over 50% morbidity and 18% mortality following emergency surgery resulting in a stoma and a significant statistical difference between emergency and routine surgical settings.

### **Complications**

In our study skin excoriation was the most common complication (36%), followed by mucosal necrosis (20.6%), retraction (14.2%), mucocutaneous separation (14.2%), Obstruction (12.6%), gangrene (11.00%), Prolapse (9.5%), Abscess (9.5%) etc. More than one complication was present in 22.2% of the case. In our study, we found that peristomal skin excoriation, stomal stenosis, mucosal necrosis, acute kidney injury, parastomal hernia and gangrene was mostly associated with ileostomies than colostomies whereas obstruction, stomal retraction and stomal prolapse was frequently associated with colostomies than ileostomies. Majority of cases had loop ileostomy (71.4%), followed by end ileostomy (9.5%), End Sigmoid Colostomy (7.93%), Loop sigmoid colostomy (7.93%), loop transverse colostomy (1.58%) and end transverse colostomy (1.58%). Ileostomies was associated with higher number of complications (n=39) as compared to colostomies (n=5).

TAM Malik, MJ Lee, AB Harikrishnan et al observed 526 patients underwent loop ileostomy formation, 113 had a loop colostomy and 225 had an end colostomy. Peristomal skin complications had the highest incidence across all stoma types at 14.0% (2.4–46.2%), this was followed by parastomal hernia, which occurred in 5.5% of patients (0–88.2%). The incidence of all stoma related



complications across all stoma types was 26.5% (2.0–100%). End colostomy had the highest incidence of complications, with 62.6% (2.0–100%) of patients affected. This was followed by loop colostomy at 26.3% (13.9–100%) and loop ileostomy at 14.3% (2.9–62.2%) Peri stomal skin complications were most common in patients with a loop ileostomy (median 14.0%) and loop colostomy (median 32.3%). In end colostomy cases, patients were mostly affected by parastomal hernia (median 59.3%). No deaths were attributed to the formation of a stoma.

B. Mahjoubi, A. Moghimi et al<sup>24</sup> studied Three hundred and thirty patients with end colostomy. All patients were recalled for examination for recent complications. Early complications included stoma site pain, early dermal irritation (during the first month after surgery), mucosal bleeding, stomal prolapse and psychosocial complications.

Late complications included peristomal hernia, stomal stenosis, late dermal irritation (after the first month), stomal retraction, stomal necrosis and other stoma complications (perforation, fistula etc.).

Both ileostomy and colostomy formation are commonly performed procedures yet associated with significant morbidity. Various studies have reported a complication rate of 21–70%. This wide variation in reporting the complications may be attributable to the less than systematic assessment of these vulnerable patients at differing time points postoperatively by different groups of health-care workers who communicate only intermittently.

#### **Skin Excoriation**

In our study skin excoriation was the most common complication (36%) .19 ileostomy patients had skin excoriation while as 4 colostomy patients had skin excoriation.

Carlsen E, Bergen AB et al<sup>22</sup> observed that ileostomies produce watery and frequent stools.

#### **Stoma necrosis**

In our study necrosis was present in 20.6% (n=13) of the patients. 10 patients with ileostomies had stomal necrosis while as 3 patients with colostomies had stoma necrosis. Rodrick et al<sup>42</sup> observed that in the immediate post operative period, a stoma may look oedematous caused by venous engorgement but, as the oedema to the stoma settles, the stoma shrinks in circumference by approximately 1/3.

#### **Prolapse**

In our study 9.5% (n=6) patients had prolapse. Percentage of prolapse was higher in colostomy patients as compared to ileostomy patients. The findings are consistent with other studies.<sup>42</sup>

Qureshi A et al<sup>40</sup> and Rodrick et al<sup>42</sup> defined prolapse occurs when a proximal segment of the bowel intussuscepts and slides to protrude through the stomal orifice

#### **Stoma retraction**

In our study 14.28% (n=9) patients had stomal retraction. Similar results were obtained in various other surgeries<sup>23,24</sup>

Shelli to PC et al<sup>41</sup> and Rodrick et al<sup>42</sup> defined stoma retraction as any stoma that is 0.5 cm or more below the skin surface, that is noticed within 6 weeks of stoma formation and requires surgical intervention.

#### **Parastomal hernia**

Two cases of parastomal hernia were observed in our study and both the cases were associated with ileostomies. Studies<sup>41,42</sup> have defined as an incisional hernia associated with an abdominal wall stoma.

#### **Metabolic complications**

In our study two cases of acute kidney injury were observed and both the cases were associated with ileostomies.

Shabbir J, et al<sup>43</sup> had observed that the severity of those complications depends on the length of the bowel segment used.

### Summary and conclusion

A prospective study was conducted over a period of two years in the department of general and minimal invasive surgery and its colorectal division. A total of 63 cases were studied. Majority of the cases were males belonging to rural areas.

Constipation and pain abdomen were the most common presenting complaints of the patients. Most of cases had loop ileostomy (71.4%), followed by end ileostomy (9.5%), End Sigmoid Colostomy (7.93%), Loop sigmoid colostomy (7.93%), loop transverse colostomy (1.58%) and end transverse colostomy (1.58%). Skin Excoriation was the most common complication (36%), followed by mucosal necrosis (20.6%), retraction (14.2%), mucocutaneous separation (14.2%), Obstruction (12.6%), gangrene (11.00%), Prolapse (9.5%), Abscess (9.5%) etc. A statistically significant association was found between complications and operating surgeon, setting of surgery, serum albumin levels, nature of lesions and type of stoma.

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