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**Original Research Article**

# Emergency intestinal stomas incidence and early complications

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## ABSTRACT

**Background:** An intestinal stoma is a frequently performed procedure with a high percentage of complications. Even though creating an intestinal stoma is a procedure that can save lives while treating various gastrointestinal conditions, its accompanying morbidity and mortality have been the topic of many studies. This study was carried out in order to better understand a variety of complications in various types of intestinal stomas.
**Methods:** A total of 60 patients with intestinal stoma construction in the general surgery emergency department at Kasr Al-Ainy emergency hospital Cairo, Egypt as an emergency procedure from December 2019 to May 2020 were included in this prospective cohort analysis. The inclusion criteria were all emergency cases undergoing intestinal stomas for treatment of either traumatic bowel injuries or acute abdominal surgical emergencies.
**Results:** With a mean age of 45.18 years, 60 patients in all were evaluated. Males were 65% and females were 35%. End ileostomy with mucous fistula (33.3%) and loop transverse colostomy (18.30%) were the two stomas that were constructed most frequently. Intestinal obstruction (41.7%) was the most often reported indication of stoma formation. Complications of the peristomal skin made up the majority of cases (61.90%).
**Conclusions:** This work significantly advances our understanding of stoma problems and their prevention to some extent through pre-operative soma site marking, good surgical technique, an experienced surgeon, a stoma therapy nurse, and patient education to enhance the care and quality of life for those who have stomas.

**Keywords:** Intestinal stoma, Stoma types, Stoma complications, Ileostomy, Colostomy, Peristomal skin complication

## INTRODUCTION

The stoma is an opening created surgically in the anterior abdominal wall to divert the feces far from the distal bowel loops in order to ease an obstruction or product anastomosis.[1] Stomas are typically constructed to relieve intestinal obstruction, protect the anastomotic site, or a combination of these indications.[2,3] In surgical practice, ileostomy and colostomy are frequently performed, but there are many more types, such as the uncommon jejunostomy, which is designed to lavage, decompress, and divert gut contents.[4,5] The gastrointestinal segment from which the common types of stomas originate gives rise to their names. For instance, a caecostomy in the caecum, a jejunostomy in the jejunum, an ileostomy in the ileum, and a colostomy in the colon.[6]

Although the construction of an intestinal stoma is a procedure that can save lives while treating various gastrointestinal conditions, its accompanying morbidity and mortality have been the topic of many studies.[3,5] A range of complications related to stoma creation and its closure have been reported.[3,7]

Intestinal stoma complications are experienced by 20-70% of the patients and are grouped into early complications (occurring within the first 30 days of the procedure) like hemorrhage, stomal retraction, stomal necrosis, peristomal skin complications, and malfunction, and late complications (occurring after the first 30 days) like stomal stenosis, prolapse, and hernia formation.[4,7,8] Early complications are often of a technical origin and may require urgent intervention, whereas late

complications can also be a result of early complications but are more often a normal part of a stoma's maturation.[5]

The type and frequency of complications are influenced by factors such as the surgical specialization, the surgeon's experience, the use of suitable preoperative marking, patient education, and patient conditions like obesity, age, diabetes, and the patient's tendency to care about stomas.[3] In developed countries, primary definitive surgery is typically done instead to prevent problems related to stoma creation and closure, in contrast to many regions of Africa where intestinal stomas are trusted to cure a variety of gastrointestinal and abdominal conditions. As part of the treatment for those clinical conditions, stoma has remained a life-saving procedure.[7]

Although many gastrointestinal conditions are treated with this common procedure, there are complications that have been observed in our local setting following the development of an intestinal stoma that are not well documented. Therefore, the present study was conducted to explain the incidence of various types of intestinal stomas and their early post-operative complications.

## METHODS

### *Study type*

A prospective cohort study type was used.

### *Study place*

The study was conducted at Kasr Al-Ainy hospital's general surgery emergency department, Cairo, Egypt.

### *Study period*

The study was conducted over a period of 6 months from Dec-2019 to May-2020.

### *Selection criteria of the patients*

A total of 60 patients were enrolled in the study, all emergency cases undergoing intestinal stoma construction for treatment of either traumatic bowel injuries or acute abdominal surgical emergencies. After obtaining informed written consent.

By evaluating the mode of presentation as either a traumatic or acute surgical emergency, a protocol-based assessment of the overall condition was performed. According to advance trauma life support (ATLS) recommendations, unstable patients were resuscitated first. Following full resuscitation of the patients and completion of the primary survey, a careful history was taken to assess comorbidities. In a structured proforma, the patient's age, gender, presentation, operative procedure, type of stoma, and incidence of post-operative complications and mortality were recorded. Patients were evaluated every day while in the hospital and on follow up in outpatient department once a week for a month and monthly for next 2 month.

### *Preoperative*

*Planning stoma site*

Identifying the "ostomy triangle," which is defined by the umbilicus, the anterior superior iliac spine, and the pubic tubercle, is the first step in marking. The stoma location must be on a region of skin that is flat and smooth and should be 5 cm apart from skin folds, bony prominences, or previous scars, with the belt line of the patient passing just below the umbilicus through the rectus muscle. Usually, ileostomies are placed in the right lower quadrant of the abdomen, colostomies in the left lower quadrant, and mid-transverse colostomy in the upper abdomen. However, in challenging circumstances, like with a big patient whose abdominal wall is thick or who has a large abdominal pannis marking superior to the umbilicus, it is easier to create and care for stomas.

### *Intraoperative finding*

Following mid-line exploration, intraoperative decisions were made for types of stomas according to the pathology, indications, and better prognosis of patients. The ostomy was positioned in the lower right or left quadrant along an imaginary line traced across the rectus muscle that extends from the umbilicus to the anterior superior iliac spine. End colostomies were frequently positioned in the patient's left lower quadrant, whereas ileostomies were typically placed in the lower right quadrant of the abdomen.

Patients with gangrenous sigmoid volvulus, low descending colon perforation, or rectosigmoid mass perforation were indicated for Hartmann's procedure. The construction of an ileostomy with a mucous fistula is required after a right hemicolectomy, ileocolic anastomosis leakage, or resection of the gangrenous small bowel portion. Diverting a transverse loop colostomy may be indicated in cases of necrotizing fasciitis to promote healing by preventing soiling through a small incision in the right upper quadrant. In cases of rectal tears, obstruction from rectal or anal cancer, or both, a covering loop sigmoidostomy was performed.

### *Post-operative care*

Following surgery, a clear ostomy appliance is used to enable bowel inspection for viability, functioning, and spouting, especially in the case of an ileostomy. Patients with stomas were followed up every day after the construction of stomas during the hospital stay for complications. Stoma was considered complicated in the following conditions: Ischemia/ necrosis (Figure 1)- 1. Mucosa appears dark or grayish in colour, 2. The serosa does not bleed when scratched with a needle tip and 3. A

congested stoma will transilluminate bright red with a flashlight if it is viable.

Retraction (Figure 2)-The stoma is pulled back at least 0.5 cm below the skin level, it was seen with or without complete mucocutaneous separation and it results in improper appliance fitting, which frequently causes feces to leak and severely irritates the peristomal skin.

***Malfunction***

Obstruction resulting from twisting of the stoma, food blockage, or obstruction persisting proximal to the stoma's creation. Non-functioning of the stoma within 48 hours after construction of the stoma peristomal skin complication (Figure 3). The skin around the stoma will appear reddened and moist. Erythema, edema, blisters, and skin tears may occur and skin is painful and may appear as partial or full-thickness tissue loss.

***Stoma prolapsed***

Protrusion of bowel through stoma orifice. It may be evident when standing/with valsalva maneuver. It may/may not reduce spontaneously/with manual reduction.

***Stenosis***

Impossibility of inserting a finger or Hegar dilator No. 12 through the stoma. Typically, a stoma stricture will develop at the fascial or skin level. Presents with symptoms of constipation, increased cramping pain, and effluent exiting the stoma under pressure.

***Parastomal hernia***

Abdominal distention around the stoma. Hernias are only observed while standing or sitting, and they may "disappear" when lying on the back. Even while in a different position, a hernia can occasionally be felt. An uncomfortable but not painful feeling of fullness, tightness, or a heavy weight in the parastomal region

Patients should complete all education regarding stoma care and be carefully assessed prior to hospital discharge. Following discharge, follow-up with patients was done in person every week for 1 month and monthly foe next 2 month from the day of the operation.

***Ethical approval***

Ethical approval was obtained from the research ethical committee Cairo university, faculty of medicine, REC code MS-343-2019.

***Statistical measures***

The following data analysis was carried out by an IBM computer using SPSS (statistical application for social science, version 21): An explanation of quantitative variables, including mean, SD, median, and IQR, qualitative variables are described as percentages and numbers and A chi-square analysis was performed to compare qualitative variables between groups. Instead, when one expected cell is fewer than 5, the Fisher exact test is used. Significant at $p \leq 0.05$ and highly significant at $p < 0.01$

## RESULTS

We had 60 patients who underwent surgery due to various indications for stoma construction, with a mean age of 45.18±16.16 years, ranging from 12 years to 80 years. The majority of the patients were male, 39 (65%).

Regarding the comorbidities, 21 (35%) out of 60 patients under study had them. The most common associated comorbidity was hypertension, representing 20% of patients, followed by diabetes in 10% of patients, as shown in (Table 1), 52% of individuals with comorbidities have only one comorbidity, as shown in (Table 2).

Intestinal obstruction (41.7%) was the most common cause of stoma construction, followed by strangulation (23.3%) and traumatic bowel injury (20%) as shown in (Figure 4).

End ileostomies with mucous fistulas were the most frequently created stomas, accounting for almost a third of all cases (33.3%), followed by a loop transverse colostomy (18.30%), and an end colostomy with Hartmann's procedure (16.7%), as shown in (Table 3).

More than one-third (35%) of patients develop complications. The most common was peristomal skin complications (61.90%), followed by retraction (28.6%) and malfunction (14.30%) (Figure 5).

Patients with an end colostomy with Hartmann's procedure had the highest rate of complications, representing 60% of their patients (Table 4). Regarding the relation between type of stoma and complication (Figure 6), the most common complication was peristomal skin complications, except in loop ileostomy, where the most common complication was retraction, and in loop transverse colostomy, where the most common complication was necrosis.

Out of 60 patients, five died. So, the overall mortality rate was 8.3%, as illustrated in Figure 8. A patient with a penetrating abdominal injury who had undergone a left hemicolectomy followed by an end colostomy with a mucous fistula died of hemodynamic instability and AKI on the 1$^{st}$ postoperative day. Two patients died of perforation: the first patient died of sepsis secondary to a perforated rectosigmoid mass who underwent the Hartman procedure, and the second patient died of sudden cardiac arrest on the 1st postoperative day

secondary to a perforated caecal and sigmoid mass who underwent total colectomy with end ileostomy. A case of MVO who underwent right hemicolectomy and ileal resection leading to an end ileostomy with a mucous fistula had a revision of the stoma due to retraction and died of sudden cardiac arrest on the 1st postoperative day. A patient with strangulated paraumbilical hernia died of sepsis who underwent end ileostomy with mucous fistula and was on VAC due to infection of the midline incision.

**Table 1: Type of comorbidities of patient studied.**

| Comorbidities | N | Percentages (%) |
|---|---|---|
| **Hypertension** | 12 | 20 |
| **Diabetes mellitus** | 6 | 10 |
| **Chronic kidney disease** | 3 | 5 |
| **Hepatitis C virus positive** | 4 | 6.70 |
| **Ischemic heart disease** | 4 | 6.70 |
| **Others** | 6 | 10.20 |

**Table 2: Number of comorbidities in the same patient.**

| No. of comorbidities per patient | N | Percentages (%) |
|---|---|---|
| **One** | 11 | 52.40 |
| **Two** | 6 | 28.60 |
| **Three** | 4 | 19.00 |

**Table 3: Types of stoma.**

| Types of stoma | N | Percentages (%) |
|---|---|---|
| **End ileostomy with mucous fistula** | 20 | 33.3 |
| **Loop transverse colostomy** | 11 | 18.3 |
| **End colostomy with Hartmann's procedure** | 10 | 16.6 |
| **End colostomy with mucous fistula** | 9 | 15 |
| **Loop ileostomy** | 4 | 6.7 |
| **Loop sigmoid colostomy** | 4 | 6.7 |
| **End colostomy with splenic flexure ligation.** | 1 | 1.7 |
| **End ileostomy with Hartmann's procedure** | 1 | 1.7 |

**Figure 1: Ischemia or necrosis.**

**Table 4: Distribution of type of operation according to complication.**

| Types of stoma | N | Complicated cases, n (%) | P value |
|---|---|---|---|
| **End colostomy with splenic flexure ligation** | 1 | 1 (100) | 0.074 |
| **End colostomy with Hartmann's procedure** | 10 | 6 (60) | |
| **End colostomy with mucous fistula** | 9 | 2 (22.2) | |
| **End ileostomy with mucous fistula** | 20 | 7 (35) | |
| **End ileostomy with Hartmann's procedure** | 1 | 0 (0) | |
| **Loop ileostomy** | 4 | 3 (75) | |
| **Loop sigmoid colostomy** | 4 | 1 (25) | |
| **Loop transverse colostomy** | 11 | 1 (9.1) | |

**Figure 2: Retraction.**

**Figure 3: Peristomal skin complication.**

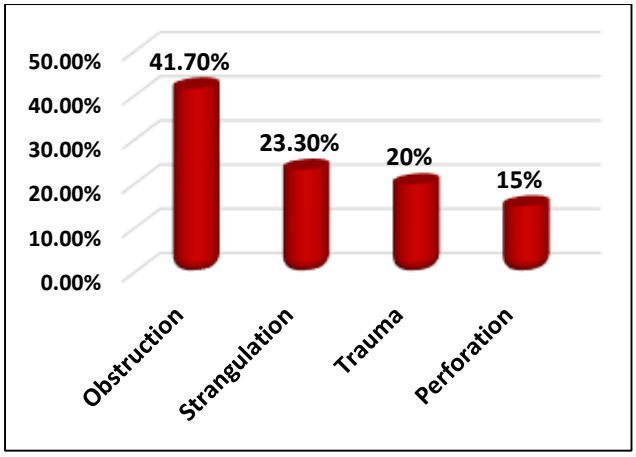


**Figure 4: Indication for stoma construction.**

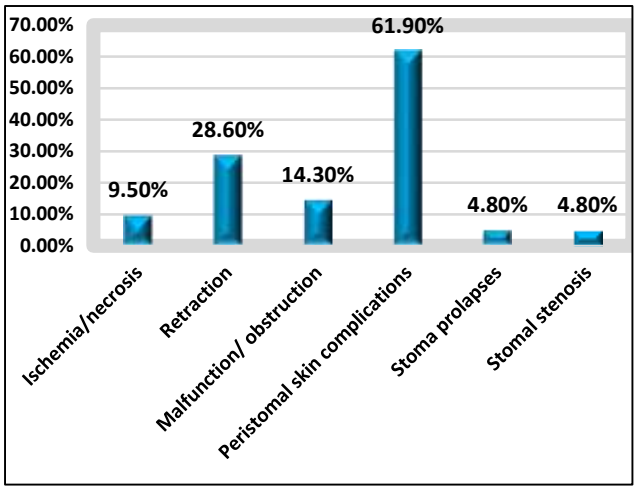


**Figure 5: Complication of stoma.**

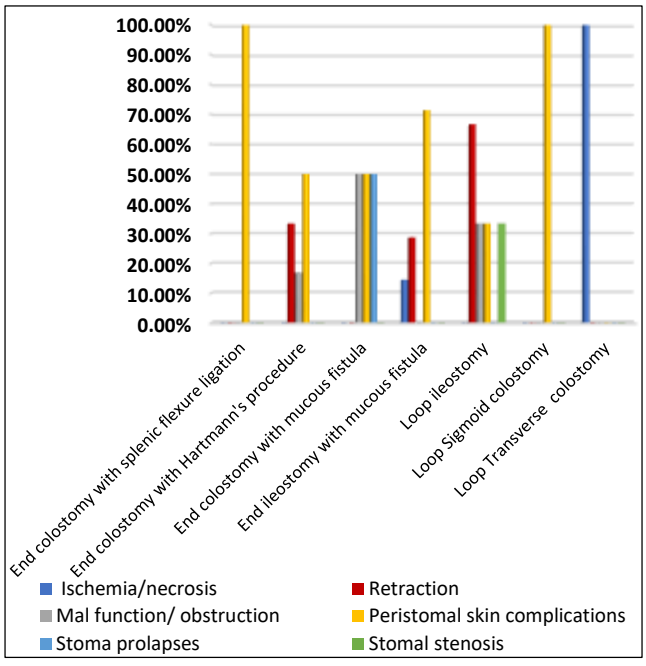


**Figure 6: Percent distribution of specific complication in each stoma type.**

## DISCUSSION

Since ancient times, stoma formation has been an important lifesaving procedure. Despite the fact that creating an intestinal stoma can save lives when used to treat many gastrointestinal conditions, numerous studies have focused on the procedure's associated morbidity and mortality.[3,5] The complications that arise after constructing an intestinal stoma are divided into early complications (occurring within the first 30 days of the procedure) like hemorrhage, stomal necrosis, stomal retraction, peristomal skin complications, and malfunction, and late complications (occurring after the first 30 days) like stomal stenosis, prolapse, and hernia formation.[4,7,8]

In our study, there were 60 patients in all. From December 2019 to May 2020, this study was carried out in the Kasr Al-Ainy general surgery emergency department.

Based on the study, we made the following observations: The mean age of patients in our study was 45.18 years old. The mean age following the study of Krishnaswamy et al was 37.8 years, Engida et al was 50.8 years, and Ahmad et al were 50.5 years. Our study result is about the average of the following studies.[3,9,10]

In this study, there were 65% male patients and 35% female patients. Male predominance was 69.64% in a study by Rajput et al, 70% in an Ahmad et al study, and 74.52% in an Ali et al study. This shows that, compared to the female group, male patients underwent more stoma construction.[3,11,12]

Regarding comorbidities, 21 out of 60 of the studied patients (35%) were suffering from comorbidities. This percentage is similar to the study by Jain et al who reported comorbidities in 29% of patients and much higher than the study by Chaudhary et al who reported comorbidities in 9.2%.[13,14] The most common associated comorbidity in our study was hypertension, which affected 20% of patients, followed by diabetes in 10% of patients. This data is comparable to the study of Bosshardt et al in which hypertension (20%) was the most common comorbidity, followed by immunosuppression (18.9%) and diabetes mellitus (7.9%).[15] Similarly, a study by Chaudhary et al demonstrated hypertension (27.6%), followed by diabetes (22.4%) as the most common comorbidity, which was higher than our study.[14]

Intestinal obstruction (41.7%) was the most frequent indication for stoma construction, followed by strangulation (23.30%), and then traumatic colonic injury (20%). Krishnaswamy et al in their study of 74 patients in 2018, found that 44% of patients requiring stoma formation had intestinal obstruction as the most common indication, which is comparable to the present study.[9] In contrast, Massenga et al in their study of 44 patients who

had acquired disease in 2019, reported an incidence of bowel perforation of 31.8% as the most common indication, followed by intestinal obstruction in 22.7% of cases.[16]

The stoma that was created most frequently was an end ileostomy with mucous fistula in about a third of cases (33.3%), followed by a loop transverse colostomy (18.30%), and then an end colostomy with Hartmann's procedure (16.70%). There were 35 colostomy (58.3%) and 25 ileostomy (41.7%). This data is similar to the study by Ahmad et al in which Colostomy (58%), followed by ileostomy (42%), were the most often performed intestinal stomas.[5] In contrast, Veena et al observed that ileostomy was done the most frequently (72%), followed by colostomy (28%).[17] The same results were observed in a study conducted by Shah et al where ileostomy (74% of the total) were the most common stomas, followed by colostomy (26%).[18]

In our study, complications occurred in 35% of cases, with peristomal skin complications (61.90%) being the most frequent, followed by retraction (28.6%) and malfunction (14.30%). This percentage is comparable to the study by Veena et al which had 25 patients with complications in 32% of cases, with peristomal skin irritation (50%) and retraction (12.5%) ranking first and second most frequently.[17] Similarly, a study by Kapoor et al revealed peristomal skin irritation (70%) followed by retraction (18%), while Pearl et al found that peristomal skin irritation was the most common complication in 42% of cases.[19,20]

Patients with end colostomy with Hartmann's procedure had the highest rate of complications, representing 60% of their patients. Except for loop ileostomy, where retraction and loop transverse colostomy-necrosis were the most frequent complications, peristomal skin complications were the most common.

Out of 60 patients, five died. So, the overall mortality rate was 8.3%. Mortality was related to the primary pathology rather than a stoma complication.

### *Limitations*

There are many significant drawbacks to the study, the first being the small sample size of 60. The reliability of the measured complications' frequencies and incidences would be improved with a bigger sample size. Stoma creation was not performed by a single surgeon, so there may be bias in the procedure. Lack of access to WOC nursing places which might have increased risk of developing peristomal skin complications.

## CONCLUSION

This work significantly advances our understanding of stoma problems and their prevention to some extent through pre-operative soma site marking, good surgical technique, an experienced surgeon, a stoma therapy nurse, and patient education to enhance the care and quality of life for those who have stomas.

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*Ethical approval: The study was approved by the Institutional Ethics Committee Cairo university, faculty of medicine, REC Code MS-343-2019.*

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