Challenges of Temporary Stoma Creation – An Observational Study from a Tertiary Care Centre in Mumbai, India

ABSTRACT

Aims: To identify the challenges that are faced with the creation of temporary stomas

Study Design: Observational Study

Place and Duration of Study: This study was undertaken in Topiwala National Medical College (TNMC) and BYL Nair Charitable Hospital, Mumbai, over a 4-year period between 2018 and 2022.

Methodology: Institutional Ethics Committee clearance was first obtained. Based on their diagnosis, and clinical and radiological findings, patients above the age of 18yrs who were planned for temporary enterostomies were identified. The details of the procedure and the intra-operative findings were documented for the sample population that was calculated to be 150. The exclusion criteria included patients with permanent stomas, urinary conduits and enterocutaneous fistulae.Patients were followed up until stoma closure or death.

Results: The highest incidence of stoma creation was seen in the 51-60yr age group - 25.3%. Our study identified that 104 patients were men (69.3%). Emergency stoma creation was done in 100 patients and 50, in the elective setting. Colorectal Carcinoma was the most common indication for stoma creation (42.7%). Stomas were least commonly performed for Carcinoma Cervix, Sigmoid perforation and Sigmoid Volvulus.Loop ileostomy was the most commonly performed procedure, accounting for 45.3% of enterostomies. Out of the sample population, 47 suffered from stoma-related complications. Peristomal skin excoriation accounted for the maximum number of cases, 25 patients (53.1%). Majority of patients who developed complications were managed conservatively (78.7%).

Conclusions: In emergency settings, as life-saving surgeries require the least intra-operative time, stoma creation is one of the most widely used strategies. It is imperative that proper techniques of stoma creation are employed to minimise the complications associated with their creation. Most complications can be treated conservatively while few may require surgical intervention.

Keywords: General Surgery, Emergency Surgery, Enterostomy, Gastrointestinal Surgery, Colorectal Carcinoma

1. INTRODUCTION

The term “ostomy” or a surgically created opening between a hollow organ and the body surface, has been interchangeably used with the term “stoma”, Greek for “mouth”. In the context of the bowel, an “ostomy” is created when a path is made between some part of the bowel and the skin surface. Stomas can either be temporary or permanent, and depending on which part of the bowel is brought out onto the skin, can either be an ileostomy or colostomy. Ostomies can be loop, double barrel or end, depending on the technique used for their creation, and their indications.

Temporary stomas, in general, are configured in such a way that they act as diverting conduits to permit the surgeon to tackle the pathology. These pathologies include colorectal malignancy, intestinal obstruction, perforative peritonitis, Inflammatory Bowel Disease (IBD), mesenteric ischemia, anorectal malformations and complex anal fistulae.1 Sometimes, temporary stomas are also created to prevent faecal flow to an area of the bowel that has been anastomosed with another region of bowel, to prevent anastomotic leakage. Once the primary pathology is tackled, the stoma is closed. In direct contrast, permanent stomas are constructed when the pathology in question prevents the achievement of bowel continuity.2 Existing literature suggests that 20-70% of patients with stomas may develop complications3. The risk of developing complications exists throughout their lives, with the highest incidence occurring within the first 5 years of construction. Closure of temporary stomas is usually done in 6-8wks.

The complications of stomas can be categorized as:

- Early (occurring within 6wks) – stomal necrosis, peristomal skin irritation, obstruction, excoriation, stomal retraction and blackening
- Late (occurring between 6 – 10wks) – parastomal herniation, subcutaneous prolapse, stomal prolapse, stomal retraction, stomal stenosis, parastomal abscess

The idea of stoma creation is for relief of symptoms and betterment in quality of life. In this regard, incompetent techniques of construction, improper stoma care and inadequate counselling may lead to complications that could be technical, mechanical, physiological or psychological. The impact of these complications can range from simple inconvenience to life threatening complications.

The main aim of the study was to identify the challenges that are faced with the creation of temporary stomas.

2. METHODOLOGY

An observational study was undertaken after Institutional Ethics Committee clearance, to find the incidence of temporary stomal complications and their management. The study was a prospective study undertaken in 2018, for a period of 4 years, spanning 2018-2022. Informed consent was taken from each patient prior to their inclusion.

Each patient was diagnosed after the required clinical examination and radiological studies. Once diagnosed, enterostomies were carried out, according to the presenting indication. The details of the procedure and the intra-operative findings were documented. All patients above 18yrs of age with either temporary ileostomies or colostomies were included in our

study. Those with permanent stomas, urinary conduits and enterocutaneous fistula were excluded. A total of 150 patients in whom enterostomy was carried out in our Tertiary Care Centre in Mumbai, India, either in an emergency or elective setting, were included in the study. Each patient who was a part of the study was followed up till closure of the stoma or death.

3. RESULTS

Table 1: Age distribution of the study population

Age Group	Number	Percentage
18 to 30 years	34	22.7
31 to 40 years	24	16
41 to 50 years	28	18.7
51 to 60 years	38	25.3
61 to 70 years	18	12
>70 years	8	5.3
Total	150	100

Among the study population, the highest incidence of stoma creation was seen in the 51-60yr age group, standing at 25.3%, closely followed by 18-30yr age group at 22.7%. The least incidence was seen in the >70yr age group, at 5.3%.

Table 2: Gender distribution of the study population

Sex	Number	Percentage
Female	46	30.7
Male	104	69.3
Total	150	100

Our study identified that 104 patients were men (69.3%) while 46 patients were females.

Table 3: Preoperative setting of the study population

Setting	Number	Percentage
Emergency	100	66.7
Elective	50	33.3
Total	150	100

Of the patients where stoma creation was carried out, 100 were in the emergency setting and 50, in an elective setting (33.3%).

Table 4: Underlying disease pathology of the study population

Underlying disease pathology	Number	Percentage
Abdominal TB	12	8
Appendicular pathology	8	5.3
Carcinoma of cervix	2	1.3
Colorectal carcinoma	64	42.7
Colonic diverticula	4	2.7
Fournier's gangrene	3	2
Gangrene bowel	16	10.7
Sigmoid perforation	2	1.3
Sigmoid volvulus	2	1.3
Trauma	13	8.7
Typhoid	20	13.3
Ulcerative colitis	4	2.7
Total	150	100

Among the causes for stoma creation, Colorectal Carcinoma was found to be the most common cause, at 42.7%, followed by typhoid (13.3%), Gangrenous Bowel and Trauma, responsible for 10.7% and 8.7% cases of stoma creation respectively. The least incidence of stoma creation was seen among patients suffering from Carcinoma Cervix, Sigmoid perforation and Sigmoid Volvulus, accounting for 1.3% each.

Table 5: Type of stoma created in the study population

Type of stoma		Number	Percentage
Ileostomy	Loop ileostomy	68	45.3
	End ileostomy	18	12
	Double barrel ileostomy	11	7.3
Colostomy	Loop colostomy	30	20

	End colostomy	17	11.4
	Double barrel colostomy	6	4
Total		150	100.0

Loop ileostomy was the most commonly performed procedure, accounting for 45.3% of enterostomies, irrespective of the setting of surgery. Loop colostomies and end ileostomies were found to be the procedure of choice for 20% and 12% of patients, respectively. The least performed surgery, in the study population, was found to be the double-barrel colostomy, seen to be done only in 6 out of 150 patients.

Table 6: Complications of stoma surgery in the study population

Complication	Number	Percentage	Percentage of the study population
Stomal necrosis	11	23.4	7.3
Parastomal hernia	2	4.2	1.3
Peristomal Skin excoriation	25	53.1	16.7
Stomal prolapse	4	8.6	2.7
Stomal retraction	5	10.7	3.3
Total	47	100	31.3

We identified that 47 patients of 150 included in the study (31.3%) had some form of complication associated with stoma creation. Of these, peristomal skin excoriation accounted for the maximum number of cases, 25 patients (53.1%) accounting for 16.7% of the entire study sample. Stomal necrosis was seen to affect 23.4% while stomal retraction was seen in 5 patients (10.7%). The least commonly seen complication was parastomal herniation, accounting for 4.2% of cases, 2 of the 47 patients.

It must also be noted that some patients presented with more than one complication. For example, 6 out of the 11 stomas complicated by stomal necrosis also had peristomal skin excoriation. Similarly, all 5 patients who suffered from stomal retraction were found to have peristomal skin excoriation.

Table 7: Management of stomal complications

Management method	Number	Percentage
Conservative	37	78.7
Surgical	10	21.3
Total	47	100

Majority of patients who developed complications were managed conservatively (78.7%) while the rest were managed surgically.

Table 8: Association of Indication, Surgery and Complication

Indication for Surgery (n)	Surgery (n)	Complication (n)
Abdominal TB (12)	Loop Ileostomy (11) Double-Barrel Ileostomy (1)	Stomal necrosis (5)
Appendicular pathology (8)	Loop Ileostomy (8)	Peristomal Skin Excoriation (5)
Carcinoma of cervix (2)	Loop Colostomy (2)	
Colorectal carcinoma (64)	Loop Ileostomy (18) End Ileostomy (14) Loop Colostomy (13) End Colostomy (14) Double-Barrel Colostomy (5)	Peristomal Skin Excoriation (5) Parastomal Hernia (2) Stomal Retraction (2) Stomal prolapse (4)
Colonic diverticula (4)	Loop Colostomy (4)	
Fournier's gangrene (3)	Loop Colostomy (3)	
Gangrene bowel (16)	Loop Ileostomy (6) Double-Barrel Ileostomy (10)	Stomal Necrosis (4) Peristomal Skin Excoriation (4) Peristomal Skin Excoriation (3)
Sigmoid perforation (2)	Loop Colostomy (2)	
Sigmoid volvulus (2)	Loop Colostomy (2)	
Trauma (13)	Loop Ileostomy (1) End Ileostomy (4) Loop Colostomy (4) End Colostomy (3) Double-Barrel Colostomy (1)	Stomal Necrosis (1) Peristomal Skin Excoriation (3) Stomal Necrosis (1)
Typhoid (20)	Loop Ileostomy (20)	Peristomal Skin Excoriation (5) Stomal Retraction (3)
Ulcerative colitis (4)	Loop Ileostomy (4)	

Of the 68 Loop Ileostomies that were created, we found that 19 patients had peristomal skin reactions, 9 patients had stomal necrosis and 3 patients presented with stomal retraction, accounting for 45.5% of the population in whom this surgery was performed. Loop

colostomies were carried out in 30 patients of whom, 4 patients presented with stomal prolapse as the only complication (13.3%). End Ileostomies accounted for 18 patients of the study population. In them, we found 3 patients to have presented with peristomal skin excoriation, 2 patients each with parastomal hernia and stomal retraction, and 1 with stomal necrosis – a complication rate of 44.4%. 17 patients had end-colostomies performed for their diagnoses and none of them presented with any complications until stoma closure. Double-barrel Ileostomy was the stoma of choice for 11 patients, 3 of whom presented with peristomal skin excoriation (27.3%). The least performed surgery was the Double-barrel colostomy – 6 patients – none of whom presented with any complications.

4. DISCUSSION

It is clear from our study that the highest incidence of stoma creation was seen in the 51-60yr population (n=38) followed closely by the 18-30yr population (n=34). This is in accordance with existing literature, for example the study by Pandiaraja et al. wherein the age groups of 26–35yr and 46–55yrs appeared to require maximum stomal surgeries[1]. A similar discovery was made by Choudhary et al. in their study, who found that maximum number of stomas were being made for the 16-30yr age group (36%) followed by the 46-60yr age group (28%)[4].

The age distribution of stoma creation in these age groups may be explained by disease distribution, with higher incidence of disease at those particular age groups. For example, the age of occurrence of Abdominal Tuberculosis is maximally seen in the 15-30yr age group, seconded by the 46-60yr age group, as exhibited in the study done by Gupta et al[5]. Similarly, colorectal carcinoma has a very high incidence rate in the <40yr age group, accounting for 1/3rd of all cases[6], and can be related to the high rates of stoma construction that was seen in our study for the same age group, accounting for a total of 38.7% cases. Other disease pathology appears to have a higher prevalence within the younger population as well, further establishing the need for enterostomies within the 18-30yr age bracket.

Males have a higher preponderance to develop the need for stoma creation as per our study, accounting for 69.3% of the population. We found that this was in correspondence with existing literature. According to Sharma et. al., while identifying factors that contribute to post-operative stomal outcome, they found that their sample included 63.3% males and 26.7% females[7]. A similar finding was seen in the study conducted by Patel et. al. who were assessing the outcomes of early and delayed closure of stomas and their outcomes. In their sample, they identified that 58 patients of their 96 included in the study were males[8], further establishing that the male gender is more likely to require stomal surgery.

This preponderance is again due to the incidence and pathology of disease. Zhou et. al.'s study points out that males are more likely to present with bowel obstruction and, in general, have larger tumours when compared to females[9]. Irrespective of mechanism of abdominal trauma, Agbroko and their colleagues found that males accounted for 86.8% of the population[10], further strengthening the hypothesis of abdominal disease pathology being the most important cause for stoma creation, which is more commonly seen in men.

Our study identified a higher number of patients requiring stoma creation in an emergency (66.7%) rather than an elective setting (33.3%). These findings were identified to be similar to Saradar et. al.'s study, where they identified that 77.5% of stomal surgeries were done on an emergency basis[11]. Sharma et. al.'s study also pointed out that a higher number of

patients undergo emergency stomal surgery than elective surgeries, the former accounting for 75% of cases[7]. Most patients present in the acute setting, with perforations, obstructions and traumatic injuries. Majority of these patients are critical and emergency surgery is performed. In such settings, stoma creation is a safe option. Definitive surgery is performed 6-8wks after stoma creation.

Uddin et. al, in their study, had identified that the highest rates of stoma creation were found to be in those that suffered from colorectal carcinoma, accounting for 40.8% of the study population[12]. In another study carried out in Ankara, Turkey, researchers corroborated this discovery as stoma creation was maximally seen in patients with colorectal carcinomas – 50% of the study population[13]. In our study as well, we found that majority of patients who underwent enterostomies were those affected by colorectal carcinoma (n=64), followed by intestinal perforation due to typhoid ulcers in the small bowel (20%). It must be noted that typhoid is the most common cause for intestinal perforation and the most common procedure done in an emergency setting for its management was a loop ileostomy, as evidenced in the study done by Yadav et. al[14].

Similarly, in the 13 cases of abdominal trauma encountered in our study, stomal procedures were undertaken. Yakhshiboyevich et. al.'s research into the surgical management of bowel injuries opines of similar management protocols wherein 30.5% of cases were managed via enterostomies, depending on the site of perforation[15]. In patients who suffered from gangrenous bowel associated with but not limited to intestinal obstruction (other causes being mesenteric insufficiency, trauma, adhesions, hernias etc), the most common procedure that was done in the acute setting was stoma formation accounting for 30%[16] and 13.3%[7] of cases in the studies conducted by Mukhopadhyay et. al and Sharma et. al. respectively.

As literature review for the above indications for stoma creation suggests, stomal procedures are the most preferred line of surgical management as patients present in haemodynamically compromised states that require least intervention with maximum relief of symptoms, criterion which are fulfilled by enterostomy surgeries.

In a handful of cases such as Carcinoma of the Cervix, Ulcerative Colitis, Fournier's Gangrene, Sigmoid Volvulus and Sigmoid perforation, enterostomy procedures were carried out in our study. While stomal procedures may be considered unorthodox for these indications, it must be noted that such procedures have been undertaken previously[17, 18, 19, 20, 21]. For example, in Vijayakumar and colleagues' paper on a 38-year-old female who was diagnosed with advanced cervical cancer, a diversion colostomy was done, along with urinary diversion and pelvic exenteration[22].

Through our study, we identified that the most common stomal surgery performed was the loop ileostomy (40%). Amelung et. al.'s systematic review to identify the preferential construction of ileostomies or colostomies in whom both could be performed discovered that ileostomies are more commonly created[23]. Pandiaraja et. al.'s study on enteric stoma also identified loop ileostomies to be the most commonly done enterostomy procedures, irrespective of indication[1]. The above two studies present contrasting findings to existing literature. Studies by Smalbroek et. al. and Uddin et. al. identified a higher rate of colostomy procedures being done when compared to ileostomies, 87.2%[24] and 79.6%[12] respectively. Another study conducted by Sun et. al. to study the safety of loop ileostomy and colostomy in cases of low rectal carcinoma found that their samples included majority of cases who had undergone colostomies as opposed to ileostomies (82 out of 288 patients)[25]. On further review of literature, we found that creation of ileostomies and colostomies entirely depends on the surgeon's expertise, after taking into account the patient's condition.

Yang et. al. concluded that stomal complication rates did not differ significantly between the two stomal types – ileostomies and colostomies - but individual stomas had complications that were specific to their construction[26]. We found that 31.3% of our study population developed complications related to their enterostomies, on the lower end of the spectrum of 20-70%, as postulated by Murken et. Al[2]. Research by Uddin et. al and Hoh et. al. also points to similar levels of complications in their study population, 25%[12] and 35%[27] respectively. We also noted that patients who underwent Ileostomies had a complication rate of 44.3% whereas those in whom Colostomies were preferred presented with a significantly lower complication rate of 7.5%.

Existing literature on the subject appears to be divided over which stomal surgery is likely to present with more complications. For example, in Burghgraef et. al.'s study, significant differences were found between complication rates of different stomal procedures. The researchers found that 39.1% of patients that had diverting ileostomies had complications, 44.1% of diversion colostomies produced complications, 66.7% of end ileostomies presented with post-operative complications and 49.6% of end colostomies presented with complications[28]. Contrastingly, Yang et. al.'s study postulated that the overall incidence of complications was fewer in ileostomies than in colostomies due to the simplicity of ileostomy construction but recent literature suggests that improvement in surgical techniques as well as increased awareness of the adverse effects of ileostomies have tilted the balance in favour of colostomies[29]. For example, in Sun et. al.'s study, they found that 74.3% of patients who had loop ileostomies performed presented with complications whereas only 48.7% of loop colostomies developed complications[25]. Ge et. al.'s study concluded that there was no significant difference in the complication rates seen among those operated for ileostomies and colostomies, presenting a third dimension to the siuation[30].

Our study indicated that 45.5% of loop ileostomies and 44.4% of end ileostomies developed complications. As previously elaborated, our study was one of the multiple studies that corroborate the new trend of ileostomies presenting with a higher percentage of complications than colostomies. Between the two, as evidenced by the study conducted by Santos et. al., it appears that loop ileostomies have a propensity to present with a higher percentage of complications namely, Necrosis and Retraction, when compared to end ileostomies[31]. We also found that loop colostomies had a complication rate of 13.3% while patients with divided colostomies did not present with any complications. While existing literature on the comparison between these 2 types of colostomies are few, our findings did correspond to the conclusion drawn by Youssef et. al.'s meta-analysis - divided colostomies, which includes both double-barrel and end colostomies, are less likely to develop complications and hence, may be the preferred approach when either can be performed[32].

Among the complications, the most commonly seen was peristomal skin excoriation, accounting for more than half of the complications seen in our study population (53.1%). Majority of studies that we encountered also reported similarly high levels of peristomal skin excoriation. For example, Pandiaraja et. al. reported 52.4% skin excoriation rates[1], Murken at. al.'s 43%[2], 30% in Saradar et. al.'s study[11] and so on. The explanation for these high rates of peristomal skin complications could be the use of stoma bags post-operatively, among other reasons. Adhesives present on the circumference of most commonly available stoma bags, emulsified with perspiration from the patient's body makes for a medium that serves as an irritant to the superficial epidermis. Other stoma bags that do not bear adhesives may also be used, but contain a ring-like structure that serves as an anchor through which a rope may be tied around the torso to keep the bag in place, all serving as irritants to the patient's skin. The type of stoma also plays an important role in peristomal skin excoriation. Ileostomies, known to have a high output of liquid stools, tend to erode the

skin around the stoma, if the stoma bag is not placed precisely, which it seldom is. By "pouting" the ileostomy, the ill-effects of liquid stool on the skin are decreased but not fully negated. As our study reported a higher number of ileostomies, it is only logical that it explains the relatively higher rates of peristomal skin excoriation.

After skin excoriation, stomal necrosis accounted for 23.4% of complications seen with stomal surgeries. According to Murken at. al., stomal necrosis can account for a maximum of 20%[2] of all stomal complications, strengthening our study's findings. Çiftçi et. al. identified a 4.5% stomal necrosis rate[13] and 0.37-20% stomal necrosis rate was identified in Chirco et. al.'s study which aimed at defining individual stoma complications[33]. Emergency setting of surgery, compromising vascularity by radical mesenteric excision, miniature stomal creation and restricted bowel mobilization can all contribute to the ensuing stomal necrosis.

Stomal retraction was seen in 10.7% of the population in our study. Pandiaraja et. al. as well as Yang et. al. also identified higher rates of stomal retraction than prolapse. In the former's study, 8.5% of patients suffered from retraction vs 2.4% suffering from prolapse[1] and in the latter's, 60 patients from their sample had stomal retraction and only 5 had stomal prolapse[26]. Most often, the complication of stomal retraction can be prevented adequate mobilization of the bowel, but sometimes, other factors like obesity, excessive mesenteric excision during surgery, immunosuppression and nutritional compromise need to be taken into account and managed effectively.

Prolapse, on the other hand, was seen in 8.6% of our patients, in tow with the postulation put forward by Garoufalia et. al. who suggested that prolapse may occur in 7 – 26% of patients in the general stomal population[34]. Khan et. al. observed a higher rate of stomal prolapse, approximately 30%, and hypothesised that higher rates of prolapse were seen in loop colostomies[35]. Seeing that majority of our patients underwent ileostomies, a relatively lower rate of prolapse appears justified.

The least common complication that we encountered was parastomal hernia, seen in only 2 of the 150 patients in our sample. Pandiaraja et. al. and Yang et. al. noticed that parastomal herniation was a relatively uncommon complication, accounting for 2.4%[1] and 3 of 410 cases[26] respectively. Majority of previous studies identify that parastomal herniation is a major complication of stoma creation, accounting for upwards of 50% of cases as put forth by Tzanis et. al.[36] and Chan et. al[37]. Most instances of high rates of parastomal hernia were seen in patients who underwent colostomy procedures, as per our review of existing literature on the subject, exemplified by Murken et. al.[2] and Tzanis et. Al[36]. A similar reasoning to that given for the lower incidence stomal prolapse may account for lowered incidence of parastomal hernias. Loop ileostomies accounting for 40% of cases rationalizes the decreased presentation of parastomal hernias.

Conservative management of stomal complications outnumbered its surgical counterpart by 78.7% to 21.3%. We achieved satisfactory results by continuing with daily cleaning and dressing regimen with 0.9% Normal Saline followed by topical antiseptic and emollient application. After extensive review of literature, we found that this was in line with existing research studies. For example, the management of peristomal skin complications, which accounted for the highest number of complications, according to Garcia-Manzanares et. al., could be successfully done by acetic acid dressings, topical formulations of the immunomodulator, Tacrolimus, and Vitamin C-rich diet[38]. Similarly, as put forth by Tsujinaka et. al., superficial stomal necrosis warrants a "wait and watch" policy and if tissue death is limited to the layers above the fascia, revision surgery may not be required[39]. Even in the case of prolapse, retraction and parastomal hernia, a conservative line of management is adopted, failing which surgical intervention is planned. Garoufalia et. al.'s article further

strengthens this notion, as they too found that uncomplicated stomal prolapse responded to conservative management[34].

In our study, 10 patients were managed surgically – these included 3 patients who suffered from stomal retraction, 6 patients found to have stomal necrosis and 1 patient with a parastomal hernia. The former 9 patients underwent a local exploration of the stomal opening where a loop of the bowel was brought out onto the skin, with the intention of replacing the previously-failed stomal opening. In case of stomal necrosis, the necrosed part of the bowel was excised and a new stomal opening was created by mobilising a loop of bowel into the stomal opening that was previously created. As aptly put by Parini et. al., when a case of stomal necrosis presents itself, one must consider closure of the stoma or constructing a new stoma at a different site due to the pre-existing bowel oedema and adhesions from previous surgery. But, as closure was unindicated at the time of presentation and dense adhesions were absent, in our study population, stomal re-fashioning was undertaken with acceptable results.In the case of parastomal herniation, Parini and colleagues suggest that in temporary stomas, although the risk of recurrence is high (69.4%), primary fascial closure can be considered in specific cases of contamination or complicated herniation[40]. Our patient presented with irreducibility at the parastomal site and primary fascial closure was performed with re-fashioning of a tighter stomal opening, without the placement of a mesh.

4. CONCLUSION

1. Considering that most diseases that affect the bowel have a peak incidence in the <30yr and 50-60yr population, this range of age distribution required maximum stoma creation surgeries.

2. Males are more likely to suffer from diseases that affect the bowel and hence, account for a higher percentage of patients that had enterostomy surgeries.

3. Patients present, more commonly, with acute symptoms due to obstructions/perforations and thus, a higher percentage of patients undergo stomal surgeries in the emergency setting rather than elective one.

4. Colorectal Carcinomas account for the highest indication for stomal creation, followed by Typhoid ulcer perforations, trauma and gangrenous bowel. Minor indications include Carcinoma of the Cervix, Ulcerative Colitis, Fournier's Gangrene, Sigmoid Volvulus and Sigmoid perforation.

5. The diversion procedure most commonly performed in our study was the Loop Ileostomy. There appears to be no "one size fits all" with existing literature oscillating between colostomies and ileostomies being better diversion procedures. In conclusion, the operating surgeon's expertise appears to be a major role in its decision making.

6. Patients who underwent Ileostomies had a complication rate of 44.3% whereas, those who had colostomies presented with a complication rate of 7.5%

7. Among ileostomies, loop ileostomies presented with higher complication rates than their divided-ileostomy counterparts. Similarly, divided colostomies presented with no complications as opposed to a 13.3% complication rate that was seen in loop

colostomies. Thus, even if bowel anastomosis is more difficult to achieve at the time of stoma closure, surgeons must consider divided stomas (end/double-barrel) instead of loop stomas.

8. Maximum number of patients presented with peristomal skin excoriation after stoma construction. Other complications like stomal necrosis, prolapse, retraction and parastomal hernia accounted for less than 50% of patients presenting with complications.

9. Conservative line of management appears to be the first step of management of stomal complications, failure of which leads to considering surgical intervention.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

AUTHORS' CONTRIBUTIONS

Sandeep Prakash Gaikwad designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript.Chirantan Suhrid altered the first draft, was instrumental in reviewing literature associated with this paper and re-working this article into its publishable format. Jayashri Sanjay Pandya conceptualized the study and mentored the authors in their work towards fruition of this paper. All authors read and approved the final manuscript.

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