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An Observational Study for Comparing Outcome of Primary Anastomosis versus Stoma Creation in Case of Acute Intestinal Obstruction

Dr. Keshav Pancholi[*1], Dr. Rajendra Prasad Bugalia[2], Dr Anuradha salvi[3], Dr Sandeep Kumar[4], Dr Ayushi Agarwal[5]

[1]Junior Resident, Department of General Surgery, S.M.S. medical college and hospital, Jaipur, Rajasthan, India

[2]Associate Professor, Department of General Surgery, S.M.S. medical college and hospital, Jaipur, Rajasthan, India

[3]Medical officer, Mahilla hospital, S.M.S. medical college and hospital, Jaipur, Rajasthan, India

[4]Junior Resident, Department of General Surgery, S.M.S. medical college and hospital, Jaipur, Rajasthan, India

[5]Junior Resident, Department of General Surgery, S.M.S. medical college and hospital, Jaipur, Rajasthan, India

***Corresponding author:Dr. Keshav Pancholi**

Junior Resident Department of General Surgery, S.M.S. medical college and hospital, Jaipur, Rajasthan, India
Email: keshavpancholi96@gmail.com
ORCID iD: 0009-0009-9610-9070

Abstract

Background: In the emergency settings, when there is strangulated or obstructed intestine present, surgical therapy of acute intestinal obstruction may necessitate excision of the nonviable gut. To ensure a smooth recovery following a resection of the gut, the surgeon must decide between anastomosis of resected part and the construction of a stoma solely without anastomosis.

Methods: In a teaching hospital with tertiary care facilities, a observational analysis was carried out from January 2023 to may 2024 on the first 60 adult AIO patients who underwent surgical treatment during the study period. The patients had either primary anastomosis or stoma development only after gut resection. A sample of 30 cases in each groups (primary repair v/s fecal diversion) is adequate at 95 % confidence and 80% power to verify the explained difference of 2(+/- 1) days in time taken for development of tolerance to oral feed after surgery those undergoing stoma creation alone were assigned to Stoma formation (N=30), whereas those receiving primary anastomosis were assigned to Primary anastomosis (N= 30). Data from preoperative and postoperative procedures were gathered, and the outcome was recorded in the first two weeks following surgery. The main result was

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the patients' postoperative recovery or demise. The time it took to begin an oral diet, the date of hospital discharge, and the existence of postoperative problems in both patient groups were used to calculate the secondary outcome. A 95% confidence interval was used for the Chi-square test and the Mann-Whitney U test, with a p-value of less than 0.05 being regarded as statistically significant.

Results: The mean age of the study participants who underwent stoma formation (Stoma formation) was 40.1±14.58 years while the same for patients who had primary anastomosis (Primary anastomosis) was 40.77±14.83 years. 20% & 26.7% patients in Primary anastomosis had diabetes & hypothyroidism respectively as against 3.3% and 0% in stoma formation. Incidence of Perioperative Peritonitis, Feculent peritoneal fluid and Gangrenous bowel segment was seen to be 63.3%, 50% and 50% in stoma formation as against 16.7%, 20% and 16.7% in Primary anastomosis.

Tolerance to oral feeds was seen on 2.67±1.3 Days and 3.87±1.65 days after surgery in stoma formation & primary anastomosis respectively. The mean duration of hospital stay in the groups 1 and primary anastomosis were found to be 5.00+1.930 & 7.70+2.628 days respectively.

The only operative procedure related complication seen was Anastomotic leak and it was found in 3.3% of primary anastomosis cases.

Conclusions: Each metnod has advantages and disadvantages of its own. Regardless of the surgical technique, the existence of medical co-morbidities such as diabetes and the factors regulating perioperative sepsis truly determine the early postoperative outcome. Early postoperative outcomes are better for patients who have formed stomas.

Keywords: Anastomotic leak, Postoperative outcome, Stomal complications

INTRODUCTION

Acute Intestinal Obstruction (AIO) is a mechanical or functional intestinal obstruction that prevents the normal aboral passage of the intestine regardless of etiology [1,2].

It accounts for the majority of emergency charges and operating department admissions [3,4].

The etiology of AIO is diverse, including adhesions, hernias, neoplasms, volvulus, and inflammatory bowel diseases. The management of AIO has evolved over the years, but the fundamental principles of timely diagnosis and appropriate intervention remain crucial. When surgical intervention is necessary, surgeons often face a critical decision: whether to perform a primary anastomosis or create a temporary stoma.

Primary anastomosis involves the direct reconnection of the intestinal segments after resection of the obstructed or compromised bowel. This approach offers the advantage of maintaining intestinal continuity and potentially avoiding the need for a second surgery. However, it carries the risk of anastomotic leak, especially in cases with compromised tissue integrity or significant contamination.

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On the other hand, A stoma is a surgically designed outer shell of the small or large intestine for the temporary or permanent diversion of feces[5,6]. Intestinal stoma, introduced in surgery more than 200 years ago, is one of the most common procedures performed in emergency gastrointestinal surgery[2-4,5,6,7]. Stoma formation, which is considered a safe and simple procedure, results in dramatic improvement in peritonitis and generalized sepsis associated with situations where anastomotic dehiscence is common[2-4,5-10]

Therefore, the surgeon must balance the risk of anastomotic dehiscence in a septic environment with the disadvantage of parenteral removal while relieving obstruction to achieve uneventful recovery and minimal postoperative mortality and morbidity[8-10] . Traditionally, the standard treatment for complete bowel obstruction has been emergency surgery, with the view that "the sun must never rise and set on complete bowel obstruction" [11].

In this background, we plan a study to evaluate and compare the early postoperative outcome in AIO patients treated either with primary anastomosis or only with stoma after bowel resection. The study also sought to identify factors associated with postoperative morbidity and mortality in both patient groups.

MATERIAL AND METHODS

In the tertiary care facility of SMS Medical College in Jaipur, Rajasthan, India, an observational study was conducted in the department of surgery. The investigation ran from January 2023 through May 2024. The first sixty adult AIO patients who needed intestinal resection during that time and either primary anastomosis or stoma development alone without anastomosis were considered the sample size. Every patient enrolled in the study gave their informed permission. The Institution Ethics Committee (887/MC/EC/2023, dated 19/11/2022) approved the study. The study included sixty adults who presented with AIO during the study period and were having intestinal resection followed by primary anastomosis or stoma creation alone. Patients with impaired immune systems, malnourished patients (BMI <18.5 OR >24.9), and Patient treated with primary anastomosis and diverting stomas; adult patient with American Society of Anaesthesiologists (ASA) grade V. Patients undergoing primary anastomosis were grouped into Primary anastomosis for ease of data analysis, whereas patients undergoing stoma creation alone were grouped into Stoma formation. Information was gathered about the age and gender of the patients, as well as preoperative and postoperative measures such serum biochemical markers, electrolytes, and haematology, as well as intraoperative findings like gangrenous bowel and feculent peritoneal fluid. Within the first week following surgery, postoperative complications such as wound infection, stoma problems, medical comorbidities, and final result were recorded. Patient information was gathered via operating room registries, discharge certificates, hospital records, and patient bed admittance tickets.

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CHARTS:

RESULTS:

TABLE 1. DEMOGRAPHICS AND COMORBITIES

PARAMETERS			GROUP		Total	P VALUE
			STOMA	PRIMARY		
AGE GROUP	18-20 years	Count	1	2	3	0.403
		%	3.3%	6.7%	5.0%	
	21-30 years	Count	6	7	13	
		%	20.0%	23.3%	21.7%	
	31-40 years	Count	13	7	20	
		%	43.3%	23.3%	33.3%	
	41-50 years	Count	5	6	11	
		%	16.7%	20.0%	18.3%	
	51-60 years	Count	1	5	6	
		%	3.3%	16.7%	10.0%	
	more than 60 years	Count	4	3	7	
		%	13.3%	10.0%	11.7%	
	MEAN ± SD		40.10±14.582	40.77±14.825	40.42±14.643	
GENDER	MALE	COUNT	19	17	36	0.598
		%	63.3%	56.7%	60.0%	
	FEMALE	COUNT	11	13	24	
		%	36.7%	43.3%	40.0%	
COMORBITIES	Diabetes	Count	1	6	7	0.044
		%	3.3%	20.0%	11.7%	
	Hypertension	Count	4	6	10	0.731

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		%	13.3%	20.0%	16.7%	
	Hypothyroidism	**Count**	0	8	8	**0.008**
		%	0.0%	26.7%	13.3%	
	COPD	**Count**	5	5	10	1.000
		%	16.7%	16.7%	16.7%	
	Preoperative Peritonitis	**Count**	19	5	24	**0.001**
		%	63.3%	16.7%	40.0%	

FIGURE 3: COMORBIDITIES

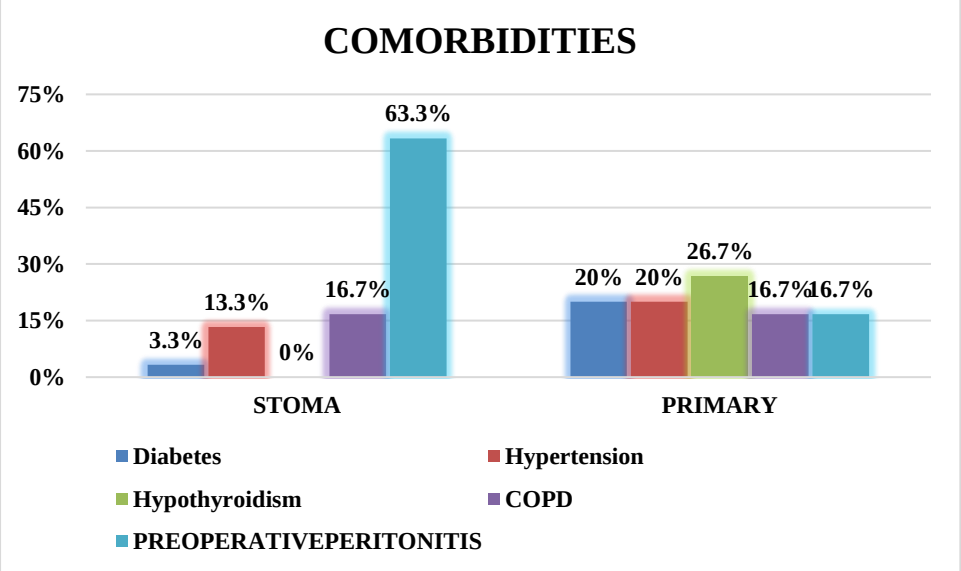

TABLE 2. OPERATIVE FINDINGS AND TIME LAG

			GROUP			P VALUE
			STOMA	PRIMARY	Total	
OPERAT		**Count**	15	6	21	**0.015**

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	Feculent peritoneal fluid on exploration	**%**	50.0%	20.0%	35.0%	
	Gangrenous bowel segment on exploration	**Count**	15	5	20	**0.006**
		%	50.0%	16.7%	33.3%	
TIME LAG	**<24 HRS**	**Count**	2	4	6	0.048
		%	6.7%	13.3%	10.0%	
	24-48 HRS	**Count**	4	2	6	
		%	13.3%	6.7%	10.0%	
	48-72 HRS	**Count**	7	0	7	
		%	23.3%	0.0%	11.7%	
	72-96 HRS	**Count**	2	0	2	
		%	6.7%	0.0%	3.3%	
	96-120 HRS	**Count**	6	12	18	
		%	20.0%	40.0%	30.0%	
	>120 HRS	**Count**	9	12	21	
		%	30.0%	40.0%	35.0%	

FIGURE 4. Preoperative and intraoperative parameters

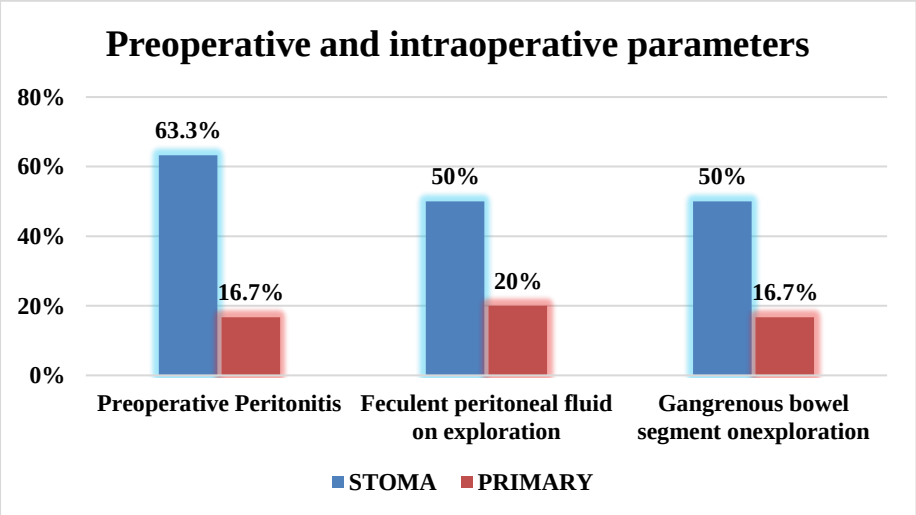

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Table 3 -preoperative and post-operative blood parameter

PARAMETERS		GROUP		P VALUE
		STOMA	PRIMARY	
PRE-OPERATIVE	Hemoglobin (gm%)	11.30±2.11	11.31±2.09	0.990
	TLC (cells/cmm)	7459.95±5589.71	5573.21±5806.49	0.205
	Serum albumin (gm/dL)	3.82±0.73	3.39±0.82	0.038
	Serum potassium (mEq/lit)	4.02±0.56	4.21±0.55	0.956
	Serum urea (mg/dL)	39.71±28.39	32.50±20.08	0.260
	Serum Creatinine (mg/dL)	1.00±0.32	0.87±0.27	0.105
POST-OPERATIVE	TLC (cells/cmm)	5369.07±4760.11	4041.30±5814.43	0.639
	Serum albumin (gm/dL)	2.79±3.15	0.60±0.81	0.061
	Serum potassium (mEq/lit)	4.12±3.38	0.89±0.97	**0.007**

FIGURE 5. Preoperative parameters

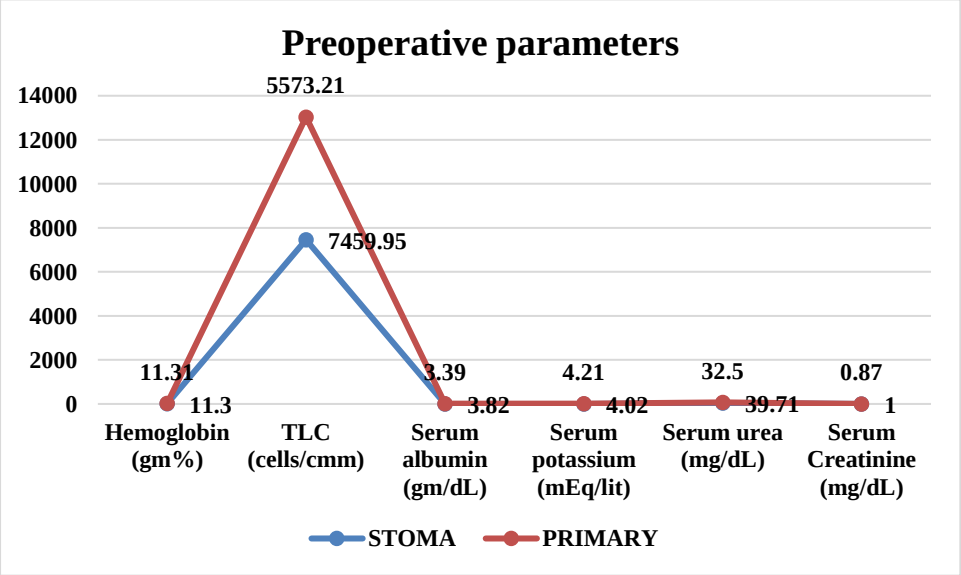

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FIGURE 6. Post-operative parameters

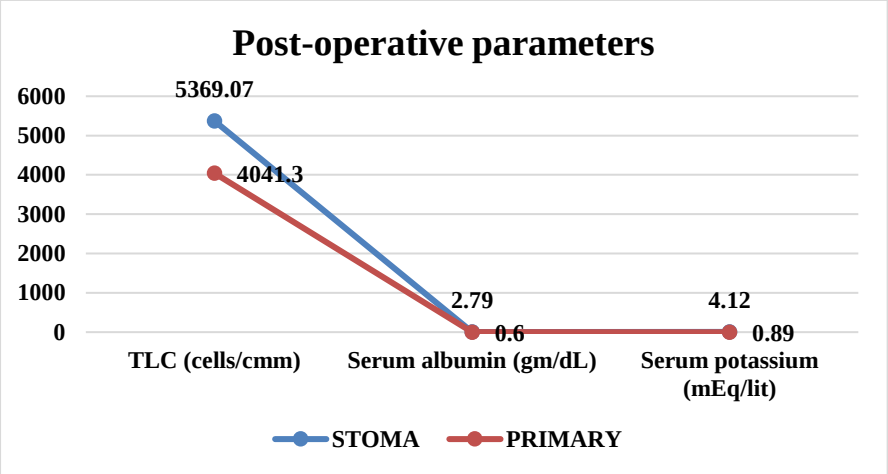

TABLE 4. Comparison of outcome parameters between two groups

POST OPERATIVE OUTCOMES			GROUP		Total	P value
			STOMA	PRIMARY		
TOLERANCE OF ORAL FEEDS AFTER SURGERY			2.67±1.295	3.87±1.655		**0.003**
DURATION OF HOSPITAL STAY (DAYS)			5.00±1.930	7.70±2.628		0.001
WOUND SITE INFECTION		Count	10	9	19	0.781
	48 hours postoperative	%	33.3%	30.0%	31.7%	
	7 days after surgery	Count	5	8	13	0.347
		%	16.7%	26.7%	21.7%	
	10 days after surgery	Count	3	7	10	0.166
		%	10.0%	23.3%	16.7%	
Requirement of re-exploration		Count	0	2	2	0.150
		%	0.0%	6.7%	3.3%	

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ANASTOMOTIC LEAK		**Count**	-	2	2	
		%	-	6.6%	3.3%	
ENTEROCUTANEOUS FISTULA		**Count**	-	1	1	
		%		3.3%	1.7%	
STOMAL NECROSIS		**Count**	-	-	-	
		%				0.229
STOMA RETRACTION		**Count**	1	-	1	
		%	3.3%		1.7%	
STOMA OBSTRUCTION		**Count**	1	-	1	
		%	3.3%		1.7%	
MORTALITY	**YES**	**Count**	1	2		0.554
		%	3.3%	6.7%	3	
	NO	**Count**	29	28	5.0%	
		%	96.7%	93.3%	57	
					95.0%	

FIGURE 7. Comparison of outcome parameters between two groups

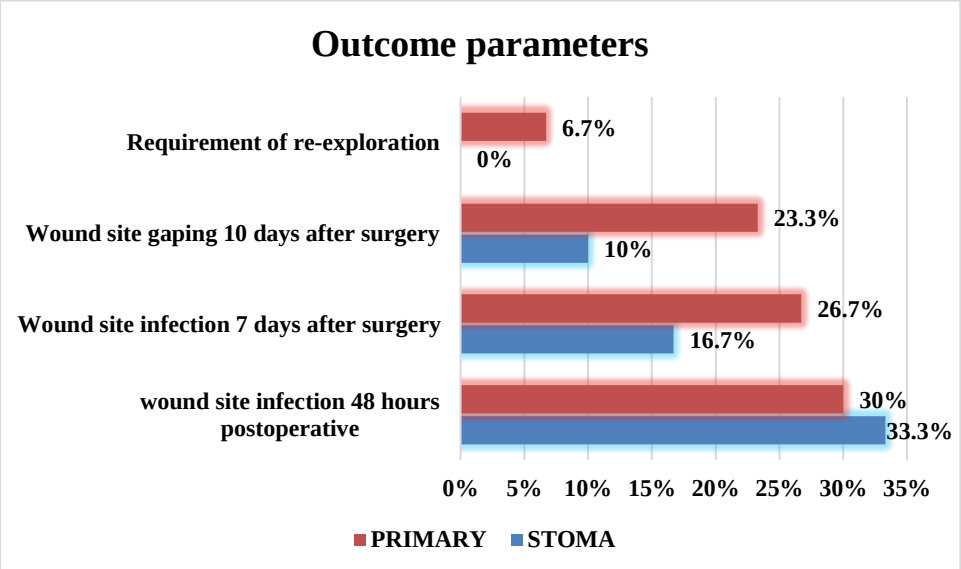

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TABLE 8. Tolerance of oral feed after surgery (days)

	GROUP		P VALUE
	STOMA	PRIMARY	
Tolerance of oral feed after surgery (days)	2.67±1.295	3.87±1.655	**0.003**
Duration of hospital stay (days)			**0.001**

FIGURE 9. Tolerance of oral feed after surgery (days)

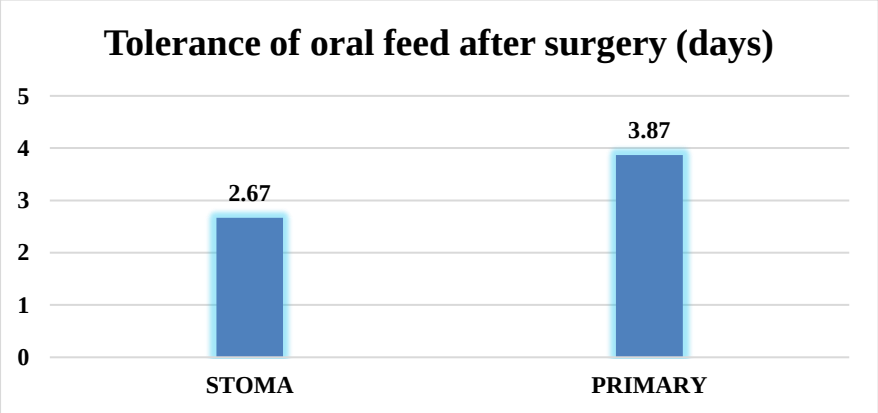

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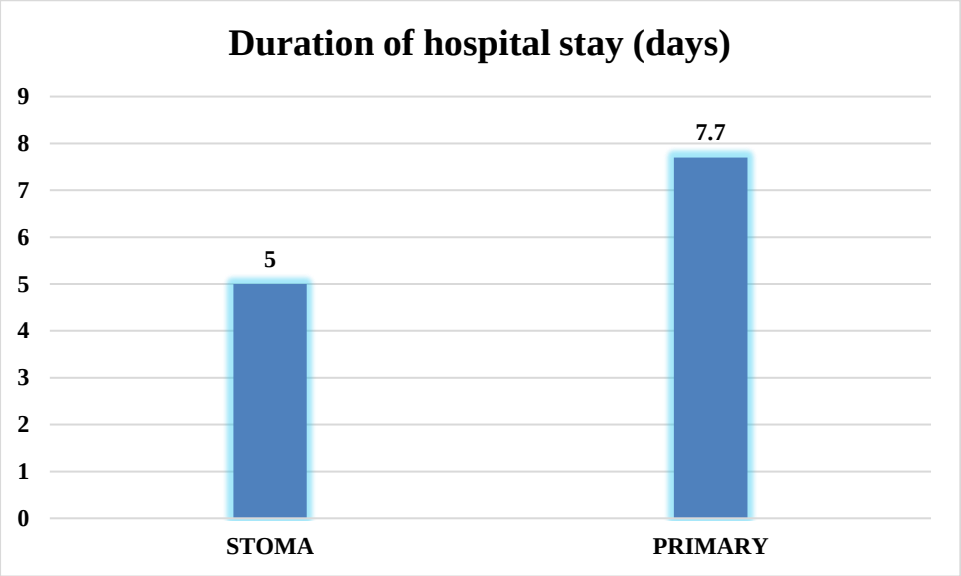
FIGURE 10. Duration of hospital stay (days)



RESULTS:

The mean age of the study participants who underwent stoma formation was 40.1±14.58 years while the same for patients who had primary anastomosis was 40.77±14.83 years. There was no statistically significant difference between the two groups and hence they were comparable in terms of their age distribution.(table 1)

63.3% of the study participants in stoma formation were males while 56.7% of the study participants in primary anastomosis were males. There was no statistically significant difference between the two groups and hence they were comparable in terms of their gender distribution.(table 1)

Statistically significant difference was seen in the prevalence of Diabetes &Hypothyroidism between the two groups. 20% & 26.7% patients in Primary anastomosis had diabetes & hypothyroidism respectively as against 3.3% and 0% in stoma formation.(table 1)

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Ileo-Ileal resections are most common, particularly in the Primary group (83.33%). Colo-Colic resections occur only in the Stoma group, representing 20% of resections there. Jejuno-Jejunal and Jejuno-Ileal resections are relatively infrequent across both groups.

Incidence of Perioperative Peritonitis, Feculent peritoneal fluid and Gangrenous bowel segment was seen to be 63.3%, 50% and 50% in stoma formation as against 16.7%, 20% and 16.7% in Primary anastomosis. The higher incidences of complications in stoma formation was statistically significant finding.(table 2)

66.7% patients in Stoma formation required Blood transfusion as against 46.7% in Primary anastomosis. However this difference was not statistically significant.

Statistically significant difference was noted in the duration of symptoms 0f onset and presentation in hospital at different time interval between the two groups.(table 2)

Preoperatively, the two groups were seen to differ significantly with respect to their serum albumin levels. It was found to be 3.82±0.73 gm/dL in stoma formation as against 3.39±0.82 gm/dL in primary anastomosis. The two groups did not differ significantly with respect to Haemoglobin levels, TLC, Serum Potassium, Serum Urea and Serum creatinine.(table 3)

Post operatively, the two groups were seen to differ significantly with respect to their serum potassium levels. It was found to be 4.12±3.38 gm/dL in stoma formation as against 0.89±0.97 mEq/L in primary anastomosis. The two groups did not differ significantly with respect to TLC and Serum albumin.(table 3)

Wound site infection 48 hours and 7 days after surgery was 33.3% and16.7% in Stoma formation respectively while the same was 30% and 26.7% in Primary anastomosis. Wound site gaping 10 days after surgery was 10% and 23.3% in Stoma formation & Primary anastomosis respectively. Requirement of re-exploration was 0% and 6.7% in Stoma formation & Primary anastomosis respectively. However, none were statistically significant differences.(table 4)

Tolerance to oral feeds was seen on 2.67±1.3 Days and 3.87±1.65 days after surgery in stoma formation & primary anastomosis respectively. This difference was found to be statistically significant.(table 4)

The mean duration of hospital stay in the groups 1 and primary anastomosis were found to be 5.00+1.930 & 7.70+2.628 days respectively. This difference was found to be statistically significant.(table 4)

The only operative procedure related seen Anastomotic leak & Enterocutaneous fistula were found to be 6.6% & 3.3%. respectively of in group 2 and Stoma retraction & Stoma obstruction were found 3.3% & 3.3% respectively in Group I.table 4)

Mortality rate was found to be 3.3% and 6.7% in stoma formation and primary anastomosis respectively. However this difference was not statistically significant.(table 4)

Discussion

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In this study mean age of the study participants who underwent stoma formation (Stoma formation) was 40.1±14.58 years while the same for patients who had primary anastomosis (Primary anastomosis) was 40.77±14.83 years. 63.3% of the study participants in stoma formation were males while 56.7% of the study participants in primary anastomosis were males. There was no statistically significant difference between the two groups and hence they were comparable in terms of their age and gender distribution.

Statistically significant difference was seen in the prevalence of Diabetes & Hypothyroidism between the two groups. 20% & 26.7% patients in Primary anastomosis had diabetes & hypothyroidism respectively as against 3.3% and 0% in stoma formation. Incidence of Perioperative Peritonitis, Feculent peritoneal fluid and Gangrenous bowel segment was seen to be 63.3%, 50% and 50% in stoma formation as against 16.7%, 20% and 16.7% in Primary anastomosis. The higher incidences of complications in stoma formation was statistically significant finding. Statistically significant difference was noted in the time lag at different time interval between the two groups.

Preoperatively, the two groups were seen to differ significantly with respect to their serum albumin levels. It was found to be 3.82±0.73 gm/dL in stoma formation as against 3.39±0.82 gm/dL in primary anastomosis. The two groups did not differ significantly with respect to Haemoglobin levels, TLC, Serum Potassium, Serum Urea and Serum creatinine.

Post operatively, the two groups were seen to differ significantly with respect to their serum potassium levels. It was found to be 4.12±3.38 gm/dL in stoma formation as against 0.89±0.97 mEq/L in primary anastomosis. The two groups did not differ significantly with respect to TLC and Serum albumin.

Wound site infection 48 hours and 7 days after surgery was 33.3% and 16.7% in Stoma formation respectively while the same was 30% and 26.7% in Primary anastomosis. Wound site gaping 10 days after surgery was 10% and 23.3% in Stoma formation & Primary anastomosis respectively. Requirement of re-exploration was 0% and 6.7% in Stoma formation & Primary anastomosis respectively. However, none were statistically significant differences.

The only operative procedure related seen Anastomotic leak & Enterocutaneous fistula were found to be 6.6% & 3.3%. respectively of in anastomosis cases and Stoma retraction & Stoma obstruction were found 3.3% & 3.3% respectively in stoma cases.This difference was found to be statistically significant.

Tolerance to oral feeds was seen on 2.67±1.3 Days and 3.87±1.65 days after surgery in stoma formation & primary anastomosis respectively.This difference was found to be statistically significant.

The mean duration of hospital stay in the groups 1 and primary anastomosis were found to be 5.00$\pm$1.930 & 7.70$\pm$2.628 days respectively. This difference was found to be statistically significant.The only operative procedure related complication seen was Anastomotic leak and it was found in 3.3% of primary anastomosis cases. Mortality rate was found to be 3.3%

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and 6.7% in stoma formation and primary anastomosis respectively. However this difference was not statistically significant.

When the patient is hemodynamically stable and the peritoneum is uncompromised, primary anastomosis following gut resection in AIO is a safe and successful treatment. One procedure and one hospital stay are sufficient to address the underlying etiopathology. It is possible to avoid the financial burden and morbidity associated with stomas. However, as our work and several other investigations have shown, an anastomotic leak may significantly increase postoperative morbidity, and high output may also result in reoperation or even death. In an emergency situation, stoma creation without primary anastomosis might be a safer option.

LIMITATIONS

The study included only 60 patients (30 in each group), which may limit the statistical power and generalizability of the findings. As an observational study, it cannot establish causality between the surgical approach and outcomes. There may be confounding factors influencing the results. Patients were not randomly assigned to the two groups, which could introduce selection bias. The decision for stoma vs anastomosis might have been influenced by patient condition, potentially skewing the results. The research was conducted in a single hospital, which may limit its external validity to other healthcare settings or populations. The study focused on early postoperative outcomes. Long-term complications, quality of life issues, and stoma reversal outcomes were not

CONCLUSION

The choice between primary anastomosis and stoma creation in patients with intestinal obstruction is complex and multifactorial. Primary anastomosis offers the advantage of maintaining intestinal continuity and avoiding the complications associated with a stoma, but it carries a risk of anastomotic leakage and infection. Stoma creation, while often safer in unstable patients or those with significant contamination, impacts quality of life and requires further surgical intervention for reversal.

The economic impact of these two surgical options is an important consideration. Primary anastomosis, while potentially involving higher initial surgical costs due to the complexity, may result in lower overall costs due to a shorter hospital stay and no need for additional surgeries. Conversely, stoma creation might have lower initial costs but can result in higher long-term costs due to the need for stoma care supplies, potential complications, and a second surgery for stoma reversal.

In conclusion, the decision should be individualized based on the patient's condition, the cause of the obstruction, and the presence of complicating factors. Surgeons must weigh the benefits and risks of each approach to optimize patient outcomes. With advances in surgical techniques and perioperative care, the outcomes of both procedures continue to improve, offering hope for better management of this challenging clinical condition.

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DECLARATIONS

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Conflict of interest: None declared

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