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Comparison between Primary Repair and Ileostomy in the Management of Typhoid Intestinal Perforation

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ABSTRACT

Objective: To compare the outcomes of primary repair with ileostomy in the management of typhoid intestinal perforation.
Study Design: Quasi-Experimental Study.
Place and Duration of Study: Surgical Departments of Combined Military Hospital, and Pak Emirates Military Hospital, Rawalpindi Pakistan, from Nov 2021 to Jun 2022.
Methodology: A total of 400 patients presenting with typhoid ileal perforation were recruited. Patients of either gender, aged under 60 years with a positive blood culture for S. Typhi were included. Those with a history of abdominal surgery or ileal perforation due to any cause other than typhoid were excluded. The study population was categorized into two groups (A, and B) of 200 patients each. Group-A received primary repair, and Group-B received ileostomy. Complications were compared between both groups. A primary outcome (mortality) was also examined.
Results: Mean age of patients noted was 22.47±14.8 years. In Group-A, 124(62%) patients, and in Group-B 118(59%) patients were males. Postoperative wound infection was the most frequent complication found, in 32(16%) patients in Group-A and 44(22%) patients in Group-B. No complications were found in 96(48%) patients in Group-A and
80(40%) patients in Group-B. The mortality rate was higher in Group-B 34(17%) in comparison to Group-A 22(11%).
Conclusions: Primary repair is a safe technique, and it has less morbidity and mortality in comparison to ileostomy for treatment of typhoid intestinal perforation.

Keywords: Intestinal perforation, Primary repair, Typhoid fever.

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INTRODUCTION

Enteric fever is a term used for both typhoid fever and paratyphoid fever. It is caused by *Salmonella enterica* serotype *Typhi* which was formerly called *S.Typhi*. It is a gram-negative bacillus[1] which cannot be detected without laboratory investigations.[2] Pakistan has been observed to have the highest incidence rate of typhoid fever in South Asia,[3] surpassing even Africa.[4] Fever, abdominal pain and rose spots can be seen on the abdomen, which can later progress to hepatomegaly, splenomegaly, toxic megacolon, and intestinal bleeding and perforation.[5,6]

If a febrile patient is living in or has recently visited an endemic area, then typhoid should be considered, and blood and stool cultures should be obtained.[7] Meanwhile, empirical therapy with antibiotics should be started as delay in diagnosis and treatment may lead to more complications like intestinal perforation and sepsis.[8]

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Intestinal perforation because of typhoid is still prevalent in developing countries, especially in children. Patients may present with caecal or gall bladder perforation or even multiple intestinal perforations.[9] The diagnosis of typhoid perforation is mainly clinically but supported by laboratory investigations and radiological findings like gas under the diaphragm noted on erect abdominal X-ray or presence of free fluid on abdominal ultrasound.[9,10] Surgical techniques used for perforation include primary repair, segmental intestinal resection, ileostomy formation, and if cecum is involved then right hemicolectomy. Keeping in mind the high prevalence and incidence of typhoid in a country like Pakistan we designed this study. Emerging multidrug resistance and typhoid complications like intestinal perforation led us to formulate our study to compare complications and outcomes of surgical interventions in cases of typhoid perforations.

METHODOLOGY

The quasi experimental study was conducted at the Surgical Departments of Combined Military Hospital and Pak Emirates Military Hospital,

Rawalpindi Pakistan from November 2021 to June 2022 after taking approval from the Institutional

Review Board (letter number 284). Sample size was calculated using WHO sample size calculator taking prevalence of typhoid perforation 0.4935%.[11]

Inclusion Criteria: Patients of either gender, aged from newborn to 60 years, and presented with positive blood culture for *S. Typhi* and typhoid perforation were included.

Exclusion Criteria: Patients with a history of any sort of abdominal surgery or those with a history of ileal perforation due to any cause other than typhoid, those with Diabetes Mellitus, chronic liver disease, chronic illness, and hematological or intestinal tumors or cancers and patients with symptoms of typhoid but with negative blood culture reports were excluded.

The study population was divided into two groups of 200 patients by computer generated random tables (Figure), each based on readiness for surgery; Those patients whose gut was prepared for surgery beforehand proceeded with primary repair (Group-A), whereas those patients whose clinical status did not allow time for gut repair were proceeded with ileostomy (Group-B). The research was explained, and informed consent was obtained from all participants. Patients demographic details like age, gender, and socio- economic status on basis of income. Cases with monthly income of <Rs. 20 thousand were categorized as low socioeconomic status, those with >Rs 20 thousands but <80 thousands per month were in middle socioeconomic status. >Rs 80 thousands per month were considered of higher socioeconomic status. Surgeries were done by experienced surgeons (with an experience of more than 10 years) and they all performed the same technique. Primary closure in Group-A was done in two layers. The inner layer was closed using vicryl (3-0 polyglycolic acid) and the outer layer was closed with silk 3-0. Group-B ileostomy was done which was later to be reversed via a second surgery after three to six months. All procedures were carried out as per standard operating principles of the hospital's surgical department. We compared the postoperative complications like wound infection, wound dehiscence, anastomotic leak and intrabdominal collections between both groups on the seventh day. A primary outcome such as mortality was examined on the 10th postoperative day.

Data were analyzed using Statistical Package for the social sciences (SPSS) version 23 statistical analysis. Descriptive data were analyzed in terms of frequencies and percentages. Chi-square test was applied in order to compare the post-operative complications and mortality between both surgical techniques. The *p*-value of ≤0.05 was considered statistically significant.

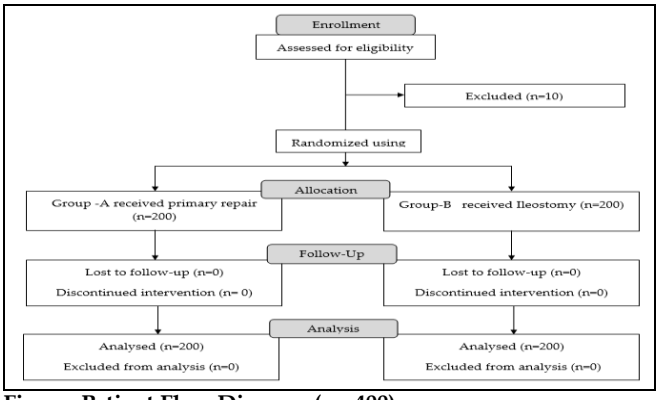

Figure: Patient Flow Diagram (n= 400)

RESULTS

The mean age of study participants was 22.47±14.8 years. Out of the 400 patients included in the study, 242(60.5%) were and 158(39.5%) were female. Two hundred and twenty-three(55.75%) respondents belonged to low socioeconomic group, while 177(44.25%) belonged to middle socioeconomic group. None of the respondents belonged to high socioeconomic group. The breakdown for each group is given in Table-I.

Table-I: Baseline Characteristics of Patients in Primary Repair Groups versus Ileostomy Group (n=400)

	Gender		Socioeconomic Status	
	Male	Female	Low	Middle
Group-A (n=200)	124(62%)	76(38%)	110(55%)	90(45%)
Group-B				

Postoperative wound infection was observed as the most frequently occurring complication, found in 32(16%) patients in Group-A and 44(22%) patients in Group-B. We observed wound dehiscence in 24(12%) patients and 28(14%) in Group-A and Group-B respectively. 14(7%) in Group-A and 16(8%) patients in Group-B had anastomotic leakage. The intra-abdominal fluid collection was found in 20(10%) in Group-A and 32(16%) in Group-B. No complications were found in 96(48%) patients in Group-A and 80(40%) patients in Group-B. The overall complication rate in Group-B was high as compared to Group-A. Table-II is showing detailed post-operative complications noted in both groups on the 7th post-operative day.

Table-II: Postoperative Complications Observed in both Groups (n=400)

		Postoperative Complications					*p*-value
Treatment Type	Groups	Wound Infection	Wound Dehiscence	Anastomotic Leak	Intra- Abdominal Collection	No Complication	
Primary Repair	Group-A (n=200)	32(16%)	24(12%)	14(7%)	20(10%)	96(48%)	<0.001
Ileostomy	Group-B (n=200)	44(22%)	28(14%)	16(8%)	32(16%)	80(40%)	<0.001

In Group-A 22(11%) patients and in Group-B 34(17%) patients died during ten days of follow-up. The mortality rate was higher in Group-B 34(17%) as compared to Group-A 22(11%). Table-III shows mortality rate in both groups noted on the 10th post-operative day.

Table-III: Comparison of Mortality in Study Groups (n=400)

Mortality	Group-A	Group-B	*p*-value
Yes	22(11%)	34(17%)	<0.001
No	178(89%)	166(83%)	

DISCUSSION

Among the complications of typhoid, ileal perforation is one of the most serious and fatal complications if not diagnosed and treated on time. Surgical treatment options commonly used are primary repair and ileostomy.[12]

The mean age of participants in our study was 22.47±14.8 years. In a study done in the year 2021[13] mean age of patients with typhoid ileal perforation was 28.5±19.1 years with more frequency in males (69% of the total patients). We also observed a high frequency of males in both groups 124(62%) in Group-A) and 118(59%), in Group-B). A study from Sindh, Pakistan[14] on typhoid cases noted a high prevalence of cases in males (58.04%) and 51.04% of cases were above 25 years. So typhoid and ileal perforation because typhoid is more prevalent in males in the early adulthood group. It may be because of sex liked differences like more environmental exposure, dining out behaviour, and improperhygiene practices followed by males.[15]

In our study more than 50% of cases in either Group-Belonged to a low socioeconomic class (Group-A: 55%), Group-B: 56.5%). These results are noted by a study done in 2021 in Baluchistan[16]. They documented that the strongest predictor of typhoid complications after the clinical condition was socioeconomic status. They also observed that 56% belonged to a low socioeconomic status, which is consistent with our findings.

In a local study from Swat, Pakistan[17] wound infections after primary repair of typhoid ileal perforation was noted in 28.8% of cases. They noted wound dehiscence in 4.1% of cases and intra-abdominal collection in 11% of cases. We also observed intraabdominal collection in 10% of cases but wound dehiscence percentage is slightly higher in our study (12%) but is still less than that noted in ileostomy cases of our study (14%) (*p*-value<0.001).

In another study, the overall complication rate was 65% with ileostomy and 40% in patients treated with primary repair for typhoid intestinal perforation.[18] We also observed a high complication rate in ileostomy-treated cases. These results were also comparable to other studies.[19,20]

The morbidity and mortality in our study were high in the ileostomy group. A study conducted by Naga Babu *et al*.[21] reported a high morbidity and mortality rate in the group who received primary repair. These findings are contrary to ours. In Pakistan limited data on case fatality is available. In a retrospective study done on five- year data[11], the case fatality of typhoid hospitalized cases was 1.8%. This is lower than noted by us. The reason may be that we only included those typhoid cases who underwent surgery, and they included all hospitalized cases with typhoid. However, there are studies available supporting our observation of primary repair being better than ileostomy. Other International studies[18] noted a high mortality rate in the ileostomy group and low in the primary repair group.[18,22] As per the findings of our study, primary repair has fewer complications as compared to ileostomy for typhoid intestinal perforation. It also has less mortality. Ileostomy needs a second surgery of reversal for bowel continuity usually done after three to six months after bowel exteriorization. This prone the patient to high morbidity.

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LIMITATION OF THE STUDY

We didnot consider signs and symptoms at presentation, day of typhoid illness, and there was no follow-up on operated cases after the 10th post-operative day due to time constraints. Multicenter studies with the inclusion of clinical history, treatment history, and regular follow-ups are suggested.

CONCLUSIONS

Among surgical options for treatment of intestinal perforation because of typhoid, the primary repair is a safe and easy technique and has acceptable morbidity and mortality as compared to ileostomy.

Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

UAS & SMAR: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

KSB & MJ: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

TI & AM: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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