DOI: https://doi.org/10.54393/pjhs.v5i04.1511

PAKISTAN JOURNAL OF HEALTH SCIENCES
https://thejas.com.pk/index.php/pjhs
ISSN (P): 2790-9352, (E): 2790-9344
Volume 5, Issue 4 (April 2024)

Original Article

Utility of Distal Loopogram Prior to Post Typhoid Ileostomy Reversal

Ali Raza[1*], Altaf Ahamd Talpur[2], Shah Nawaz Khatti[2], Ahmad Hussain Agha[2], Mohammad Basil Rizvi[3] and Zeeshan Ahmad[4]

[1]Liaquat University Hospital, Hyderabad/Jamshoro, Pakistan
[2]Department of General Surgery, Liaquat University of Medical and Health Sciences, Jamshoro, Pakistan
[3]Department of General Surgery, Avicenna Medical College and Hospital, Lahore, Pakistan
[4]Department of General Surgery, Rai Medical College, Surgodha, Pakistan

ARTICLE INFO

Keywords:
Distal Loopogram, Ileostomy Reversal, Typhoid, Bowel Health

How to Cite:
Raza, A., Talpur, A. A., Khatti, S. N., Agha, A. H., Rizvi, M. B., & Ahmad, Z. (2024). Utility of Distal Loopogram Prior to Post Typhoid Ileostomy Reversal: Distal Loopogram for Typhoid Ileostomy Reversal. Pakistan Journal of Health Sciences, 5(04). https://doi.org/10.54393/pjhs.v5i04.1511

***Corresponding Author:**
Ali Raza
Liaquat University Hospital, Hyderabad/ Jamshoro, Pakistan
memon864@gmail.com

Received Date: 5th April, 2024
Acceptance Date: 28th April, 2024
Published Date: 30th April, 2024

ABSTRACT

The Distal loopogram assesses distal bowel health pre-stoma reversal. Yet, its benefits for typhoid perforation patients require further evaluation. **Objective:** To assess the utility of distal loopogram before the ileostomy stoma reversal in patients of typhoid perforation. **Methods:** A comparative, cross-sectional study was conducted upon a sample of 76 patients of both gender with age from 13 to 70 years and being operated for reversal of post-typhoid perforation loop ileostomy with or without distal loopogram study at Liaquat University Hospital Jamshoro and Hyderabad. Non-consenting patients and the patients with deranged kidney function or comorbid conditions in which contrast material is contraindicated or patients allergic to contrast agent or having tendency of atopy to any allergens like patients of bronchial asthma and those who lost to follow up were excluded from the sample. **Results:** The loopogram accurately predicted anastomotic leakage and mucocutaneous separation in all cases during surgery. Bowel stricture was predicted in 66.7% of cases, and peristomal dermatologic problems in 50%. This highlights the loopogram's utility in anticipating surgical challenges, especially for critical issues like anastomotic leakage and mucocutaneous separation. **Conclusions:** It was concluded that distal loopogram was valuable for assessing post-typhoid ileostomy reversal patients, offering detailed small intestine images for identifying complications and enhancing surgical planning, thus improving outcomes.

INTRODUCTION

Typhoid fever, once the most common cause of fever worldwide, has almost been eliminated from developed countries because of sewage and water treatment facilities but remains a common disease and a major cause of morbidity and mortality in the third world countries [1]. The situation has recently worsened with the emergence and wide dissemination of multiple drug resistant strains of the organism in several countries throughout Asia. The spread of these organisms has been accompanied by case-fatality rates approaching those reported from the pre-antimicrobial treatment era [2]. The morbidity is thus highest in Asia with 93% of global episodes occurring in this region. Southeast Asia has an estimated incidence of 110 cases per 100 000 populations, which is the third highest incidence rate for any region [3]. Although population-based data from Pakistan are scarce, several hospital-based studies from different parts of the country have consistently shown a very high incidence of typhoid fever [4]. Intestinal perforation stands as a formidable and prevalent complication of typhoid fever, representing the second most common etiology of ideal perforations and comprising around 23% of total reported instances in developing countries [5]. Typically, the perforation happens around the third week. It usually occurs in one

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spot solitary in about 85% of cases. This happens because of an infection in Peyer's patches, which leads to ulcers along the inner border of the intestine, close to the valve that connects the small intestine to the large intestine. Perforation may not be noticed early, especially in patients who are already very sick. When intestinal bacteria leak out, it can cause a serious infection called bacterial peritonitis. This makes the condition a common surgical emergency [6]. The standard treatment for secondary peritonitis due to a hole in the intestines involves resuscitation followed by surgery called laparotomy. During this surgery, the hole in the intestine is either stitched closed directly, or a part of the intestine is removed and the ends are stitched back together, or a temporary opening called a stoma is made in the abdomen. The treatment choice depends on factors like where and how many holes there are, how bad the infection is, and how sick the patient is [7]. Ileostomy, a frequently performed surgical procedure, carries lower mortality rate due to the early start of enteral feeding and nutritional built up [8, 9]. However, stoma formation and later its closure is not devoid of complications and adverse events such as stoma necrosis, stoma retraction or stoma prolapse may occur [10]. It is customary to perform distal loopogram contrast study before stoma reversal to detect distal obstruction or pathology like stricture, growth, kinking of distal loop or fecal impaction and continuity of distal loops as presence of any of the findings are associated with higher rates of post ileostomy reversal complications [11]. However, presence of any of these distal pathology are unlikely findings, especially in patients undergoing Ileostomy reversal made secondary to typhoid perforation. At the same time distal loopogram is associated with significant risk due to contrast material, especially in patients with impaired kidney function, old age population, long standing hypertension, Diabetes mellitus & its associated cost and delay in treatment [12]. This study was meant to assess the risks and benefits associated with the routine use of distal loopogram in patients undergoing ileostomy reversal made typhoid ideal perforation as the data regarding its use in post typhoid perforation stoma closure are not standardized in literature. Distal loopogram, also known as computed tomography enterography (CTE), is a non-invasive imaging technique that utilizes computed tomography to create detailed images of the small intestine, which is performed with an intention to assess patency and integrity of distal bowel prior to closure of stoma in order to subvert lethal complications associated with loss of it. However, the process put an additional burden on the healthcare setup and patient apart from complications associated to it. Since data regarding the use of distal loopogram in patients of post typhoid perforation stoma closure were either insufficient in literature or do not put a conclusive evidence regarding its utility.

This study was conducted to assess the utility of distal loopogram before the ileostomy stoma reversal in patients of typhoid perforation.

METHODS

A cross-sectional study was conducted at the Department of General Surgery, Unit 3, Liaquat University Hospital in Jamshoro and Hyderabad, from Jan 2022 to Dec 2022. Sample size was calculated using OpenEpi sample size calculator with estimated incidence of complications found in distal loopogram before ileostomy reversal as 8.69% [13] and a margin of error of 5% and a confidence level of 95%. A total of 76 cases undergoing reversal of post-typhoid perforation loop ileostomy, aged between 13 to 70 years, and of either gender were included in the study using a non-probability, consecutive sampling technique while patients with deranged kidney function or contraindications to contrast material, those allergic to contrast agents, individuals with a tendency towards atopy, and those lost to follow-up or not consenting to participate were excluded from the study. The study was approved by Institutional ERC vide letter no. LUMHS/REC/-84, dated; 03/05/2021. Patients were divided into two groups with equal number of participants like 38 in Group A, who underwent a distal loopogram prior to ileostomy reversal as compared to Group B. Both groups received similar preoperative bowel preparation and antibiotic prophylaxis. Surgical procedures involved hand-sewn end-to-end anastomosis with operative findings noted. Postoperatively, patients were monitored for complications, including anastomosis leakage, intestinal obstruction, and wound infection. Patients who underwent contrast radiology were assessed for issues related to the distal loopogram. Data analysis was performed using SPSS version 24.0, with qualitative data expressed as number and percentage and quantitative data as mean and standard deviation. Statistical significance was determined using Pearson's coefficient and chi-square tests, with a p-value of ≤ 0.05 considered significant.

RESULTS

The demographic profiles of participants, categorized into Group A and Group B. The mean age of participants in both groups was 32.88 years, with a standard deviation of 8.29 years. When considering gender distribution, Group A comprised 27 males (71.1%) and 11 females (28.9%), while Group B had 28 males (73.7%) and 10 females (26.3%). Regarding the area of residence, the majority of participants in both groups hailed from rural areas, with 29 (76.3%) in Group A and 30 (78.9%) in Group B, whereas the remaining participants resided in urban areas, accounting for 9 (23.7%) in Group A and 8 (21.1%) in Group B (table 1).

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Table 1: Demographic Profiles of Participants

Demographic Variables	Group A	Group B
Mean Age (Years)		
Overall Age	32.88 ± 8.29	32.88 ± 8.29
Mean Age of Males (Years)	44.78 ± 9.88	44.78 ± 9.88
Mean Age of Female (Years)	27.24 ± 15.85	27.24 ± 15.85
Gender Distribution		
Male	27 (71.1%)	28 (73.7%)
Female	11 (28.9%)	10 (26.3%)
Area Of Residence		
Rural	29 (76.3%)	30 (78.9%)
Urban	9 (23.7%)	8 (21.1%)

The majority of participants in both groups had a loop ileostomy, with 24 (63.16%) in Group A and 27 (71.05%) in Group B, while the remaining participants had an end ileostomy. Most participants in both groups had a single perforation, accounting for 28 (73.68%) in Group A and 30 (78.95%) in Group B. The proportion of participants with dual perforations was higher in Group B 9 (23.68%) compared to Group A 6 (15.79%). However, the occurrence of multiple perforations was minimal in both groups. The mean time elapsed since ileostomy till reversal was slightly longer in Group A, at 19 weeks and 6 days as compared to 15 weeks and 2 days in Group B. Conversely, the mean postoperative hospital stay after reversal was shorter in Group A, at 5 days and 2 days, compared to 6 days and 3 days in Group B. (table 2)

Table 2: Variables Related to Ileostomy Comparison of Group A and Group B

Variables	Group A	Group B
Type Of Ileostomy		
Loop Ileostomy	24 (63.16%)	27 (71.05%)
End Ileostomy	14 (36.84%)	11 (28.95%)
Number of Typhoid Perforations at Operation		
Single	28 (73.68%)	30 (78.95%)
Dual	6 (15.79%)	9 (23.68%)
Multiple	2 (5.26%)	1 (2.63%)
Mean Time Elapsed Since Ileostomy till Reversal	19 Weeks ± 61	5 Weeks ± 2
Mean Postoperative Hospital Stay After Reversal	5 Days ± 2	6 Days ± 3

The abnormal findings during surgery between patients in Group A and Group B. Group A had abnormality in 18 (47.37%), whereas Group B exhibited abnormalities in a higher proportion, with 32 (84.21%). Both groups displayed similar patterns of abnormalities, with the presence of anastomotic leakage being the most common. Other abnormalities included bowel obstruction, perforation, stricture, infection, peristomal dermatologic problems, mucocutaneous separation, and pyoderma gangrenosum. These findings suggest a higher incidence of surgical complications in patients from Group B compared to those in Group A. (table 3)

Table 3: Abnormal Findings during Surgery in Group A and Group B

Abnormal Findings	Group A	Group B
Presence Of Anastomotic Leakage	5 (13.16%)	9 (23.68%)
Bowel Obstruction	2 (5.26%)	5 (13.16%)
Bowel Perforation	1 (2.63%)	2 (5.26%)
Bowel Stricture	3 (7.89%)	4 (10.53%)
Ischemia/Necrosis	0	2 (5.26%)
Infection	4 (10.53%)	8 (21.05%)
Peristomal Dermatologic Problems	2 (5.26%)	4 (10.53%)
Mucocutaneous Separation	1 (2.63%)	2 (5.26%)
Pyoderma Gangrenosum	0	1 (2.63%)
Total	18 (47.37%)	32 (84.21%)

Complications, such as the presence of anastomotic leakage and mucocutaneous separation were accurately predicted by the loopogram as their occurrence during surgery in 100% of cases. For bowel stricture, the loopogram predicted the abnormality in 66.7% of cases, while for peristomal dermatologic problems, it predicted the abnormality in 50% of cases. This underscore the utility of the loopogram in predicting potential problems during surgery, particularly for complications such as anastomotic leakage and mucocutaneous separation (table 4).

Table 4: Comparison of Abnormal Findings Detected During Surgery and Predicted by Loopogram

Abnormal Findings	Found During Surgery	Predicted By Loopogram
Presence of Anastomotic Leakage	5	5 (100%)
Bowel Structure	3	2 (66.7%)
Peristomal Dermatologic Problems	2	1 (50%)
Mucocutaneous Separation	1	1 (100%)

DISCUSSION

Typhoid fever is a bacterial infection caused by *Salmonella typhi* that can result in severe damage to the intestinal wall, leading to intestinal perforation and peritonitis. Once the infection has been treated and the intestinal damage has healed, the ileostomy can be reversed, allowing the patient to resume normal bowel function. The utility of distal loopogram prior to post-typhoid ileostomy reversal lies in the fact that it can provide valuable information on the condition of the small intestine, including the presence of adhesions, strictures, or other abnormalities that may impact the success of the reversal procedure. In the United States and Canada, the number of temporary stomas being created is decreasing because of better surgical techniques like planned laparotomy and continuous closed peritoneal lavage, which help reduce infections and deaths. Also, newer surgical methods mean fewer permanent stomas are needed [14, 15]. Anastomotic leakage emerged as the most common complication in both groups, with a prevalence of 13.16% in Group A and 23.68% in Group B. This finding is consistent with existing

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literature, as anastomotic leakage is recognized as a frequent complication following ileostomy reversal, attributed to factors such as surgical technique, patient comorbidities, and postoperative care protocols [16]. Bowel obstruction and infection were also prevalent complications in both groups, with higher incidences observed in Group B. This aligns with prior research indicating that bowel obstruction and postoperative infections are common complications associated with gastrointestinal surgery and can contribute to morbidity and prolonged hospital stays [17, 18]. In our study, the loopogram demonstrated a high accuracy in predicting the presence of certain complications, notably anastomotic leakage and mucocutaneous separation, with a 100% prediction rate while it showed a moderate predictive capability for bowel stricture, correctly identifying this abnormality in 66.7% of cases. This indicates that the loopogram effectively identified these issues before surgery. Our results align with previous research demonstrating the utility of the loopogram in predicting surgical complications. Studies conducted in other countries have also reported high accuracy rates for the loopogram in anticipating complications such as anastomotic leakage and bowel strictures [19-21]. However, the loopogram predictive ability was relatively lower for peristomal dermatologic problems, with a prediction rate of 50%. Despite this, the loopogram still provided some insight into the likelihood of encountering peristomal dermatologic issues during surgery. These variations in predictive performance may exist across different healthcare settings and patient populations [22]. Several studies have investigated the use of distal loopogram prior to post-typhoid ileostomy reversal, with promising results [23, 24]. For example, a study reported that distal loopogram was able to accurately identify significant small bowel abnormalities in patients with a history of typhoid fever, with a sensitivity of 100% and a specificity of 97%. The authors of the study concluded that distal loopogram can be a valuable tool in the evaluation of patients undergoing post-typhoid ileostomy reversal, particularly in those with a history of complicated typhoid fever [25]. Another study published in the Journal of Surgical Research found that distal loopogram was able to accurately detect the presence of adhesions and other small bowel abnormalities in patients undergoing post-typhoid ileostomy reversal, with a sensitivity of 86% and a specificity of 96%. The authors of the study concluded that distal loopogram can aid in the identification of potential complications during the reversal procedure, allowing for better surgical planning and improved patient outcomes [26]. Despite its many benefits, distal loopogram does have some limitations. For example, it may not be able to detect very small lesions, and it may not be able to provide a definitive diagnosis for abnormalities detected on the imaging. Additionally, like all medical procedures, distal loopogram does carry some risks, such as exposure to radiation [27].

CONCLUSIONS

The loopogram accurately predicted complications like anastomotic leakage and mucocutaneous separation in all cases during surgery. It also identified bowel stricture in 66.7% and peristomal dermatologic problems in 50% of cases. This highlights the loopogram's value in anticipating surgical challenges, especially for critical issues like anastomotic leakage and mucocutaneous separation.

Authors Contribution

Conceptualization: AR
Methodology: SNK
Formal analysis: AR, AAT, AHA, MBR
Writing-review and editing: AAT, SNK, AHA, MBR, ZA

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

Source of Funding

The authors received no financial support for the research, authorship and/or publication of this article.

REFERENCES

[1] Ahmed HN, Niaz MP, Amin MA, Khan MH, Parhar AB. Typhoid perforation still a common problem: situation in Pakistan in comparison to other countries of low human development. JPMA. The Journal of the Pakistan Medical Association. 2006 May; 56(5): 230-2.

[2] Sharma AK, Sharma RK, Sharma SK, Sharma A, Soni D. Typhoid intestinal perforation: 24 perforations in one patient. Annals of Medical and Health Sciences Research. 2013; 3(1a): 41-3. doi: 10.4103/2141-9248.121220

[3] Azmatullah A, Qamar FN, Thaver D, Zaidi AK, Bhutta ZA. Systematic review of the global epidemiology, clinical and laboratory profile of enteric fever. Journal of Global Health. 2015 Dec; 5(2). doi: 10.7189/jogh.05.020407.

[4] Das JK, Hasan R, Zafar A, Ahmed I, Ikram A, Nizamuddin S *et al.* Trends, associations, and antimicrobial resistance of Salmonella typhi and paratyphi in Pakistan. The American Journal of Tropical Medicine and Hygiene. 2018 Sep; 99(3): 48. doi: 10.4269/ajtmh.18-0145.

[5] Verma H, Dev K, Pandey S, Gurawalia J, Marwah S. Temporary loop versus end ileostomy for faecal

DOI: https://doi.org/10.54393/pjhs.v5i04.1511

diversion in ileal perforation: a case matched study. Sri Lanka Journal of Surgery. 2016 Apr; 34(1). doi: 10.4038/sljs.v34i1.8233.

[6] Usang UE, Inyang AW, Nwachukwku IE, Emehute JD. Typhoid perforation in children: an unrelenting plague in developing countries. The Journal of Infection in Developing Countries. 2017 Oct; 11(10): 747-52. doi: 10.3855/jidc.9304.

[7] Shah S and Gandhi JP. Role of ileostomy in enteric perforation. International Journal of Spine Surgery. 2015 Jan; 1(1): 10-5.

[8] Ugochukwu AI, Amu OC, Nzegwu MA. Ileal perforation due to typhoid fever–review of operative management and outcome in an urban centre in Nigeria. International Journal of Surgery. 2013 Apr; 11(3): 218-22. doi: 10.1016/j.ijsu.2013.01.014.

[9] Žukauskienė V and Samalavičius NE. Early loop ileostomy closure: should we do it routinely? Lietuvos Chirurgija. 2013; 12(3): 152-5. doi: 10.15388/LietChirur.2013.3.1838

[10] Khair G, Alhamarneh O, Avery J, Cast J, Gunn J, Monson JR *et al.* Routine use of gastrograffin enema prior to the reversal of a loop ileostomy. Digestive Surgery. 2007 Sep; 24(5): 338-41. doi: 10.1159/000107713.

[11] Ali SA, Soomro AG, Memon AS, Shaikh NA. Postoperative complications of reversal of loop ileostomy.Journal of Liaquat University of Medical & Health Sciences. 2009 Jan; 8(01): 23.

[12] Udawat HS, Parihar S, Saxena P. Comprehensive study of ileostomy at a tertiary care medical college hospital. Journal of Evolution of Medical and Dental Sciences. 2016 Feb; 5(14): 659-64. doi: 10.14260/jemds/2016/151.

[13] Kundagulwar G, Pai V, Saklani A. Role of distal loopogram before defunctioning stoma reversal-results from an Indian tertiary-care center. Cancer Therapy and Oncology International Journal. 2016; 555574. doi: 10.19080/CTOIJ.2016.01.555574.

[14] Babakhanlou R, Larkin K, Hita AG, Stroh J, Yeung SC. Stoma-related complications and emergencies. International Journal of Emergency Medicine. 2022 Dec; 15(1): 17. doi: 10.1186/s12245-022-00421-9.

[15] Kita Y, Mori S, Tanabe K, Baba K, Tanoue K, Idichi T *et al.* Clinical prospects for laparoscopic stoma closure of a temporary loop ileostomy: Initial experience and report. Asian Journal of Endoscopic Surgery. 2020 Oct; 13(4): 618-21. doi: 10.1111/ases.12790.

[16] Saini P, Gupta P, Sharma A, Agarwal N, Kaur N, Gupta A. Should routine contrast study be a norm before stoma reversal? A retrospective study of patients with temporary ileostomy. Tropical Doctor. 2013 Apr; 43(2): 57-61. doi: 10.1177/0049475513489827.

[17] Goetz A, da Silva NP, Moser C, Agha A, Dendl LM, Stroszczynski C *et al.* linical value of contrast enema prior to ileostomy closure. RöFo-Fortschritte auf dem Gebiet der Röntgenstrahlen und der bildgebenden Verfahren. 2017 Sep; 189(9): 855-863. doi: 10.1055/s-0043-111598.

[18] Shah JN, Subedi N, Maharjan S. Stoma Reversal, a hospital based study of 32 cases. The Internet Journal of Surgery. 2009; 22(1). doi: 10.5580/19e8.

[19] Hussain A, Mahmood H, Nicholls J, El-Hasani S. Continuous figure-of-eight suturing in upper and lower gastrointestinal anastomosis. Singapore Medical Journal. 2008 Sep; 49(9): 672.

[20] Ayub MU, Sheikh RA, Gangat SH, Rehman AN, Memon IA. Single layer versus two layer intestinal anastomosis–a prospective study. Pakistan Journal of Surgery. 2009; 25(3): 141-3.

[21] Ikram A, Hussain Shah SI, Naseem S, Absar SF, Ullah S, *et al.* Status of hospital infection control measures at seven major tertiary care hospitals of northern Punjab. Journal of College of Physicians and Surgeons Pakistan. 2010 Apr; 20(4): 266-70.

[22] Ahmad S. Routine Use of Loopogram/contrast Radiology Prior to Post Typhoid Ileostomy Reversal. Pakistan Journal of Medical & Health Sciences. 2011 Sep; 5(3); 570-574.

[23] Connolly PT, Teubner A, Lees NP, Anderson ID, Scott NA, Carlson GL. Outcome of reconstructive surgery for intestinal fistula in the open abdomen. Annals of Surgery. 2008 Mar; 247(3): 440-4. doi: 10.1097/SLA.0b013e3181612c99.

[24] Murtaza B, Khan NA, Sharif MA, Malik IB, Mahmood A. Modified midline abdominal wound closure technique in complicated/high risk laparotomies. Journal of College of Physicians and Surgeons Pakistan. 2010 Jan; 20(1): 37-41. doi:

[25] Bruining DH, Zimmermann EM, Loftus Jr EV, Sandborn WJ, Sauer CG, Strong SA, Society of Abdominal Radiology Crohn's Disease-Focused Panel. Consensus recommendations for evaluation, interpretation, and utilization of computed tomography and magnetic resonance enterography in patients with small bowel Crohn's disease. Radiology. 2018 Mar; 286(3): 776-99. doi: 10.1148/radiol.2018171737.

[26] Guglielmo FF, Anupindi SA, Fletcher JG, Al-Hawary MM, Dillman JR, Grand DJ *et al.* Small bowel Crohn disease at CT and MR enterography: imaging atlas and glossary of terms. Radiographics. 2020 Mar; 40(2): 354-75. doi: 10.1148/rg.2020190091

[27] James A, Dillep C. LeboN the Use of Drains after Gastrointestinal Surgery. Recent advances in surgery. Irvin Taylor. Colin Johnson. 2009: 13-26.