

**ORIGINAL ARTICLE**DOI: <https://doi.org/10.3329/mediscope.v10i2.67991>**Extra-abdominal Intestinal Anastomosis: A New Technique and Problem-solving Tool in Many Critical Circumstances**Faruquzzaman<sup>1</sup>**Abstract**

**Background:** Anastomosis leakage following intestinal anastomosis and the development of septic complications is a major problem for surgeons in certain clinical situations. There are many circumstances, where surgeons are in great trouble for decision making, where exteriorization of the intestine or performing a primary anastomosis is a risky procedure with a very fatal outcome. The purpose of this paper is to introduce a newer technique “extra-abdominal intestinal anastomosis”. **Objective:** The ultimate aim of this research is to assess the outcome of this new procedure compatible with such situations with different important surgical aspects. **Methods:** This prospective study was conducted with a total of 42 patients of extra-abdominal small intestinal done in Khulna Medical College Hospital (KMCH), Bangladesh. The study period was from January 2017 to November 2020. All the operations were done on emergency setup. Convenient purposive sampling was the sampling technique. **Results:** In this research, approximately 28.6% (12 patients) were undergone emergency operations for gangrenous intestine, followed by 19.0% (08 patients) for postoperative abdominal sepsis. Another important indication was strangulated hernia (07 patients, 11.9%). Extra-abdominal intestinal anastomosis on a trial basis was done in 42 patients in KMCH. Excellent results were observed. Overall mortality and morbidity have been reduced. Moreover, due to fewer complications, hospital stays, and costs have been reduced, on the contrary, patient compliance has been increased. The mortality rate with extra-abdominal intestinal anastomosis was 14.3%, whereas it was reported to be very high previously in KMCH in many circumstances. Extra-intestinal leakage was observed in approximately 26.2% of cases. Approximately in 14.3% patients of with extra-abdominal leakage, extra-abdominal repair was possible without major consequences. Early internalization of the intestinal anastomosis with the closure of the abdominal wall was possible on the 7th to 14th postoperative day in approximately 61.9% of patients with good results. **Conclusion:** The newer method, extra-abdominal intestinal anastomosis is a resilient procedure in many emergencies with fewer complications, less hospital staying, reduced mortality, morbidity rate and excellent patient compliance.

**Keywords:** Extra-abdominal anastomosis, Intestinal anastomosis, Abdominal sepsis, Mortality, Morbidity.

**Introduction**

Anastomotic leakage remains a severe complication after abdominal surgery with considerable morbidity and mortality.<sup>1-3</sup> The frequency ranges

from 1.8 to 19.2% and depends partly on different risk factors.<sup>4-6</sup> Anastomotic leak is one of the most fretted complications and its occurrence carries a significant degree of morbidity and mortality for affected patients.<sup>7</sup> Anastomotic

leaks are defined as 'a leak of luminal contents from a surgical join'. They are the most important complication to recognize following gastrointestinal surgery. Early diagnosis, resuscitation and treatment of an anastomotic leak are key. Delay leads to prolonged contamination of the abdomen or chest by the luminal contents, leading to the development of severe sepsis and progression to multi-organ failure and death. In many clinical circumstances (perforations, gangrene, traumatic injury, inadequate length of intestine, etc.), there is no alternative to performing a jejuna or ileal anastomosis. In such cases, the risk of anastomosis leakage and further complications, morbidity and mortality are inevitable responses. In such cases, exteriorization of the bowel is not practically possible due to the problem of high output fistula. Therefore, it is a great challenge to salvage the patients in such a situation. For a very long time, this has been a very practical challenge for surgeons, where there is no good solution so far. However, the new technique of extra-abdominal anastomosis may be a problem-solving tool in such circumstances.

The reported incidence varies from 6% to 30%,<sup>8-10</sup> largely based on the criteria for diagnosis and the length of follow-up, with an average of 11%.<sup>4</sup> The higher rate is seen in lower anastomoses.<sup>11-13</sup> Anastomosis has been reported to increase the mortality rate from 1.6% to 12%.<sup>14</sup> Loop ileostomy closure is associated with a morbidity of 17.3% and mortality of 0.1-4%.<sup>15-17</sup>

There are so many clinical situations (figure 01 & 02), where it is a great challenge for the surgeons to perform intestinal anastomosis or exteriorization of the intestine (problem of anastomosis leakage, short bowel syndrome, high output fistula, inadequate intestinal length, etc.). In such circumstances, extra-abdominal intestinal anastomosis is a possible solution. The main aim of this research is to describe the surgical technique and to assess the outcome and different aspects of the newly proposed method of "extra-abdominal intestinal anastomosis".



**Figure 01: Gross gangrene of jejunum-ileum due to superior mesentery artery thrombosis.**



**Figure 02: Gross gangrene of jejunum-ileum due to superior mesentery artery thrombosis.**

### Materials and methods

This research was conducted prospectively with a total of 42 patients of extra-abdominal small intestinal (jejuno-jejunal or jejunum-ileal or ileo-ileal) anastomosis in Khulna Medical College Hospital (KMCH), Bangladesh from January 2017 to November 2020. All the operations were done on an emergency basis with gross peritoneal contamination. Convenient purposive sampling was used as a method of selecting samples based on inclusion and exclusion criteria. The survey data were analyzed using descriptive statistics, such as; mean, SD, percentage, etc. Ethical clearance was taken from the ethical review committee of Khulna Medical College Hospital.

**Operational definitions:**

**Extra-abdominal bowel anastomosis:**

Extra-abdominal bowel anastomosis is a surgical technique where the intestinal anastomosis is done outside the abdominal wall usually in a relatively sterile way.

**Operative procedure:**

Single-layer extra-mucosal or sero-muscular anastomosis is done. Only skin fixation is done. Fascial layer fixation (fixation to fascia or peritoneum) is not done.



**Figure 03: Extra-abdominal anastomosis.**



**Figure 04: Extra-abdominal anastomosis.**



**Figure 05: Extra-abdominal anastomosis.**



**Figure 06: Sterile covering.**



**Figure 07: Sterile covering with sterile extra-abdominal drainage.**

**Indications:**

**Absolute:**

- ✓ High risk anastomosis.
- ✓ Inadequate bowel length.

**Relative:**

- ✓ Vulnerable patient/surgery.
- ✓ Proximal anastomosis (jejunum with a chance of high output fistula) with gross peritoneal contamination with disease gut.
- ✓ Multiple bowel perforations (traumatic/pathological) with proximal extra-abdominal anastomosis with de-functioning of the rest of the perforated (repaired) gut.
- ✓ Other surgical considerations.

**Purpose/ advantage:**

- Good and effective surgical option and a substitute for double barrel ileostomy.
- The chance of anastomosis leakage and high output fistula is relatively very less.
- In case of inadequate gut length, immediate complications can be compensated.
- Complications of jejunal anastomosis leakage/breakdown can be eliminated in many circumstances.
- In the case of extra-abdominal anastomosis, if leakage occurs it can be gradually repaired extra-abdominally.
- In anastomosis leakage, the patient will be saved.
- Internalization of the bowel is relatively easier (may be even done as a day-case procedure with local anaesthesia). Major operation of ileostomy closure can be avoided.
- Early internalization of the bowel is possible with high patient compliance.
- In case of leakage or indicated situation, conversion to double barrel ileostomy is possible.
- In the case of double barrel ileostomy, extra-abdominal anastomosis is possible in a risk-free way (distal patency and functional status can be also assessed).

- This is a cost-effective and simpler technique, as the cost related to the application of an ileostomy bag and respective care is not necessary with extra-abdominal anastomosis.

**Drawback:**

This new method is not compatible with all clinical scenarios, as the situations vary from person to person, pathology to pathology, factor to factor, etc. Therefore, the surgeon's consideration and concern are key factors here. Further trials on this new surgical technique are essential to justify the beneficiary effect and the limitation.

**Conversion:**

**Type 1:** Extra-abdominal anastomosis to double barrel ileostomy/jejunostomy/(colostomy).

**Type 2:** Double barrel ileostomy/jejunostomy/colostomy to extra-abdominal anastomosis.

**Results**

The age and sex distribution of all patients are shown in table 01.

**Table 01: Age and sex of the study subjects.**

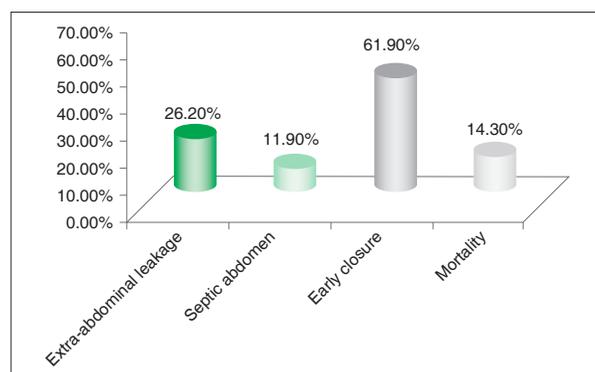
Age group (Years)	Male			Female		
	Frequency	%	Mean±SD	Frequency	%	Mean±SD
<30	02	4.8	<b>54±2.1</b>	00	00	<b>55±2.0</b>
30-39	02	4.8		02	4.8	
40-49	07	16.7		01	2.4	
50-60	14	33.3		07	16.7	
>60	05	11.9		02	4.8	
<b>Total</b>	<b>30</b>	<b>71.4</b>		<b>12</b>	<b>28.6</b>	

Pathology and indication for emergency operations are represented in table 02.

**Table 02: Indications of operation.**

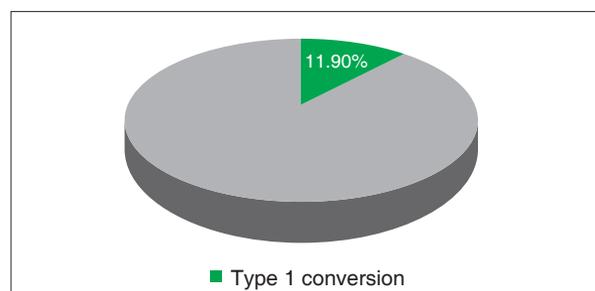
Indication	Frequency	%
Inflammatory perforation	04	9.5
Traumatic perforation	03	7.1
Intestinal obstruction	03	7.1
Gross gangrene	12	28.6
Postoperative abdominal sepsis	08	19.0
Strangulated hernia	05	11.9
Others	07	16.7
<b>Total</b>	<b>42</b>	<b>100</b>

Important major post-surgical events are depicted in figure 08.



**Figure 08: Major postoperative events.**

Most often, type 1 conversion of extra-abdominal anastomosis was not required. The overall rate of type 1 conversion is shown in figure 09.



**Figure 09: Type 1 conversion rate.**

### Discussion

In this research study, most of the patients were male (30 patients out of total 42 patients, 71.4%). The majority of the study population were in the 50-60 years of age group, which were 33.3% and 16.7% respectively in both male and female (table 01). Mean±SD of age was 54±2.1 and 55±2.0 years in the respective groups. In the research institute (Khulna Medical College Hospital, Bangladesh), it was a great challenge for the surgeon in many clinical scenarios (due to inadequate intestinal length, gross peritoneal contamination, gross intestinal gangrene, the chance of high anastomosis leakage, high output fistula, short bowel syndrome, etc.) for many years. Our experience also reflects that it is very difficult to salvage the patients from catastrophic outcomes even in the short term. We were looking for a solution for a very long time to cope with the situation. We tried different ways and techniques, but all failed. After many trials, we realized that extra-abdominal intestinal anastomosis is a possible solution in such a scenario.

In this research, most of the extra-abdominal anastomosis was done for gross intestinal gangrene (example-figure 01 & 02). Approximately 28.6% (12 patients) underwent emergency laparotomy for gangrenous intestine (for superior mesenteric artery thrombosis and other causes), followed by 19.0% (08 patients) for postoperative abdominal sepsis (with history of previous hysterectomy, caesarean section and other abdominal surgery). Strangulated hernia with gangrene was another important indication (07 patients, 11.9%). Other pathology like malignancy, perforated appendicitis with gross generalized peritonitis, inflammatory bowel diseases with sub-acute obstruction, etc. were also important indications (Table 02).

In Khulna Medical College Hospital, anastomosis leakage, development of abdominal sepsis and further consequence were the inevitable outcome in many such clinical situations. However, with the introduction of extra-abdominal intestinal anastomosis on a trial basis, promising results have

been observed (figure 01). Overall mortality and morbidity have been reduced. Moreover, due to fewer complications, hospital stays, and costs have been reduced, on the contrary, patient compliance has been increased. The results of this study suggest that the mortality rate with extra-abdominal intestinal anastomosis was 14.3% (06 out of the total 42 patients). The incidence of extra-intestinal leakage was observed in approximately 26.2% (11) cases. And among these 11 patients, in 06 (14.3%) patients gradual extra-abdominal repair was possible without major leakage by simple stitching. Early internalization of the intestinal anastomosis with the closure of the abdominal wall was possible on the 7th to 14th postoperative day in approximately 61.9% (26) patients with good outcomes. However, type 1 conversion was required in 05 (11.9%) cases (figure 02). As in the case of early closure, there is no necessity for closure of stomas later on and no need for stoma care and application of an ileostomy bag and accessories, which is why, the overall hospital stay, cost, and complications are significantly less. Therefore, this new method is not only cost-effective but also a reliable and resilient technique with excellent prognostic outcomes, which has the potential to improve overall mortality and morbidity.

### Recommendations

Further extended research is still required to justify the new lifesaving surgical procedure. Moreover, this trial was conducted with only jejunum-jejunal, jejunum-ileal and ileo-ileal anastomosis, more trials are required to assess the outcome with extra-abdominal colonic anastomosis, as this has the potential to save too many lives in many critical circumstances.

### Conclusion

Extra-abdominal intestinal anastomosis (sterile) is a new, resilient and effective procedure, especially in emergency setups to salvage patients. This technique is associated with fewer complications and fewer hospital stays. This is a cost-effective procedure with excellent patient compliance. Moreover, this is an excellent problem-solving tool

for surgeons in many critical scenarios.

### Conflicts of interest

The author declares no conflict of interest.

### References

1. Ashburn JH, Stocchi L, Kiran RP, et al. Consequences of anastomotic leak after restorative proctectomy for cancer: effect on long-term function and quality of life. *Dis Colon rectum*. 2013;56(3):275–280.
2. Di Cristofaro L, Ruffolo C, Pinto E, et al. Complications after surgery for colorectal cancer affect quality of life and surgeon-patient relationship. *Color Dis*. 2014;16(12): 407–419. doi: 10.1111/codi.12752.
3. Thornton M, Joshi H, Vimalachandran C, et al. Management and outcome of colorectal anastomotic leaks. *Int J Color Dis*. 2011;26(3):313–320.
4. Bakker IS, Grossmann I, Henneman D, et al. Risk factors for anastomotic leakage and leak-related mortality after colonic cancer surgery in a nationwide audit. *Br J Surg*. 2014;101(4):424–432.
5. Krarup PM, Jorgensen LN, Andreasen AH, et al. A nationwide study on anastomotic leakage after colonic cancer surgery. *Color Dis*. 2012;14(10):661–667.
6. Matthiessen P, Hallbook O, Rutegard J, et al. Defunctioning stoma reduces symptomatic anastomotic leakage after low anterior resection of the rectum for cancer: a randomized multicenter trial. *Ann Surg*. 2007;246(2):207–214.
7. Michael J. Stamos, Matthew T. Brady, Anastomotic leak: are we closer to eliminating its occurrence?, *Annals of Laparoscopic and Endoscopic Surgery*, *Ann Laparosc Endosc Surg* 2018;3:66

8. Isbister WH. Anastomotic leak in colorectal surgery: A single surgeon's experience. *ANZ J Surg* 2001;71:516-20.
9. Matthiessen P, Hallbook O, Andersson M, et al. Risk factors for anastomotic leakage after anterior resection of the rectum. *Colorectal Dis* 2004;6:462-9.
10. Paun BC, Cassie S, MacLean AR, et al. Post-operative complications following surgery for rectal cancer. *Ann Surg* 2010;251:807-18.
11. Park IJ. Influence of anastomotic leakage on oncological outcome in patients with rectal cancer. *J Gastrointest Surg* 2010;14:1190-6.
12. Park YA, Kim JM, Kim SA, et al. Totally robotic surgery for rectal cancer: from splenic flexure to pelvic floor in one setup. *Surg Endosc* 2010;24:715-20.
13. Snijders HS, Wouters MW, van Leersum NJ, et al. Meta-analysis of the risk for anastomotic leakage, the postoperative mortality caused by leakage in relation to the overall postoperative mortality. *Eur J Surg Oncol* 2012;38:1013-9.
14. Alves A, Panis Y, Trancart D, et al. Factors associated with clinically significant anastomotic leakage after large bowel resection: multivariate analysis of 707 patients. *World J Surg* 2002;26:499-502.
15. Wong KS, Remzi FH, Gorgun E, Arrigain S, Church JM, Preen M, Fazio VW. Loop ileostomy closure after restorative proctocolectomy: outcome in 1,504 patients. *Dis Colon Rectum*. 2005;48:243–250.
16. Chambers WM, Mortensen NJ. Postoperative leakage and abscess formation after colorectal surgery. *Best Pract Res Clin Gastroenterol*. 2004;18:865–880.
17. Chow A, Tilney HS, Paraskeva P, Jeyarajah S, Zacharakis E, Purkayastha S. The morbidity surrounding reversal of defunctioning ileostomies: a systematic review of 48 studies including 6,107 cases. *Int J Colorectal Dis*. 2009;24:711–723.