

# SAFETY OF SINGLE LAYER CONTINUOUS EXTRA MUCOSAL GUT ANASTOMOSIS IN EMERGENCY

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## ABSTRACT

**Objective:** To evaluate the safety and complications of a single layer continuous extra mucosal gut anastomosis in emergency.

**Methodology:** This descriptive study was conducted in emergency department of Lady Reading Hospital Peshawar over a period of ten months from September 2007 to July 2008. Study comprised of fifty consecutive patients after fulfilling the inclusion and exclusion criteria. The safety of anastomosis technique was analysed by postoperative complications of morbidity and mortality.

**Result:** Among 50 patients 80 % were male and 20 % were female, mainly young adults. Patients with anastomotic leakage were 8%. The rate of wound infection was 34 %. Mean hospital stay was 7.22 days. Mortality was 8% due to septicemia and hypovolumic shock.

**Conclusion:** Single layer continuous extramucosal anastomosis is safe and with less anastomosis-related morbidity and mortality.

**Key Words:** Intestinal anastomosis, Extramucosal, Morbidity, Mortality

This article may be cited as: Ahmad M, Amer S, Alam S, Ullah A, Sadiq MU, Khan MA. Safety of single layer continuous extra mucosal Gut anastomosis in emergency. J Postgrad Med Inst 2013; 27(1): 69-73.

## INTRODUCTION

Anastomosis in the gut was not taken successfully until the 19<sup>th</sup> century. Lambert described his seromuscular technique in 1826, which became the main stay of gastrointestinal surgery in the 2<sup>nd</sup> half of century<sup>1</sup>. Halsted favoured a one-layer closure that does not incorporate the mucosa. Connell used a single layer of interrupted sutures incorporating all layers of the bowel<sup>1</sup>. There are different techniques for intestinal anastomosis. Conventional methods, include sutured (Single Layer interrupted or continuous, double Layer) and stapled.

Unconventional methods include compression rings (BAR; AKA), tissue glue and laser welding<sup>2</sup>.

Currently, the single layer extramucosal anastomosis is popular and is advocated by Norman Matheson of Aberdeen as it probably causes the least tissue necrosis and luminal narrowing<sup>1</sup>.

In Single Layer technique, employing extramucosal sutures allows for accurate apposition, incorporate the strongest layer (submucosa) of gut, causes minimal damage to submucosal vascular system and least disturbance to the lumen<sup>3,4</sup> which is the most important determinant<sup>5</sup>.

The mechanical strength of the intact intestinal wall is conditioned by the submucosa and muscularis, while the serosa and mucosa show no significant strength<sup>6,7</sup>. Both continuous and interrupted sutures are commonly used in fashioning intestinal anastomosis. No randomized trials have addressed the question whether interrupted suture have a significant advantage over continuous sutures in Single Layer anastomosis; however, retrospective services have not revealed any such advantage<sup>3,8</sup>.

Experimentally one layer technique has been proven superior to two-layer method with respect to luminal reduction tissue strangulation

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Date Received: November 18, 2011

Date Revised: October 9, 2012

Date Accepted: October 23, 2012

and strength of anastomosis on fifth postoperative day<sup>9,10</sup>.

Single Layer gut anastomosis is safe, straightforward, easy to perform, simply to teach, take less time to create and with less anastomosis related Morbidity and Mortality.

Interrupted single layer serosubmucosal suture is the "gold standard" for intestinal anastomosis and is preferred hand sewn technique<sup>2</sup>.

The purpose of this study was to evaluate the complications and safety of single layer continuous extramucosal gut anastomosis in emergency cases.

## METHODOLOGY

This descriptive study was conducted in emergency department of Lady Reading Hospital Peshawar over a period of ten months from September 2007 to July 2008. All adult patients more than 14 year of both sexes who underwent single layer continuous extra mucosal gut anastomosis from DJ junction to rectosigmoid junction in emergency were included. Gastric, duodenum, rectum, single perforation in diseased gut, patient received after six hours of primary insult and elective surgical cases were excluded.

All patients presenting with abdominal trauma (blunt or penetrating) and acute abdomen, on clinical and radiological examination underwent emergency surgery in the casualty department of Lady Reading Hospital Peshawar.

All cases were admitted through casualty. Informed consent for operation as well as about stoma was taken from the patient or relatives. All patients were provided proforma for data collection.

All patients were resuscitated and given intravenous Antibiotics (covering both gram positive and gram negative organism).

Pass nasogastric tube and urethral catheter for stomach and bladder decompression and output record. Oxygen inhalation was given and pre-operative blood was transfused to the patients who needed oxygen and blood.

After history and complete examination were carried out to establish the diagnosis, routine investigations like complete blood count, blood grouping and cross matching, urea, creatinine and serum electrolytes were done. X-ray abdomen (Both supine and erect films) were taken out in cases of intestinal obstruction and acute abdomen, Ultrasound examination of abdomen and pelvis, Chest X-ray and ECG were done in selected cases.

All the patients underwent surgical

exploration and further action was decided on intraoperatively. All the anastomoses were carried out by senior post graduate medical resident or consultant. All the anastomoses were performed by doing single layer continuous extramucosal suture either end to end, end to side or side to side with or without proximal stoma.

The criteria of the patients in whom the anastomosis were carried out primarily without stoma included duration of less than six hours; minimal faecal contamination of the peritoneal cavity; small gut injury; tension free anastomosis; and free bleeding at the cut ends of the bowel.

Those patients who were subjected to stomal diversion proximal to anastomosis, the following criteria was applied Large gut injury, loaded colon, duration more than six hours. Before resection and anastomosis, bowel was full mobilized and mesentery was transfixed with catgut 0 by taking small bites. After resection of the bowel the proper orientation of bowel was checked before starting the anastomosis.

All the anastomoses were carried out by vicryl 3/0. Two stay sutures were taken at mesenteric and antimesenteric borders of both the ends of gut. Continuous sutures were inserted through the bowel to include the submucosa but exclude the mucosa from mesenteric to anti-mesenteric border anteriorly and posteriorly. All the sutures were inserted 5mm apart and 5mm from margin. After completion of anastomosis, patency was checked by finger and thumb method, and mesentery defect was closed with catgut 2/0. Peritoneal cavity was washed with normal saline in cases of the contaminated operation and drainage tube was put in all cases.

In patients having suspected mass lesions due to tuberculosis or malignancy, resected specimen was sent for histopathology.

All the data was analyzed by using SPSS version 11. Frequency and percentages was calculated for qualitative variables like demographic features, sign and symptoms, post operative complications like anastomotic dehiscence (leak, fistula, abscess). Mean±standard deviation was calculated for quantitative variables like age and hospital stay. The results were expressed through frequencies, tables, graphs and charts.

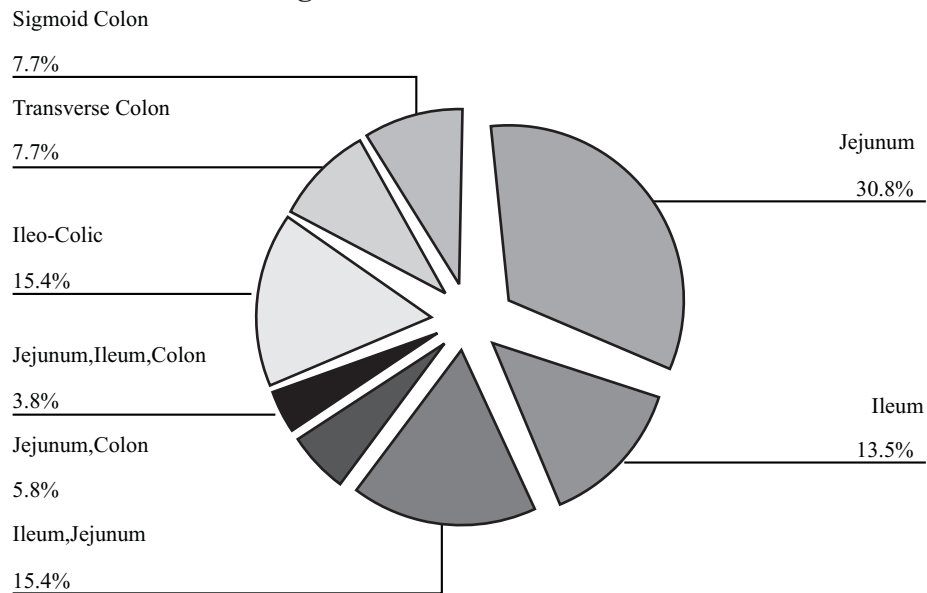
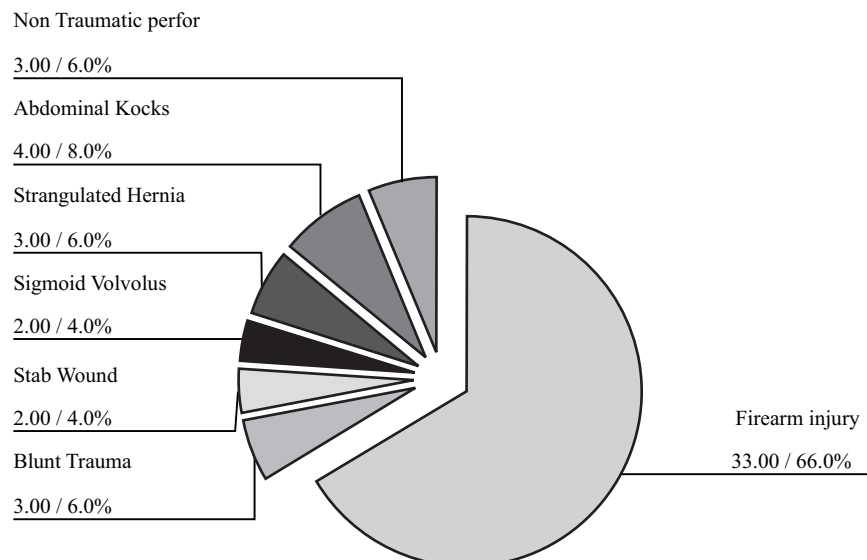
## RESULTS

A total of 50 patients were included in whom single layer continuous extramucosal gut anastomosis was done as shown in Table 1.

All anastomosis were constructed in area of small intestine (Jejunum & ileum) and large

**Table 1: Age and sex cross tabulation**

Age range in Years	Sex		Total
	Male	Female	
14-24	12(24.0%)	4(8.0%)	16(32.0%)
25-35	15(30.0%)	4(8.0%)	19(38.0%)
36-46	7(14.0%)	2(4.0%)	4(8.0%)
47-57	4(8.0%)	-	4(8.0%)
>57	2(4.0%)	-	2(4.0%)
Total	40(80.0%)	10(20.0%)	50(100.0%)

**Figure 1: Site of anastomosis****Figure 2: Disease pattern**

intestine upto upper rectum (i.e. above peritoneal reflection) {Figure 1}.

In 18% of patients, stoma was made proximal to anastomosis and distal anastomosis was checked by distal loopogram after four weeks in which there was no leak.

Patients with anastomotic leakage were 8%. The rate of wound infection, abdominal abscess, peritonitis and septicemia were 34%, 8%, 8% and 14% respectively. Mortality was 8% due to septicemia and hypovolumic shock.

Hospital stay was analyzed among 50 patients as mean hospital was  $7 \pm 2.18$  days.

## DISCUSSION

This study was conducted to evaluate the safety and complication of single layer extra mucosal anastomotic technique in emergency cases. According to Langer S<sup>11</sup>, single layer anastomosis is associated with lower rate of complications. By comparing two groups of patients with different anastomotic techniques, Langer S found that double row suture prolonged the healing process, delayed revascularization, and led to formation of intramural abscess and stenotic intraluminal roll building. These problems were not observed in single row anastomosis, which is designed to promote faster healing.

According to Cvetko R<sup>12</sup>, anastomotic leakage mostly occurs as a result of infection and abscess formation that can be prevented to a large extent with the use of sutures that do not penetrate the mucosa.

The most important aspect of this study was the anastomotic leakage.

According to our study, anastomotic leakage occurred in 4 patients (8%) and according to various studies, the leakage rate for single layer interrupted extra mucosal technique vary from 1.2-7.7%<sup>13-16</sup> and results of my study are near its upper limit.

According to prospective audit of extramucosal anastomosis by Carty NJ<sup>10</sup>, a leakage rate of 2.2% (11 patients in 500 patients) was noted which was lower than the result of our study but the lower leakage rate in this study was due to large number of patients and non emergency procedures.

According to Leslie A<sup>4</sup>, extramucosal technique is gold standard for anastomosis involving small and large bowel. According to this study, the leakage rate was 0.2% (one in 553 patients) which was very low than the result of my study. This low leakage rate may be due to extraordinary precautions and strict adherence to

surgical principles of operative surgery and absolutely sterile environment which we lack in our setup because of poor funds and heavy casualty in this war zone.

In our study, in 36% (18 in 50 patients) proximal stoma was created and distal anastomosis was checked by contrast study, in which there was no leakage. The wound infection rate in our study is 34 %, which is higher than 2-11 % reported in literature<sup>4,10</sup>.

Intra-abdominal abscess and peritonitis, occurred in 8 % & 8% due to anastomotic dehiscence and poor sterilization. Septicemia occurred in 12 % (6 in 50 patients) due to anastomotic dehiscence. Mean Hospital stay was 7.22 days and overall mortality was 8 % (4 in 50 patients) which is also higher than 1.5 to 5.8% reported in the literature<sup>10</sup>. The cause of death was septicemic shock and D.I.C. The higher rates were due to emergency nature of surgery and poor sterilization in the emergency in our setup.

## CONCLUSIONS

It is concluded that single layer continuous extramucosal anastomosis is safe and with acceptable anastomosis-related morbidity and mortality in emergency condition.

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#### **CONTRIBUTORS**

MA conceived the idea and planned the study. SA, SA, AU & MAK did the data collection and analyzed the study. MUS supervised the study. All the authors contributed significantly to the research that resulted in the submitted manuscript.