

## Double layer versus Single layer Gastro-intestinal anastomosis in gastric cancer surgery in Mymensingh Medical College Hospital.

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### Abstract

**Introduction:** In gastric cancer surgery, gastrojejunostomy is one of the most important procedures. Anastomosis between different parts of the stomach and the intestine is a basic technical component in all gastrointestinal procedure. **Backgrounds and aims:** This study evaluated complications of gastrojejunostomy in gastric cancer surgery with two methods: single-layer and double-layer anastomosis. **Materials and methods:** This study was carried out in the department of surgery in Mymensingh Medical College Hospital from January 1, 2009 to December 31, 2012. 100 patients with carcinoma stomach who needed gastrojejunostomy were included in this study. These patients with average age of 43.22 years were divided in two groups (50 in each group); single-layer and double-layer anastomosis. In single-layer anastomosis gastrojejunostomy was performed in interrupted method with absorbable suture (2/0 vicryl). Double-layer anastomosis was carried out with continuous suture (2/0 silk, 2/0 catgut). Possible post-operative complications like anastomotic leakage, pelvic abscess, abdominal sepsis, anastomotic stenosis and wound infection were evaluated. **Results:** In the single-layer group, 4 patients (8%) developed anastomotic leakage, wound infection and only 2 patients (4%) developed abdominal sepsis, pelvic abscess and anastomotic bleeding. No patient developed anastomotic stricture. In double-layer group, 2 (4%) patients developed anastomotic leakage, only 1 (2%) patient had pelvic abscess, abdominal sepsis and anastomotic bleeding but wound infection in 2 (4%) patients. **Conclusion:** Gastrojejunostomy with single-layer hand-sewn suture technique is safe without serious complications in comparison to double-layer suture technique. More-over operation time is less and cost is less in single-layer method.

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**Key words:** Anastomosis, Single-layer, Double-layer, Gastrojejunostomy.

### Introduction

When a segment of the gastrointestinal tract is resected for benign or malignant indications and gastrointestinal continuity needs to be restored, an intestinal anastomosis becomes necessary. Gastrojejunostomy is one of the most important procedures in gastric cancer surgery. Anastomosis between different parts of the stomach and the intestine is a basic technical component in all gastrointestinal procedure.

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The aim of the procedure is to reconstruct the gastrointestinal tract with a strength anastomosis with less morbidity<sup>1</sup>. Intestinal anastomosis can be performed in a variety of ways. Anastomosis may be done with the help of stapling devices, by using double layered suturing technique or by a single layer technique. Stapling devices are expensive and not available in emergency situation in our set up. The traditional double layered anastomosis incorporates large amount of ischemic tissue in the suture line leading to increased tension at suture line and increased chances of the luminal narrowing. Single layered anastomosis may be done through continuous suturing<sup>1,2</sup> or by using extra mucosal interrupted suturing technique. Although continuous absorbable single layer technique has been claimed to be superior to other techniques<sup>3,4</sup> but data is scarce. Similarly, single layer interrupted extra musocal technique is also argued to be superior for being constructed in shorter time and at lower cost but similar in term of safety to two layer technique<sup>5</sup>, however, no randomized trials have addressed the question of whether interrupted sutures or the single layered technique is superior to double layered technique. There was paucity of literature on this topic in our country and also internationally. So, we conducted a study for making a comparison between single -layer interrupted extra mucosal and double layer continuous techniques on the basis of rapidity to perform, cost effectiveness and chances of anastomotic failure.

Attempts have been made to develop the concept of anastomosis by a single-layer technique. Rate of anastomotic leakage, pelvic abscess, abdominal sepsis, stricture formation, anastomotic bleeding and wound infection justify a search for a better technology<sup>3-12</sup>.

## Background and Aims

The basic principles of intestinal anastomosis were established more than 100 years ago by Travers, Lambert and Halsted<sup>14</sup>. Two layer anastomosis was done by Larry in 19<sup>th</sup> century using traditional

technique<sup>15</sup>. Recently single layer anastomosis has been performed in different institutes without any significant risk of morbidities<sup>16, 17, 18, 19</sup>. The single-layer anastomosis was first described by Hautefeuille in 1976<sup>20</sup>. Duration of surgery in single-layer technique was less compared with double layer anastomosis. Recently many surgeons in different institutes of Bangladesh are performing single-layer anastomosis due to fewer incidences of morbidities like ischemia, tissue necrosis, or narrowing of the lumen in comparison to double- layer anastomosis. In this study we evaluated complications of a simple procedure with a single-layer technique for marking a gastrojejunostomy and compared the results with that of a double-layer continuous anastomosis.

## Methods

A study was carried out in the department of surgery in Mymensingh Medical College Hospital from January 1<sup>st</sup>, 2009 to December 31<sup>st</sup> 2012. 100 patients with carcinoma stomach who needed gastrojejunostomy were included in this study. These patients with average age of 43.22 years were divided in two groups: single-layer and double-layer anastomosis (50 in each group). In single- layer anastomosis gastrojejunostomy was performed in interrupted method with absorbable suture (2/0 vicryl). Double-layer anastomosis was carried out with continuous suture (2/0 silk and 2/0 catgut). All the patients were followed up during the post-operative hospital stay and 6 months after discharge from hospital to assess the possible post-operative complications like anastomotic leakage, pelvic abscess, abdominal sepsis, anastomotic stenosis, anastomotic bleeding and wound infection. All anastomosis were performed with the hand sewn method. Chi-square test was used for analysis.

## Results

In this study, 100 patients (72 males and 28 females) were included with a mean age of 43.22 (range, 20-70) years. In 90 (90

percent) patients operative procedure was palliative and in 10 (10 percent) patients operative procedure was curative. Follow up was complete in all patients with a follow up period of 6 months. Tumors were staged using the TNM system as shown in Table 1 (10 patients' stage-I, 40 patients' stage-II and 50 patients' stage-III). Among 100 patients, 36 patients suffered with Grade-I, 38 patients with Grade-II and 26 patients with Grade-III tumor. In most of the patients (80 patients) histopathological type of the tumor was adenocarcinoma, 15 patients was lymphoma but in remaining patients (5 patients) was mucin secreting signet ring carcinoma. In majority of the patients that is in 64 (64%) patients only bypass (Gastrojejunostomy) procedure was performed and in 36 (36 %) patients Partial gastrectomy with Gastrojejunostomy (Billroth type-II) procedure was performed.

**Table: 1 TNM Staging of Resected Pathological Specimens (n=100).**

TNM Staging	Number of specimens (%)
I	10 (10)
II	40 (40)
III	50 (50)

**Table: 2 Tumor Grading (n=100).**

Tumor Grading	Number of specimens (%)
I	36 (36)
II	38 (38)
III	26 (26)

Average time for the construction of the single layer anastomosis was 30 min and in double layer was 45 min per operatively. The difference in average time is statistically significant as p value <.001. Moreover, suture material consumption was more in two layered technique (Group 2). Average duration of stay was 216 hrs and 264 hrs in group 1 and 2 respectively, the difference in average stay is also statistically significant as p<.001. Anastomotic failure was noted in 3 patients of group 1 and 2 patient of group 2. So

leakage rate was near equal (6%) in group 1 while 4 % in group 2 but longer stay and chance of narrowing of gut lumen added to that lead to more hospital expenses on two layered technique.

## Complications

In the single-layer group (Group 1), 3 patients (6%) developed anastomotic leakage, 1 in Bypass gastrojejunostomy and 2 in Partial gastrectomy and gastrojejunostomy), wound infection and only 2 patient (4%) had abdominal sepsis and anastomotic bleeding. 1 patient developed abdominal sepsis. No patient developed anastomotic stricture. In double-layer group (Group 2), 2 (4%) patients developed anastomotic leakage, 1 (2%) patient developed abdominal sepsis, pelvic abscess, anastomotic bleeding and 2 (4%) patients developed wound infection. 1(one) patient had anastomotic stricture .

**Table: 3 Post-operative complications in two methods of anastomosis (n=100).**

Method of anastomosis	Anastomotic leakage	Pelvic abscess	Abdominal sepsis	Anastomotic stricture	Anastomotic bleeding	Wound infection
Single-Layer	3 (6)	2 (4)	1 (2)	0 (0)	2 (4)	4 (8)
Double-Layer	2(4)	1(2)	1(2)	1 (1)	1(2)	2(4)
P-value	< 0.05	< 0.05	< 0.05	<0.05	< 0.05	< 0.05

Parenthesis indicates percentage.

## Discussion

The process of gut anastomotic healing mimics that of wound healing<sup>21</sup>. A leading role is played by the submucosa, where collagen synthesis and degradation takes place<sup>22</sup>. Most of the strength of the bowel wall resides in the submucosa and hence this is the only layer which provides mechanical strength to the anastomosis while other layers contribute very little; that is why sutures that don't stitch onto submucosa are unreliable<sup>23</sup>. The objections against the traditional double layer anastomosis are that it ignores the

principles of accurately apposing the clean cut edges and large amount of ischemic tissue is incorporated in the suture line which may increase the risk of leak. The inner layer increases the chances of strangulation of mucosa due to the damage to submucosal vascular plexus and the outer seromuscular layer may lead to narrowing at the site of anastomosis<sup>24</sup>. Many studies have reported that single layer anastomosis takes less time to create<sup>25</sup>, allows more accurate tissue apposition<sup>26</sup>, and causes less damage to the vascularity of bowel wall<sup>8</sup> and less narrowing of the intestinal lumen. This study presents our experience of a series of consecutive resection and gastro-jejunal anastomosis or only bypasses gastrojejunal anastomosis. It is not a series of a single person or of selected patients but a series of patients operated by senior surgeons in Mymensingh Medical College Hospital. Single-layer anastomosis is safe. In this study we found that complications of single-layer anastomosis are acceptable in comparison to the double-layer anastomosis and this study is similar to the study of Askarpour et al<sup>27</sup>. Anastomotic leakage was observed in 3 (6%) patients in single-layer and in 2 (4%) patients in double-layer group,  $p < 0.05$  and this is similar to other study by Shikata et al<sup>28</sup>. Pelvic abscess, and anastomotic bleeding were found only in 2 (4%) patient in group 1 but 1 (2%) patients in double layer group,  $p < 0.05$  and abdominal sepsis is same in both group. This is similar to other studies conducted by Burch et al<sup>29</sup> and Skakun et al<sup>30</sup>. Wound infection was present in 4 (8%) patients in single layer group and in 2 (4%) patient in double layer group. In group 2, one (1) patient developed anastomotic stricture. Average time for the construction of the single layer anastomosis 30 min and in double layer was 45 min per operatively. Moreover, suture material consumption was more in two layered technique, cat gut, vicryl (Group 2). Average duration of stay was 216 hrs and 264 hrs in group 1 and 2 respectively. This is consistent with the study conducted by Khan et al. 2010<sup>31</sup>.

## Conclusion

The current meta-analysis clarified that two-layer gastro-intestinal anastomosis offers no definite advantage over single layer anastomosis in terms of complications and postoperative leak. Considering duration of the anastomosis procedure and medical expenses, single-layer intestinal anastomosis may prove the optimal choice in most surgical situations. In this present study, the gross and histopathologic findings revealed well-established healing at the anastomotic sites without significant complications. Further work is needed before a single-layer gastrojejunostomy can be recommended clinically.

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