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Original Research Article

Comparison between extra mucosal continuous prolene repair versus interrupted through and through silk repair in colonic anastomosis

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ABSTRACT

Background: The traditional double layered colonic anastomosis incorporates large amount of ischemic tissue in the suture line causing luminal narrowing and fistula formations. Single layered anastomosis may be done through continuous extramucosal suturing or by interrupted through and through technique using nonabsorbable materials. The single layer of suture has shown to be safe and causes fewer complications.
Methods: The study was conducted in the Department of surgery, VIMSAR, Burla during the period from October 2016 to September 2018. All the patients of colonic anastomosis were included in the study. One group consists of extra mucosal continuous prolene repair and other interrupted though and through silk repair. Both groups were followed up and were compared taking different variables.
Results: 146 cases of colonic anastomosis were performed, 110 with interrupted through and through silk repair (75.34%) and 36 with continuous extra mucosal prolene repair (24.66%).The mean time taken for silk repair was more (25.67 min) than prolene (15.5 min). The patients of prolene repair had shorter duration (9 days) of hospital stay than silk (12.4 days). The postoperative ileus was more in silk (16.36%) than prolene (5.56%). Anastomotic leak in prolene is less (2.78%) in comparison to silk (8.18%). The bowel movement appeared earlier with prolene (4.2 days) is less than silk (5.3 days).
Conclusions: The present study shows single layer monofilament thin diameter prolene for different end to end colonic anastomosis has better prognostic panorama in relation to morbidity and mortality, and had an edge over conventional single or bilayere anastomosis.

Keywords: Colonic anastomosis, Extra mucosal continuous prolene repair, Interrupted silk repair

INTRODUCTION

Anastomosis is a surgical procedure where two hollow viscera are approximated together to establish the continuity.[1,2] It may be following the excision of a diseased segment or as a bypass. The outcome of colonic anastomosis is ever a baffling problem to the whole fraternity of surgeons. The mortality and morbidity due to faecal fistula take the toll of life to a great extent.[2,3] Late complications like subacute or acute obstructions occurring weeks, or months after surgery pose a vexing and unsatisfactory treatment, thus resulting in poor compliance. Colonic anastomosis can be done with the help of stapling device, by using double layer suturing technique or by a single layer technique.[3,4] 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 chance of luminal narrowing and

fistula formation.[3-5] Single layered anastomosis may be done through continuous extramucosal suturing or by interrupted through and through technique using different non absorbable suture materials. The anastomosis of bowel with one layer of sutures has been shown to be safe and causes less narrowing of the lumen than the use of two layers of sutures.[4,5] Everting techniques of intestinal anastomosis, with mucosa to mucosa contact, have been advocated as a way of preserving the anastomotic lumen.[7-9]

METHODS

The study was conducted in the Department of surgery, VIMSAR, Burla, Odisha during the period from October 2016 to September 2018.

The patients where colonic anastomosis was performed for various surgical colonic pathology (e.g. sigmoid volvulus, intussusceptions, colonic growth, revision colostomy closure and anastomosis) were included in the study. Patients who left against medical advice, pre operative death, patient undergone colostomy were excluded from the study.

The cases were selected at random from both emergency and elective patients. All patients were grouped into two categories basing on the type of anastomosis and suture used. One group consists of extra mucosal continuous prolene repair and another group consists of interrupted through and through silk repair.

Anastomosis was constructed using silk (2-0) with CRB needle for interrupted technique and prolene (3-0) with CRB needle for continuous technique. The anastomosis in both the procedures started from the mesenteric border incorporating bowel wall at 4-6 mm from the anastomotic margins and each stitch was advanced approximately with 5mm distance.

Further both groups were followed up in the post operative period for observation of the complications and subsequent monthly check up for a period of 6 months.

Both the techniques were compared one over other taking the variables such as time taken for anastomosis, appearance of bowel movements, anastomotic leak, duration of hospital stay, cost effectiveness, death due to anastomosis, into the account.

RESULTS

In our study 146 cases of colonic anastomoses were performed among the patients admitted to the Department of Surgery for various colonic pathology as emergency and elective cases.

Out of 146 patients with colonic anastomosis, 79 were male (54.1%) and 67 were female (45.9%), with mean age of 44.67 yrs and 50.84 yrs respectively. Total 146 cases of colonic anastomosis were performed for different colonic pathology in this study (Table 1).

Table 1: The incidence of various colonic pathology for anastomosis.

Primary pathology	No. of anastomses	Percentage (%)
Sigmoid volvulus	127	87
Compound volvulus	4	2.6
Colonic growth	6	4.1
Colostomy closure	5	3.4
Others	4	2.6

Table 2: Comparison between interrupted silk and continuous prolene anastomosis.

	Interrupted silk	Continuous prolene
No of anastomosis	110	36
Mean age	48.44yrs	48.2 yrs
Routine cases	12	3
Mean time for anastomosis in routine cases(in min)	23.5	14.8
Emergency cases	98	33
Mean time for anastomosis in emergency cases (in min)	27.89	16.33
Mean duration of hospital stay(in days)	12.4	9
Leakage	9/110 (8.18%)	1/36 (2.78%)
Leakage in routine case	0/12	0/3
Leakage in emergency case	9/98(9.18%)	1/33(3.03%)
Average days of leakage	6.5 days	7 days
Mean day of 1st bowel movement	5.3 days	4.2 days
Prolonged ileus with colonic anastomosis	18/110 (16.36%)	2/36 (5.56%)

110 cases were done with interrupted through and through silk repair (75.34%) and 36 were done with continuous extramucosal prolene repair (24.66%). Most of the anastomosis was performed as emergency operations i.e. 89.73% whereas 10.27% anastomosis was done as routine operations. Minimum age of the patient was 16yrs and maximum age of the patient was 80 yrs. Majority of intestinal anastomosis were performed in 50-59 years age group patients, 73%. Male had a slightly higher rate (54.1%) of intestinal anastomosis as compared to female patients (45.9%).the ratio between male to female is 1.18:1 (Table 2). The mean time taken for silk repair was more (i.e. 25.67 min) than prolene repair (i.e

15.5 min). The patients operated by extra mucosal continous prolene repair had shorter duration (9 days) of hospital stay than interrupted through and through silk repair (12.4 days). The incidence of postoperative ileus was more in silk (16.36%) than prolene anastomosis (5.56%). The mean duration of hospital stay is shorter than the interrupted through and through repair. The percentage of leak in continuous prolene repair is less (2.78%) than the interrupted through and through silk repair (8.18%) (Table 2). Mean post operative day leakage in silk (6.5 days) was less than the prolene (7 days). The bowel movement is earlier with extramucosal continuos prolene repair (4.2 days) as compared to interrupted through and through silk repair (5.3 days). The percentage of leakage in patients associated with faecal soiling was more (30.43%) than without faecal soiling (2.43%). Presence of gangrenous bowel segment had more leakage rate (9.09%) than non gangrenous bowel segment (6.19%). The incidence of anastomotic leak in presence of shock, peritonitis, sepsis was 11.11%, 31.25%, 27.27% respectively in both types of anastomosis. The incidence of acute and subacute intestinal obstruction by interrupted silk repair (4.8%) was more than extramucosal prolene repair (2.7%). In our study 1 patient died where prolene anastomosis was done and 4 patients died where silk anastomosis was done.

DISCUSSION

The first resection anastomosis was done by Ray bard (1833) which is a hall mark in surgery for intestinal obstruction.[1-3] In 1826 Lambert described a suturing technique in which serosa to serosa apposition was obtained.[10] In 1836, Dieffenbach performed the first successful anastomosis of the small intestine using Lembert's method.[3,4] In 1880, Czerny advocated the addition of an inner layer to reduce the risk of leakage and to achieve a precise mucosal approximation.[1,4,5] Since then, the technique has remained essentially unchanged except for the evolution of suture material for the inner layer. The single-layer interrupted anastomosis was never entirely abandoned and has periodically attracted renewed interest. The single-layer continuous anastomosis is a contemporary innovation first described by Hautefeuille in 1976.

In the United States, this technique was first described by Allen et al, who presented their results with its use before the Texas Surgical Society in 1979.[3,4,8] It was then popularized by a colon and rectal surgical group based in Houston, Texas.[5,6] In our study total 146 cases of colonic anastomosis were performed for different colonic pathology . 110 cases were done with interrupted through and through silk repair (75.34%) and 36 were done with continuous extramucosal prolene repair (24.66%). Most of the anastomosis was performed as emergency operations i.e. 89.73% where as 10.27% anastomosis was done as routine operations. This can be explained from the fact that majority of patients present as acute intestinal obstruction. Minimum age of the patient was 16yrs and maximum age of the patient was 80yrs. Majority of intestinal anastomosis was performed in 50-59 years age group patients, 73%. Males had a slightly higher rate (54.1%) of intestinal anastomosis as compared to female patients (45.9%).The ratio between male to female is 1.18:1. In our study male predominated over female with no significant variables. The mean time taken for silk repair was more (i.e. 25.67 min) than prolene repair (i.e. 15.5 min). The time taken in continuous suture is less than interrupted suture because much time has to be spent to tie multiple knots in interrupted suture. Our study fairly agreed with the finding of authors like Bailey HR et al. they recorded the time required performing continuous single layer anastomosis itself is 8 to 22 min with an average of 12 min. The patients operated by extra mucosal continous prolene repair had shorter duration (9 days) of hospital stay than interrupted through and through silk repair (12.4 days). In both procedures the mean duration of hospital stay was more in emergency cases than the routine cases because the unprepared gut took longer time to resume normal peristalsis and the coexisting infection contributed to longer convalescence. Hence bowel movement appeared earlier in extramucosal prolene repair than through and through silk repair. The same factors contributed to more postoperative ileus in silk anastomosis than prolene anastomosis. In our study the incidence of postoperative ileus was more in silk (16.36%) than prolene anastomosis (5.56%). The mean duration of hospital stay is shorter than the interrupted through and through repair attributed to the facts that the bowel movement comes earlier in extramucosal repair and the morbidity due to leakage of wound infection is less in extramucosal prolene. As it is a monofilament suture, it didn't provide any nidus for infection like polyfilament silk suture. Extramucosal suture is not exposed to intraluminal contents so the chance of infection decreases. Our study is supported by Harder F et al. who found the post operative hospital stay is less in single layer extramucosal prolene repair and hence it is more cost effective.[9,10] In our study the percentage of leak in continuous prolene repair is less (2.78%) than the interrupted through and through silk repair (8.18%). Continuous prolene repair is more water tight than the interrupted silk repair. More over the chances of suture line dehiscence is less common in prolene repair than silk repair due to infection. Focal strangulation and tissue damage at suture line is less in continuous suture than interrupted suture. In continuous suture the tension is more uniformly distributed. Mean post operative day leakage in silk (6.5 days) was less than the prolene (7 days) is attributable to the fact that the tensile strength at the site of anastomosis and the mean explosion pressure at site of anastomosis are more in prolene than silk. Our study is supported by findings of Harder et al, Bailey et al, Aysan et al. The bowel movement is earlier with extramucosal continuos prolene repair (4.2 days) as compared to interrupted through and through silk repair (5.3 days) because prolene causes less inflammatory reaction than silk and the mucosal damage is absent in the

extramucosal repair, so the mucosal continuity is established earlier in extramucosal repair than through and through repair.[1,4-6] The percentage of leakage in patients associated with faecal soiling was more (30.43%) than without faecal soiling (2.43%) due to increase chance of infection in presence of faecal soiling. Presence of gangrenous bowel segment had more leakage rate (9.09%) than non gangrenous bowel segment (6.19%) due to decrease vascular supply in presence of gangrenous bowel segments. The incidence of anastomotic leak in presence of shock, peritonitis, sepsis were 11.11%, 31.25%, 27.27% respectively in both types of anastomosis because of high incidence of infection and poor vascular supply. The incidence of acute and subacute intestinal obstruction by interrupted silk repair (4.8%) was more than extramucosal prolene repair (2.7%) due to the fact that prolene causes less tissue reaction than silk.[3,6,7] In our study 1 patient died where prolene anastomosis was done and 4 patients died where silk anastomosis was done. Patient with prolene anastomosis had pre-existing chronic renal failure and out of 4 patients who died after silk anastomosis 3 died due to peritonitis and sepsis and one died out of pulmonary complication.

CONCLUSION

Anastomosis is a surgical procedure where two hollow viscera are approximated together to establish the continuity. The traditional double layered anastomosis incorporates large amount of ischemic tissue in the suture line leading to increased tension at suture line and increased chance of luminal narrowing and fistula formation. The anastomosis of bowel with one layer of sutures has been shown to be as safe and to cause less narrowing of the lumen than the use of two layers of sutures. Everting techniques of intestinal anastomosis, with mucosa to mucosa contact, have been advocated as a way of preserving the anastomotic lumen. Extramucosal continuos prolene repair takes less operative time and decreases postoperative morbidity and mortality.

The present study which focused the use of single layer monofilament thin diameter prolene for different end to end anastomosis at different sites of the colon showed a better prognostic panorama in relation to morbidity and mortality and had an edge over other conventional interrupted single layer colonic anastomosis with silk.

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