Research Article

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A comparative study between figure of eight suturing technique and omentopexy in closure of peptic ulcer perforation: a prospective study on 60 patients with APACHE II score ≤10

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ABSTRACT

Background: Figure of 8 techniques has been described in the literature for peptic ulcer perforation repair especially when the patient comes late, when the edges of the ulcer and the wall of duodenum are very friable.

Methods: Sixty patients included in the study were divided into two groups after randomization. Study group, patients underwent figure of eight suturing technique and Control group, patients underwent Grahm's technique of omentopexy for peptic ulcer perforation.

Results: Only 1 patient from control group developed post-operative bile leak in this study, 3 (10%) patients from study group and 4 (13.33%) patients from control group developed septicaemia, 1 from study group and 2 from control group developed intra-abdominal abscess, 8 (26.66%) in study group and 9 (30%) in the control group developed wound infections, 4 (13.33%) in study group and 7 (23.33%) in the control group developed burst abdomen, 5 (16.66%) from study group and 6 (20%) from control group developed lung complications.

Conclusions: The present study is non-inferior than omentopexy in terms of post-operative complications. It can be used as a safe alternative to omentopexy especially when the patient comes late.

Keywords: Peptic ulcer perforation, Figure of eight suturing technique, Omentopexy, APACHE score

INTRODUCTION

Perforation peritonitis is the most catastrophic complication of peptic ulcer disease. Peptic ulcer perforation occurs in 2-10% of patients with peptic ulcer disease.

Perforated peptic ulcer is mostly treated by omentopexy³. The figure of 8 technique has been described in the literature especially when the patient comes late, that is after two, three or more days, when the edges of the ulcer and the wall of duodenum are very friable.⁴

However, there has been no study comparing on this technique. The aim of this study was to study the safety of figure of eight suturing technique in comparison to omentopexy.

METHODS

The present study was conducted in department of surgery, Vardhman Mahavir medical college & Safdarjung hospital, New Delhi during the period of October 2012 to March 2014. Sixty patients included in the study were divided into two groups after

randomization. Study group (SG), patients underwent figure of eight suturing technique for peptic ulcer perforation and control group (CG), patients underwent Grahm's technique of omentopexy for peptic ulcer perforation.

Inclusion criteria

- 1. All patients of Peptic perforation between 12-60 years of age.
- 2. Size of perforation ≤2 cm.
- 3. APACHE II score 1-10.

Exclusion criteria

- 1. Patients with other Intra-abdominal organ pathology.
- 2. Patient not fit enough to withstand surgery (advance cardiac disease).

Data on patients' profile was collected which included age, sex, socio-economic status, risk factors (smoking, alcohol, tobacco chewing, use of ulcerogenic drugs and history of acid peptic disease), symptoms, signs, chest X-ray findings, USG abdomen findings, day of presentation, presence of shock at presentation, chest condition, laboratory investigations (Haemoglobin concentration) and pre-operative APACHE II score.

Grahm's technique of omentopexy was performed by closing the perforation by placing interrupted fullthickness 2-0 vicry sutures along the margins of the ulcer, leaving the ends sufficiently long, so that viable omental patch can be securely placed over the perforation. The sutures were tied drawing the patch into the perforation. In the figure of '8' suturing technique, suture was applied a bit away from edges and a figure of 8 was made as follows. Needle was inserted proximal to the perforation (Point A) and brought out through the perforation (Figure 1), it was then reintroduced into the perforation and bought out at a point (Point B) distal to the perforation (Figure 2). The needle was then inserted below the first point of entry proximal to the perforation site (Point C) and brought out at Point D in the same manner (Figure 3 and 4). The suture was then tied making figure of '8'. Care was taken to keep the knot in the middle (Figure 5). The closed ulcer was covered by omentum and sutures were applied to the stomach and the duodenum wall to fix the omentum to cover the ulcer area. A tube drain was put inside the peritoneal cavity at the hepatorenal pouch through a separate stab incision in the right flank after a through abdominal lavage with warm saline in all cases.

Outcome was compared based on mean operative time, intra-operative & post-operative mortality within 30 days, development of bile leak, septicemia, intra-abdominal abscess, wound infection, burst abdomen and lung complications, commencement of oral feeding from day

of surgery, and duration of hospital stay. All patients were discharged with anti H. pylori treatment for 14 days followed by PPIs for a period of 1 month. Patients were followed up for a period of 1 month.

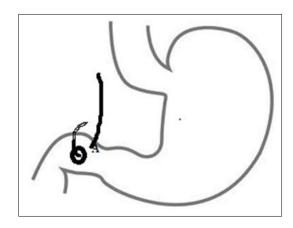


Figure 1: Needle was inserted proximal to the perforation (Point A) and brought out through the perforation.

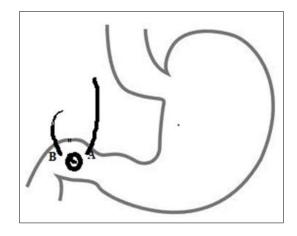


Figure 2: Needle was reintroduced into the perforation and bought out at a point (Point B) distal to the perforation.

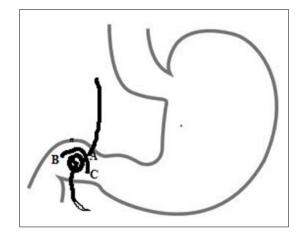


Figure 3: The needle was inserted below the first point of entry proximal to the perforation site (Point C).

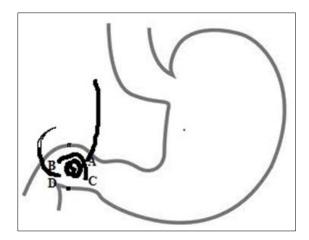


Figure 4: The needle was brought out at Point D.

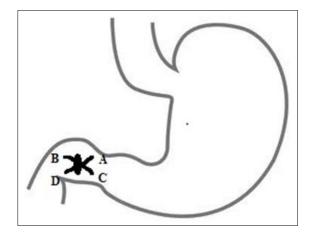


Figure 5: The suture was then tied making figure of '8'. Care was taken to keep the knot in the middle.

Statistical analysis

Unpaired t-test was used to compare means between two groups. Difference between two proportions was calculated by Chi-square test. Continuous variable were compared using the Mann-Whitney test while categorical variables were compared using Chi-square test and Fisher's exact test. P < 0.05 was taken as level of statistical significance. Statistical analysis was performed by using SPSS computer software v. 16.0.

RESULTS

Both study and control groups were comparable in terms of age, sex, socio-economic status, risk factors, comorbidities, day of presentation and preoperative APACHE II score distribution.

Age distribution

Mean age in study group was 40.60 years (range 18-60 years) SD, 11.39 and 44.46 years in control group (range 21-60 years) SD 10.71. (P = 0.181).

Sex distribution

Out of the 30 patients in study group 28 (93.3%) were male and 2 (6.66%) were female and in control group, 29 (96.6%) were male and 1 (3.33%) was female. Over all 57 (95%) male and 3 (5%) female. Male:female ratio was 19:1. (P = 1.000) (Figure 6).

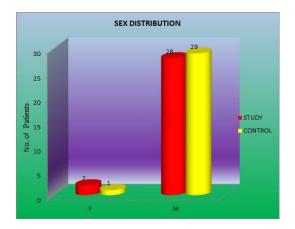


Figure 6: Sex distribution.

Socio-economic status distribution

Of the 60 patients, 55 (91.66%) patients belonged to lower socio-economic group and 5 (8.33%) patients belonged to upper group. Out of the 30 patients in study group 28 (93.3%) patients belonged to lower socioeconomic group and 2 (6.66%) patients belonged to upper group. In control group, 27 (90%) patients were from lower socio-economic group and 3 (10%) from upper group. Lower and upper socio-economic group ratio was 11:1. (P = 1.000).

Risk factors

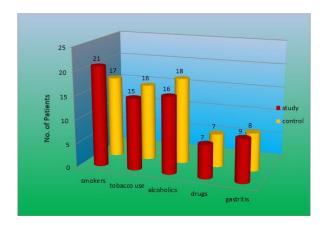


Figure 7: Risk factors.

Of the 60 patients, 38 (63.33%) patients were smokers. Out of these 21 (70%) patients were in study group and 17 (56.66%) were in control group. 31 (51.66%) patients were tobacco chewers out of these 15 (50%) were belonged to study group and 16 (53.33%) were belonged to control group. Of 34 (56.66%) alcoholics, 16 (53.33%) belonged to study group and 18 (60%) belonged to control group. Out of these 60 patient, 14 (23.33%) were taking ulcerogenic drugs like NSAIDs, 7 in the Study group and 7 in the Control group. 17 (28.33%) patients gave history of chronic gastritis, of these 9 (30%) belonged to study group and 8 (26.66%) belonged to control group (Figure 7).

Day of presentation

In total of 60 patients, 21 (35%) patients presented to hospital on first day of their onset of symptoms and another 21 (35%) patients presented to hospital on second day. 6 patients presented on third day of onset of symptoms. Three patients presented late, 2 patients presented on sixth day and 1 presented on the seventh day, all the 3 belonged to study group (P = 0.341). Mean day of presentation to hospital in study group was 2.533 days, (SD 1.67); and control mean was 2 days (SD 1.0171).

Symptoms

Total of 60 patients, all presented with localized abdominal pain in right hypochondrium and 54 (90%) patients presented with generalized pain, of these 28 (93.33%) belonged to study group and 26 (86.66%) to control group. Distention was present in 28 patients, of this 12 (40%) belonged to study group and 16 (53.33%) to control group. Obstipation was present in 14 (23.33%) patients. Fever was present in 9 (15%) patients.

Signs

All these 60 patients had rebound tenderness. Guarding was present in 49 (81.66%) patients, of these 26 belonged to study group and 23 to control group. Rigidity was present in 45 (73.33%) patients, of these 22 were from study group and 23 from control group.

Co-morbidities

Co-morbidity like diabetes mellitus and hypertension were present in 8 patients, 4 patients from each group. Both study and control groups were comparable in term of co-morbidities, (P = 1.000).

Blood pressure

Of 60 patients, 6 (10%) patients presented to our emergency department with low blood pressure, 3 patients in each group (P = 1.000).

Chest examination

Preoperative chest examination revealed bilateral coarse crepitations in 11 (18.33%) patients, of which 6 were from study group and 5 from control group. (P = 1.000).

Haemoglobin

Mean preoperative, haemoglobin concentration in study group population was 11.6 g% (SD, 2.33). The mean preoperative haemoglobin concentration in control group was 11.32 g% (SD, 1.82) (P = 0.769). 17 (28.33%) patients presented with preoperative haemoglobin <10 g%. Most of patients (53.33%) had haemoglobin concentration between 10-13 g%.

APACHE II

Mean pre-operative APACHE II score in the study group was 3.50 (SD, 1.94) and mean score in the control group was 3.03 (SD, 1.80) (P = 0.340).

Outcomes (Table 1)

Operative time

Mean operative time in the study group was 74.267 min, (SD, 7.55) and mean operative time in control group was 72.3 min, (SD, 8.26) (P = 0.340).

Bile leak

Of 60 patients, only one patient from control group developed post-operative bile leak (P = 1.000).

Septiceamia

7 (11.66%) patients had post-operative septicaemia, of these 3 (10%) patients were from study group and 4 (13.33%) patients from control group (P = 1.000).

Intra-abdominal abscess

Intra-abdominal abscess like pelvic abscess and sub diaphragmatic abscess was seen in 3 (5%) patients, of these 1 was from study group and 2 from control group (P = 1.000).

Wound infections

Of 60 patients, 17 (28.33%) patients developed postoperative wound infection, of this 8 (26.66%) were in study group, 9 (30%) were in control group (P = 1.000).

Burst abdomen

11 (18.33%) patients developed burst abdomen in total, of this 4 (13.33%) belonged to study group and 7 (23.33%) to control group (P = 0.506).

Lung complications

(18.33%)developed post-operative lung complications, out of which 5 (16.66%) belonged to study group and 6 (20%) to control group (P = 1.000).

Commencement of oral feeding from day of surgery

Mean post-operative day of commencement of oral feed in study group was 3.5 days, (SD, 0.7311) and 4.133 days in control group, (SD, 1.6132). Most of patients (58.33%) were started on oral feeds on 3^{rd} post-operative day (P = 0.225).

Duration of hospital stay

Mean duration of hospital stay in study group was 6.667 days (SD, 2.3684) and 6.6 days in control group (SD, 2.221) (P = 0.882).

Post-operative mortality within 30 days

There was no post-operative mortality in either of the groups.

Outcomes	Study group n=30 (%)	Control group n=30 (%)
Mean operative time	74.267 min	72.3 min
Bile leak	0	1 (3.33%)
Septiceamia	3 (10%)	4 (13.33%)
Intra-abdominal abscess	1 (3.33%)	2 (6.66%)
Wound infections	8 (26.66%)	9 (30%)
Burst abdomen	4 (13.33%)	7 (23.33%)
Lung complications	5 (16.66%)	6 (20%)
Post-operative mortality	0	0
Commencement of oral feed (mean day)	3.5 days	4.133 days
Mean hospital stay	6.6 days	6.6 days

Table 1: Outcomes.

DISCUSSION

In our study, the mean age of patients (n=60) was 42.53 years (range 18 to 60 years) with maximum number (n=21) of patients in age group of 41-50 (35%) and 51-60 years (n=15) (25%). The present study showed highest incidence (60%) in 5^{th} and 6^{th} decade of life which is similar to other studies in the literature. There has been a shift in the age of patients with peptic perforation towards elderly in other part of world. This might be due to difference in lifestyle, such as smoking, alcohol, psychological stress etc. 6

Male: female ratio in this present study was 19:1 which is in contrast to other studies where the male to female ratio is between 9:1 to 7.5:1. 1,6-8 This might be due to the difference in the lifestyle of females in India compared to the females of western world.

In present study, maximum number of (n=55, 91.66%) patients were in lower socioeconomic groups. Langman in 1974 noted that since 1959, both gastric and duodenal ulcers have become more frequent in lower socioeconomic groups in the UK and USA.⁹

In this study, 38 patients (63.33%) were smokers, study by Svanes C^{10} showed most of ulcer perforation in subject <75 years of age can be attributed to smoking.

Most of the patients (70%) included in this study presented within 48 hours of onset of symptoms (n=42), of this 21 (35%) patients presented within 24 hours and the rest 21 (35%) patients presented between 24 to 48 hours of onset of symptoms. Only 3 patients presented very late like 6th and 7th day of onset of symptoms, and all the three were in the study group. All the 3 patients who presented late belonged to the low socio-economic group and their delayed presentation was due to their ignorance. The delay before surgical treatment is a strong determinant for increased complication rates and hospital costs. Though three patients presented very late, and all being present in the study group there was no significant difference in postoperative outcome.

Of 60 patients, all presented with localized abdominal pain in right hypochondrium and 54 (90%) patients presented with generalized pain. Distention was present in 28 (46.66%) patients, Obstipation was present in 14 (23.33%) patients, Fever was present in 9 (15%) patients and signs of dehydration were present in 14 (23.33%) patients. A study by Gujar N et al. 12 showed localised pain was seen in 100% patients, generalized abdominal pain was present in 89.78% patients, distension of abdomen in 72.04%, dehydration in 58.60% and fever in 43.01%. All these 60 patients had rebound tenderness, guarding was present in 49 (81.66%) patients, rigidity was present in 45 (73.33%) patients.

In this study, 52 (86.66%) patient's X-ray abdomen showed free sub-diaphragmatic gas. Pre-operative ultrasonography of abdomen showed the dilated bowel loops in 14 (23.33%) patients, 23 (38.33%) patients had free fluid in peritoneal cavity and 13(21.66%) patients had free air in peritoneal cavity. Whilst a definitive ulcer history and positive pre-operative radiological findings are strong corroborative factors, their absence in any individual patients should not deter the surgeon from making the diagnosis of perforated peptic ulcer and initiating treatment if the clinical picture is appropriate. ¹³

Testini and coworkers in their study showed 9 (6%) patients were in shock at the time of admission and mortality among them was 55.6%. In our study on 60 patients, 6 (10%) patients presented to our emergency department with low blood pressure, 3 patients from each group and there was no mortality among them. This might be due to our aggressive management of shock and their low APACHE II score.

Mean pre-operative haemoglobin concentration was 11.6 g% in this study which is low as compared with that of western population. ^{15,16} Mean pre-operative haemoglobin concentration in study group was 11.6gm% (SD, 2.33) and in control group was 11.32gm% (SD, 1.82).

This study included the patients who had APACHE II score between 1 to 10 at the time of admission. The overall mean APACHE II score was 3.265. Mean pre-operative APACHE II score in study group was 3.50 (SD, 1.94) and mean score in control group was 3.03 (SD, 1.80). As this study included the patients with well-preserved over all pre-operative conditions, this was the major limitation of the study.

Mean operative time in study group was 74.267 (SD, 7.55) and mean operative time in control group was 72.3 (SD, 8.26). There was no significant difference in the operative time in the study and control group.

In this present study, the post-operative complications noted were bile leak. septicaemia, intra-abdominal abscess, wound infection, burst abdomen and lung complications. Of these, wound infection (28.33%) was most common followed by burst abdomen (18.33%) and lung complications (18.33%). Only 1 patient from control group developed post-operative bile leak in this study. 7 (11.66%) patients had post-operative septicaemia, 3 (10%) patients from study group and 4 (13.33%) patients from control group. Intra-abdominal abscess like pelvic abscess and sub diaphragmatic abscess was seen in 3 (5%) patients, 1 from study group and 2 from control group. Of 60 patients, 17 (28.33%) patients developed post-operative wound infection, 8(26.66%) in study group and 9 (30%) in the control group. 11 (18.33%) developed burst abdomen in total, 4 (13.33%) in study group and 7 (23.33%) in the control group. 11 (18.33%) were developed post-operative lung complications, out of this 5 (16.66%) belonged to study group and 6 (20%) belonged to control group.

In Kocer B et al.¹⁷ study, post-operative complications were seen in 65 (24.2%) patients. Pneumonia and wound infection were the commonest complications seen in 40 (37.04%) and 20 (18.52%) cases respectively; followed by sepsis in 9 (8.34%) patients, leakage in 6 (5.55%) patients, intra-abdominal abscess in 2 (1.86%) cases and bleeding in 1 (0.92%) patient.

Mean post-operative day of commencement of oral feed in study group was 3.5 days (SD, 0.7311) and 4.133 days in the control group (SD, 1.6132). The study by Mukhopadhy M et al.³ showed that mean day of commencement oral feed in patients treated by omental plugging was 4.8 days and mean day of commencement of oral feed in patients treated by omentopexy was 3.46 days.

Mean duration of hospital stay in study group was 6.667 days (SD, 2.3684) and 6.6 days in control group (SD, 2.221). The hospital stay varied upon the duration of perforation, initial condition of the patients, associated illness and development of post-operative complications. In this study, duration of hospital stay was less than most of the studies.⁶

Both intra-operative mortality and post-operative mortality within 30 days in both group was zero. This might be due to inclusion of patients with APACHE II score, 1 to 10.

CONCLUSION

In conclusion, the present study is non-inferior than standard omentopexy in terms of post-operative morbidity and mortality. It can be used as a safe alternative to omentopexy.

As with figure of eight suturing technique, lesser tendency to cut through because the pressure at one point is divided into two directions, and the pressure is exerted on four points instead of two points. So, the procedure can be recommended as a safer alternative to omentopexy for perforated peptic ulcer especially when the patient presents late to the hospital, where the edges of the ulcer and walls of the duodenum are very friable.

It is to remember that the present study was conducted in small sample size with pre-operative APACHE II score less than 10 and had a short term follow up, and so the conclusion of this study must be considered with caution. This conclusion needs to be further evaluated by prospective randomized control studies including large sample size, patients with extended pre-operative APACHE II score and with long term follow up of patients.

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institutional ethics committee

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