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Original Article

Comparative Study between Omentopexy and Omental Plugging in Management of Giant Peptic Perforation

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Abstract

Introduction: Peptic perforation is a life threatening surgical emergency often associated with high mortality.

Aim: This study aims to compare the success rate between omental plugging (OP) and omentopexy (OX) in the emergency management of large peptic perforations.

Materials and Methods: A prospective non-randomized study of 25 patients with large peptic perforation (≥2 cm in diameter) was done over a period of 18 months.

Results: The highest incidence was seen in the age group of 41–50 years. Intestinal fistula occurred in 23.08% of the OX group compared to none in the OP group. The mean hospital stay was slightly higher in the OX group. Three patients died in the OX group postoperatively after 24 h compared to none in the OP group which was statistically significant ($P < 0.05$).

Conclusion: OP is associated with lesser morbidity and lesser mortality compared to OX in the management of large peptic perforations.

Key words: Giant peptic perforation, Omental plugging, Omentopexy

INTRODUCTION

Perforation is one of the most catastrophic and dreaded complications of peptic ulcer.[1] Although it is a common, surgical emergency literature is silent on the exact definition, incidence, management, and complications of large perforations of peptic ulcers.[2] Giant/large peptic perforations are defined as perforations of size equal to or greater than 2 cm in diameter.[1] These perforations are considered particularly dangerous because of the extensive duodenal tissue loss, friability of the ulcer margins, surrounding tissue inflammation, poor general condition of the patient, and overwhelming sepsis due to bacterial peritonitis.

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These factors are said to preclude simple closure using omental patch, often resulting in post-operative leak or gastric outlet obstruction.[2-4] Various methods apart from standard omentopexy (OX) have been described for the management of giant perforations which include partial gastrectomy, jejunal serosal patch, jejunal pedicled graft, omental plugging (OP), and proximal gastrojejunostomy.[2] Apart from OP, all other methods are more elaborate, time consuming, and technically difficult to perform.[1] The present study was done to compare the success rate between OP and standard OX in the emergency management of giant and large peptic perforations.

MATERIALS AND METHODS

The present study is a prospective and non-randomized case series report comparing the efficacy of OP (described by Karanjia *et al.* in 1993) and OX (first described by Cellen Jones in 1929 and later modified by Graham in 1937) in the repair of giant peptic perforations (≥2 cm in diameter).

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This study was undertaken in the Department of General Surgery of Dhiraj General Hospital, Sumandeep Vidyapeeth, Piparia between March 2019 and September 2021. Two hundred and eighteen patients undergoing emergency surgery for peptic perforation were included in the study. Subsequently, only those patients who were found to have giant peptic perforations during laparotomy were selected for the study.

Patients repaired by OP were taken as cases and patients repaired by OX were taken as controls.

Apart from routine investigations, pre-operative straight X-ray of the abdomen in the erect posture was done in every case. Patients from both groups received the same standard pre- and post-operative procedures and medications including antibiotics and post-operative H2 blockers. Diagnosis was confirmed at laparotomy. The abdomen was opened by an upper midline incision in each case. After confirmation of the diagnosis, the amount of fluid in the peritoneal cavity, peritoneal soiling, the size, site, shape, and margins of the perforation was noted. The perforations with size >2 cm were allocated into two groups, cases and controls. In the first group, OP was done while in the control group, standard OX was done.

OP

The anesthetist/assistant was asked to insert the nasogastric tube further and the surgeon guided the tip of the tube so that it came out into the peritoneal cavity through the perforation. The free end of the greater omentum was sutured to the tip of the nasogastric tube using 1–0 rapidly absorbable (chromic catgut) suture. Then, the anesthetist/assistant was asked to withdraw the tube. As the tip went inside the stomach, so did the omentum. The tube was withdrawn until the omentum occluded the perforation. About 5–6 cm length of omental plug generally sufficed. The omentum was then fixed to the perforation site with 5–6 interrupted sutures of 2–0 chromic catgut taken between omentum and serosa of healthy duodenum and/or stomach.

OX

The perforation was sutured in one layer by three interrupted Lambert sutures with 2–0 polyglactin using a patch of pedicled omentum to reinforce the suture line.

A thorough peritoneal toileting was then done in all the cases. A tube drain was put inside the peritoneal cavity at the hepato renal pouch through a separate stab incision in the right flank. The patients were examined at about 4–6 weeks, at 10–12 weeks, and again between 24 and 26 weeks after operation. All patients underwent barium meal study 12 weeks after discharge to see if any patient developed features of delayed gastric outlet obstruction. Parameters compared between the two groups were mean operative time, intra-operative and post-operative mortality within 30 days of operation, development of biliary fistula, development of septicemia, development of intra-abdominal abscess, development of wound infection, development of lung complication, commencement of oral feeding from day of operation, duration of hospital stay, and development of post-operative gastric outlet obstruction.

RESULTS

Of the 218 patients, 23 (10.5%) had a giant perforation. All were males. OP was done in ten patients (cases) and OX in 13 (controls). The age ranged from 33 to 73 years, the mean age being 52.5 years. The highest incidence was seen in the age group of 41–50 years. The age incidence of the two groups is given in Table 1. Seven patients had hypertension, five in the (OX) group and three in the (OP) group. One patient in the OP group had diabetes mellitus. The time since perforation is given in Table 2. The mean operative time was 108 min in the OP group compared to 83 min in the OX group. The mean operative time, though slightly higher in OP group, is probably due to inexperience of the surgeons in this particular procedure. It was seen that with experience, the operative time became shorter. The slightly higher time taken did in no way affect the outcome and was not statistically significant.

Intestinal fistula formation was 0% in OP group while 3 (23.08%) patients developed intestinal (duodenal) fistula in the OX group. Of these three patients, two were reoperated and partial gasterectomy was done in both cases. Unfortunately, all three patients died. The above data, when calculated on standard error of proportion, were significant at 5% level. Thus, it can be concluded that OP is a better operation in preventing intestinal fistula formation in giant peptic perforations.

Table 1: Age distribution

Age group	OP	OX	Total (%)
≤30	-	-	-
31–40	3	3	6 (26)
41–50	4	5	9 (39)
≥50	3	5	8 (35)

Table 2: Duration of symptoms

Time (h) (since pain started)	OP	OX	Total
<6	-	-	-
6–24	-	1	1
24–48	7	9	16
>48	3	3	6

Wound infection occurred in 20% of patients of the OP group compared to 30.76% in the OX group. Intra-abdominal abscess occurred in 20% of the OP group compared to 15.4% of the OX group. Lung complications and septicemia occurred in 20% of the OP group compared to 30.76% of the OX group. All the above data were statistically insignificant at 5% limit ($P < 0.05$) and no conclusive evidence can be drawn from this study that any of the two procedures is better in preventing wound complication, intra-abdominal abscess or lung complications, and septicemia Table 3.

Oral feeding in OX was started as soon as peristalsis occurred, which usually varied between 3 and 4 days. In OP, as it was a new procedure and as omentum was sutured with the nasogastric tube, initially people were skeptical to start oral feeding early. In the remaining eight cases, oral feeding was started in about 4–5 days.

The mean hospital stay was 12.6 days for the OP group compared to 14.2 days for the OX group. It is slightly higher in OX group because three patients in that group developed bile leak and intestinal fistula, resulting in increased hospital stay. The above data are statistically insignificant.

Among the 23 patients, six patients died. The mortality of the two groups is shown in Table 4. Among the six patients, three died in the immediate post-operative period, that is, within 24 h of surgery. This included two patients in the OX group and one in the OP group. The patients were aged >50 years, had features of septicemia and two patients were in shock when they attended the hospital. All three patients had duration of symptoms for more than 48 h.

Table 3: Morbidity

Parameter	OP	OX	Significance
Mean operative time	108 min	83 min	Not significant
Intestinal fistula	-	3	Significant
Wound infection	2	4	Not significant
Intra-abdominal abscess	2	2	Not significant
Lung complication/septicemia	2	4	Not significant
Mortality	1	5	Not significant
Mean hospital stay	12.6 days	14.2 days	Not significant
Oral feeding	4.8 days	3.46 days	Not significant
Gastric outlet obstruction	-	-	Not significant

Table 4: Mortality

Total no of cases		Death		Total
		Within 24 h of surgery	>24 h	
OP	10	1	-	1
OX	13	2	3	5

Statistically when we consider total deaths, the data are not significant, that is, from the number of total mortality, we cannot conclude that either OP or OX is a better procedure, though apparently it appears that death is much lower in OP group. However, if we consider deaths that occurred >24 h after surgery, the data become statistically significant and show that OP causes lesser mortality than OX at 5% level ($P < 0.05$). In fact, this data are more important than total number of deaths, because death within 24 h of surgery is mostly due to pre-existing physiologic disturbances rather than due to the operative procedure.

Five patients were lost in post-operative follow-up at 3 months and six patients died; in the remaining 12 barium meal X-ray was done.

No case of gastric outlet obstruction was detected. These 12 patients were followed up for 6 months. None of them developed any clinical signs of gastric outlet obstruction.

DISCUSSION

Peptic perforation is a common disease in the general population. There is a sharp decrease in elective peptic ulcer surgery but the emergencies such as perforation are on rise in some studies.[5] The size of perforation in a peptic ulcer varies from 3 mm to over 3 cm in diameter, which adversely affects the prognosis. If the perforation is <5 mm in diameter, there is a 6% mortality rate, when it is between 5 and 10 mm, the mortality goes up to 19% and when it is more than 10 mm, the mortality rate is around 24%.[6] There is a paucity of data in the literature regarding giant peptic ulcer perforation management. The overall incidence of 2 cm or more diameter perforation is about 3%.[1] In our study, the incidence was 3.2%. In our study, the highest incidence was seen in the 5th decade which is similar to other studies in the literature.[1,7,8] All our patients were males which is in sharp contrast to other studies where the male to female ratio is between 9:1 and 7.5:7.[1,7,9,10] It may be said that since the number of patients in our study is small, the ratio is not relevant. However, even in the 218 patients of peptic perforation initially included in our series, all were males.

Duration of perforation along with the size of the opening in most cases determines the extent of peritoneal

contamination. In the present study, the most of the patients had severe amount of contamination (60.87%), in two patients it was minor whereas in seven only the supra colic compartment of abdomen was involved. Three patients among the severely contaminated group died in the immediate post-operative period.

In the present series, post-operative complications were encountered in 11 patients (47.8%). The complications were wound infection, respiratory tract infection and pulmonary infection, burst abdomen, intra-abdominal abscess, and most importantly intestinal fistula formation. Wound infection (26%) and respiratory tract infection (26%) were the most common complications. These figures correspond to the available literature. Hastings and Machida[11] reported post-operative complications in 86 patients, comprising 24%, the most common of which was wound complications followed by those of respiratory tract. Giant perforations are technically difficult to repair due to the duodenum's complex anatomy and marginal blood supply shared with the pancreas. High intra-luminal pressure, tendency of the mucosa to extrude through the suture line and autodigestive enzymes of the pancreas, and bile acid add to the risk of breakdown of the suture line.[12]

Conventional wisdom dictates that healthy vascularized tissue should be incorporated in the repair of any defect with tissue loss or with friable edges.[12] Several elaborate surgeries have been devised to manage complicated giant peptic ulcers.[1] These include resection of the perforation bearing duodenum and gastric antrum in the form of a partial gasterectomy, conversion of the perforation into a pyloroplasty, or the closure of the perforation using a serosal patch or pedicled graft of the jejunum.[2] However, as can be appreciated, each of these procedures not only prolong the operating time, but also require a level of surgical expertise that may not be available in the emergency.[2,13]

In contrast to these elaborate measures, the omental plug is a simple procedure which does not require significant expertise and can even be performed in a very short time by a trainee general surgeon in a seriously ill patient in an emergency situation.[1,13] In this study, intestinal fistula formation in control group was 23.08% and 0% in study group. The above data correspond well to that obtained by Jani and Saxena[14] in a randomized control trial. The possible explanation for this phenomenon may be sought from the basic principle of physics. In the OP group, as a part of the omentum is taken inside the stomach, even with rise of intra-gastric pressure, the omentum is always kept in contact with gastric mucosa. In contrast, in OX, the repair is done from outside and so with rising intra-gastric pressure; the patch could be easily disturbed. In our study, the overall mortality rate was 26%. The death in the OP group was 10% and that in the OX group was 38.5%. Three patients died within 24 h of operation due to pre-existing septicemia. Another three patients, all in the OX group, developed intestinal fistula and died at a later stage. Mortality rates were higher in the OX group and the data are statistically significant if we only consider deaths 24 h after surgery.

The average stay of patients in the OP group was 12.6 days and in those who underwent OX it was 14.2 days. The slightly higher hospital stay in the control group was due to the fact that three patients developed intestinal fistula of whom two were re-operated, increasing the mean hospital stay of that group.

CONCLUSION

Giant perforations are rare, about 3–4% of total perforations, but are associated with significantly higher mortality and morbidity when compared to smaller perforations. OP for giant perforations, a relatively newer and less utilized technique, is associated with lesser cases of intestinal fistula formation when compared to the standard method of OX. Our results show that the mortality rate excluding pre-existing septicemia is lower in the OP group, making it a better choice of technique for repair of giant perforations. One particular point that needs to be mentioned here is that as this is a non-randomized study and due to a small sample size and short period of follow-up, the conclusions must be considered with caution.

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