

ORIGINAL ARTICLE

Outcomes of Primary Peritoneal Drainage and Taylor's Conservative Method in High-Risk Cases of Perforated Peritonitis

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ABSTRACT

Aim: To evaluate the outcomes of primary peritoneal drainage and Taylor's conservative method in high-risk patients of perforated peritonitis.

Methods: The study was carried out within 6 months after the approval of synopsis i.e. from 21st August, 2020 till 20th February, 2021, in the East Surgical department, Mayo hospital Lahore. A total of 66 patients who fulfilled the inclusion criteria were enrolled. Percutaneous peritoneal drainage was performed under local anesthesia and two wide bored intra-abdominal tube drains were placed in both flanks through these incisions. Pus/fluid/bile was evacuated. Outcomes were monitored in terms of mortality, morbidity (SSI, wound dehiscence) and need for definitive surgery after PPD within 14 days (as per operational definition). Post stratification Chi square test was applied and a p-value of ≤ 0.05 was considered as significant.

Results: The mean age of the patients was 49 ± 9.9 . Mortality occurred in 65.2% patients, morbidity was seen in 25.8% patients, out of which 13.6% patients had superficial SSI. 62.1% patients had to undergo laparotomy. However, only 31.8% of the patients died postoperatively after definitive laparotomy, which is less than the high mortality rate in high-risk patients of perforation peritonitis.

Conclusion: We have concluded from our study that PPD with Taylor's conservative method served as an effective method of initial resuscitation and stabilization in high-risk patients of perforation peritonitis. Once the general condition of the patients improved, they were subjected to definitive laparotomy under general anesthesia. Post-laparotomy outcomes were improved in such patients.

Keywords: peritonitis, drainage, laparotomy

INTRODUCTION

Perforation peritonitis is one of the most common surgical emergencies encountered by surgeons all over the world including Pakistan¹. Perforations of proximal gastrointestinal tract are more common than distal gastrointestinal tract in developing countries.² It has been reported commonly in the younger age group in Asians, with the majority of patients being male^{2,3}. Early diagnosis and aggressive management strategy is crucial for the successful treatment of perforation peritonitis. Even so, perforation peritonitis has a high mortality^{4,5}. Various factors contributing to poor prognosis include old age, co-morbidities, delayed presentation and septic shock⁶.

At present, after adequate resuscitation, immediate laparotomy and closure of perforation is considered to be the gold standard for the ultimate management of perforation peritonitis⁶. However, in high-risk patients, if no improvement is seen in their general condition despite intensive resuscitative protocols, immediate laparotomy under general anesthesia is not advisable. Mortality remained quite high in this group of patients despite improvements brought about by the wide availability of antimicrobial agents, surgical advancements, anesthesia and critical care. Various innovative techniques have made their way to bring down mortality in these patients⁵. Primary peritoneal drainage (PPD), laparoscopic sanitation; Taylor's conservative method, laparotomies and planned re-laparotomies have been recommended as an alternative to immediate laparotomy for such circumstances^{7,8,9}.

Primary peritoneal drainage works on principle of self-healing and recovery is expected if peritoneal sepsis is drained away using percutaneous peritoneal drainage catheters under local anesthesia. PPD under local anesthesia (LA) has long been established as a definitive approach of management in infants with necrotizing enterocolitis associated peritonitis, but its use in adults is still under debate¹⁰. Taylor's conservative method, proposed by Taylor in 1946, includes keeping patient nil per oral, administering intravenous fluids, empirical antibiotics and assessing his status by

repeated physical examinations. It was supported by Donovan et al stating that this method caused self-healing in about 50% of the cases^{11,12}.

Very few local and international studies have been done on combination of PPD and Taylor's conservative management in high-risk perforation peritonitis. Moreover, the results of these studies show variable results. (French meta-analysis) Thirumanikandan et al demonstrated a mortality rate of 22%, whereas Bhasin et al showed a death rate of 66% after application of this management strategy^{13,14}. This controversy in literature and scarce data on this topic prompted us to carry out this study in our setup. We planned to evaluate the outcomes of PPD and Taylor's conservative method in such patients.

The objective of the study was to evaluate the outcomes of Primary peritoneal drainage and Taylor's conservative method in high risk patients of perforated peritonitis.

Operational definitions:

High Risk Patients of Perforated Peritonitis: Patients with obvious signs and symptoms of perforated peritonitis (presenting with tense and tender abdomen, TLC $>11000/\text{mm}^3$ and X-Ray showing air under the diaphragm), delayed presentation (>24 hours), hemodynamic instability and co-morbid conditions with ASA grade 3 or more were labelled as high risk patients.

Outcomes were measured in terms of:

Mortality: It was measured by the number of deaths occurring within 14 days of admission.

Morbidity:

Surgical site infection (SSI): It was defined as infection occurring within 14 days of procedure at operation site.

Superficial SSI: It was labelled as pain, tenderness, swelling, redness and purulent discharge from incision site confirmed by culture and sensitivity.

Deep SSI: Abdominal purulent collection (>50 ml) documented on ultrasonography was labeled as deep SSI.

Wound dehiscence: Separation of the margins of a closed surgical incision that had been made in skin with the exposure or protrusion of abdominal organs. Separation occurred at single or multiple areas or involved the full length of the incision and affected some (partial) or all tissue layers (complete).

Received on 24-08-2022

Accepted on 14-12-2022

Need for definitive surgical intervention: If the patient became hemodynamically stable but drainage volume remained high till 3 days (>100 ml) after primary peritoneal drainage, definitive surgical intervention was planned. These patients were labeled as having 'need for definitive surgical intervention.'

METHODOLOGY

It was an observational cohort study, carried out for a duration of 6 months i.e., from 21st August, 2020 till 20th February, 2021, in the Surgical Department, Mayo Hospital, Lahore. By non-probability, consecutive sampling, a sample size of 66 patients was calculated keeping 95% confidence interval, 10% margin of error and taking expected frequency of mortality as 22%⁷

Our inclusion criteria were as under:

- Patients of both genders i.e., male and female.
- Age 18-70 years
- Patients with perforated peritonitis diagnosed by the obvious symptoms and abdominal signs with erect chest X-ray showing gas under diaphragm (as per operational definition)
- High risk patients i.e., ASA grade \geq 3

Our exclusion criteria were as under:

- Primary peritonitis or spontaneous bacterial peritonitis
- Peritonitis developing after trauma.
- Postoperative peritonitis due to leakage of anastomosis.
- Past history of abdominal surgery.
- Patients who were hemodynamically unstable at presentation, but became stable within 4 hours of resuscitation. Sixty six patients who fulfilled the inclusion criteria were admitted through the Emergency Department of Mayo hospital, Lahore. History, clinical examination and full laboratory work up of these patients was requested and recorded.

A written informed consent was taken. According to Taylor's method, all the patients had a nasogastric tube to decompress the stomach and a Foley catheter to monitor urine output. All received intravenous broad-spectrum antibiotics and intravenous fluids. A monitoring chart showing vitals, NG and Foley output and physical examination was maintained.⁸

Percutaneous peritoneal drainage was performed under local anesthesia through a 2-2.5cm long skin incision in both flanks. The external oblique aponeurosis, internal oblique, and transversus abdominis were split under vision with the help of artery forceps. Upon entering the peritoneal cavity, the index finger was swiped in all directions to break adhesions and provide good drainage. Two wide bored intra-abdominal tube drains of 28/32F were placed in both flanks through these incisions. One drain was placed in the pelvic cavity and the other in an upward direction. Pus/fluid/bile was evacuated and collected for culture and sensitivity. Another drain was placed about 1cm above the umbilicus and was directed towards the pelvis. This drain was attached to normal saline for continuous irrigation and the flank drains provided drainage.

Table 2: Association of age with mortality:

Mortality	Age groups				Total	p-value
	Young age(18-30 y)	Early middle age (31-45y)	Late middle age (46-60y)	Old age (61-70y)		
Yes	0	19(28.8%)	18(27.3%)	6(9.1%)	43(65.2%)	0.047
No	2(3%)	8(12.1%)	13(19.7%)	0	23(34.8%)	
Total	2(3%)	27(40.9%)	31(47%)	6(9.1%)	66(100%)	

Table:3 Association of gender with mortality:

Mortality	Male	Female	Total
Yes	41(62.1%)	2(3.1%)	43(65.2%)
No	17(25.8%)	6(9%)	23(34.8%)
Total	58(87.9%)	8(12.1%)	66(100%)

P value 0.011

DISCUSSION

Perforation peritonitis is a life-threatening condition associated with a high mortality and morbidity in patients with delayed presentation and co-morbidities. Although surgery remains the gold standard treatment in perforation peritonitis, such high-risk patients are unfit

Irrigation was done with 2 liters of normal saline in a continuous manner per 24 hours and drain outputs were monitored. Physiological maintenance of the patient's health was done. Total parenteral nutrition (TPN) was started for patients remaining NPO for more than 3 days. CBC, RFTs and serum electrolytes were regularly monitored and were managed, if needed. Ventilatory support, inotropic support and dialysis was provided if necessary. Drain output was monitored daily and contents noted. Patients with increased drain output till 5 days after PPD underwent definitive surgical intervention.

Outcomes were measured in terms of mortality, morbidity (SSI, wound dehiscence) and the need for definitive surgery. Data was entered into SPSS version 26 for analysis. Quantitative variables like age were presented as mean \pm standard deviation. Qualitative variables like gender were presented as frequency and percentage. Data was stratified for age and gender. Post stratification Chi square test was applied and a p-value of \leq 0.05 was considered as significant.

RESULTS

The study enrolled 66 patients. The mean age (in years) of the patients was 49 \pm 9.9. There were 58 (87.9%) male and 8 (12.1%) female patients. Mortality occurred in 43 (65.2%) patients while morbidity was seen in 17 (25.8%) patients, out of which 9 (13.6%) patients had superficial surgical site infection, 6 (9.1%) had deep surgical site infection and 5 (7.6%) had wound dehiscence.

Laparotomy was planned in 43(62.1%) patients, out of which almost half 21 (31.8%) of the patients died. 22(30.5%) patients died without undergoing surgery because their condition deteriorated rapidly within the first 24 hours, and 3(4.5%) patients recovered by conservative management and thus didn't require any further intervention (Table 1).

Data was stratified for age and gender. Post-stratification chi square test was applied. There was a statistically significant association between age and mortality(p=0.047); mortality was high in patients belonging to the middle-aged group (Table 2). A significant association was also observed between gender and mortality (p=0.011) and between gender and the need for laparotomy (p=0.018) (Table 3). Neither age nor gender were associated with morbidity as indicated by a p value of >0.05.

Table 1: Association of mortality with the need for laparotomy:

Mortality	Need for laparotomy		Total
	Yes	No	
Yes	21(31.8%)	22 (33.3%)	43(65.2%)
No	20(30.3%)	3(4.5%)	23(34.8%)
Total	41(62.1%)	25 (37.9%)	66(100%)

for general anesthesia with the result that initial definitive surgery is associated with poor outcomes in such patients¹⁵.

Primary peritoneal drainage with Taylor's conservative method has been evaluated recently as an initial management strategy in such patients. However, only a few studies have been conducted on this subject, with variable results¹⁵.

According to our study, the mean age was 49+9 years, and majority of patients were male^{14,16,17}. This is mostly in accordance with previous studies, however Asghar et al and Saber et al have documented a higher prevalence of high-risk perforation peritonitis in older age groups.

The mortality rate was found to be 65.2%. This is in contrast with majority of the studies, which have observed a lower death

rate in patients undergoing percutaneous peritoneal drainage^{16,17,18,19}. Only a few studies have comparable results with our research^{14,20}. This difference might probably be attributed to the availability of better ICU facilities in other setups. However, only 31.8% of the patients died postoperatively after definitive laparotomy, which is less than the mortality rate of 41.3% in high-risk patients of perforation peritonitis²¹. Some of the local studies have demonstrated a similar decrease in the proportion of patients dying post-operatively. We observed a significant association of mortality with increasing age and male gender in accordance with most studies.

Only 4.5% of the patients recovered by this conservative technique, obviating the need of surgery. Variable results are observed in the literature in this regard. According to Bhasin et al, 20% of the patients did not require definitive laparotomy after PPD, whereas the percentage was only 2% in a study conducted by Baloch et al^{14,17}.

Morbidity was seen in 25.8% of the patients, out of which the majority suffered from superficial surgical site infection. It is the most common post-operative complication according to the existing literature on this subject^{5,16,17}. Deep surgical site infection and wound dehiscence were also observed in a few patients. These results were comparable to those for open repair of perforation²².

The current study has certain limitations. Firstly, it was carried out at a single center and the sample size was not large enough for the results to be generalized. Secondly, critical care facilities were not up to the mark in our hospital setup. More studies of similar nature need to be conducted involving large study samples and better intensive care units.

CONCLUSION

We have concluded from our study that PPD with Taylor's conservative method served as an effective method of initial resuscitation and stabilization in high-risk patients of perforation peritonitis. Once the general condition of the patients improved, they were subjected to definitive laparotomy under general anesthesia. Post-laparotomy outcomes were improved in such patients.

Conflicts of Interest: None to declare.

Funding Disclosure: None to declare.

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