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ORIGINAL ARTICLE

Evaluation of Percutaneous Peritoneal Drainage Among Patients with High Risk Perforated Peritonitis in Tertiary Care Hospitals

MUHAMMAD QAMMAR NOSHAD[1], UMAIR AHMAD[2], ATIF IQBAL[3], MANISHA ASWANI[4], AAZMA MIRZA[5], MUHAMMAD HAIDER ALI[6]
[1]*Specialist, General Surgery, Al-Qamar General Hospital Shekhupura.*
[2]*Associate Professor Surgery, Department of Surgery, Quaid-e-Azam Medical College /Bahawal Victoria Hospital Bahawalpur.*
[3]*Assistant Professor, Department of Surgery, Jinnah International Hospital, Abbottabad.*
[4,5]*Postgraduate Trainee, Jinnah Postgraduate Medical Centre Karachi.*
[6]*Resident Surgeon, Surgery Unit HMC*
Corresponding author: Umair Ahmad, Email: umairdr1@gmail.com

ABSTRACT

Aim: The aim of this study was to evaluate the effectiveness of percutaneous peritoneal drainage (PPD) as a treatment option for high-risk perforated peritonitis in tertiary care hospitals.

Methods: This prospective investigation was conducted at multiple centres including Department of Surgery, Quaid-e-Azam Medical College / Bahawal Victoria Hospital Bahawalpur and Jinnah International Hospital, Abbottabad from August, 2022 to January, 2023. Patients with peritonitis accompanied by shock or who did not respond to initial resuscitative protocols were included in the study. Patients with primary peritonitis or spontaneous bacterial peritonitis and those with a history of multiple previous abdominal surgeries were excluded. The study evaluated the effectiveness of PPD as a treatment option for high-risk perforated peritonitis. Chi Square test was applied to assess association keeping P value < 0.05.

Results: The mean age was 54.81±9.2 years, male patients were 66 (57.9%) while female patients were 48 (42.1%). Regarding mortality after PPD 25 (21.9%) patients died, while 15 (13.2%) patients died after definitive surgery. Mortality after PPD was significantly associated with systolic BP < 90 mmHg and comorbid.

Conclusion: Based on our study findings, we have determined that percutaneous peritoneal drainage is a crucial procedure that can potentially save lives and lead to improved outcomes in high-risk patients undergoing laparotomy. Moreover, it has the potential to enhance their preoperative condition.

Keywords: High risk patients, Primary peritoneal drainage, Perforation peritonitis

INTRODUCTION

Inflammation of the peritoneum, or peritonitis, is a serious surgical emergency that can quickly become fatal. Severe abdominal discomfort is the hallmark symptom, and fatality rates in surgical circumstances range from 10% to 60% [1]. According to the available literature, the causes of peritonitis range from hereditary predisposition to local environmental variables. With a prevalence of 43.1% and 35.1%, respectively [2, 3], typhoid ileal perforation and appendicitis remain the most common causes of peritonitis. Peritonitis can also be brought on by tubo-ovarian abscesses, amoebic colonic perforations, perforated peptic ulcers, traumatic bowel perforation, and perforated gastrointestinal lining. Understanding the illness process and how to treat it locally requires an understanding of the many causes and manifestations of peritonitis in a given situation [2, 3].

One of the most prevalent types of surgical emergency is a perforation of the gastrointestinal tract[4]. Despite improvements in diagnostic and surgical therapy, care for these individuals remains challenging. Perforation peritonitis has a very different etiological range worldwide [5].

Exploratory laparotomy is considered the gold standard treatment for perforation peritonitis; nevertheless, emergency laparotomy under general anesthesia should not be performed if the patient's status has not improved after all resuscitative measures have been tried [6]. Primary peritoneal drainage (PPD) is an alternative to emergency laparotomy. Emergency rooms across the country see a lot of patients with intestinal perforations[7, 8].

Despite significant advances in peptic ulcer treatment over the past two decades, the number of cases requiring emergency surgery due to perforated gastro duodenal ulcers has increased. One possible explanation is the rising popularity of aspirin and other NSAIDs, especially among the elderly [9, 10]. Perforated peptic ulcers can be treated with either a simple closure or an emergency final operation. Perforated acute peptic ulcers are often treated with conservative measures [10, 11].Perforated gastro duodenal ulcers in otherwise healthy patients warrant a second look at the Taylor surgery [10].

In critically ill patients with systemic peritonitis, primary peritoneal drainage under LA is rarely considered as a replacement to urgent laparotomy in surgical literature. In order to determine whether or not performing major abdominal surgery under general anesthesia with percutaneous peritoneal drainage for seriously ill patients is effective and beneficial, it was decided to undertake the research. Assessments were also performed to observe that whether this method provides an efficient for long last cure, or a short-term alternative to resource management and patient optimization prior to the final surgical intervention.

MATERIAL AND METHODS

This study was a prospective study conducted at multiple centres including Department of Surgery, Quaid-e-Azam Medical College /Bahawal Victoria Hospital Bahawalpur and Jinnah International Hospital, Abbottabad from August, 2022 to January, 2023, following specific inclusion and exclusion criteria. Patients with peritonitis accompanied by shock. Patients deemed unfit for general anesthesia due to medical comorbidities. Patients who did not respond to initial resuscitative protocols were included. Young patients with stable vitals presenting with early peritonitis. Patients with primary peritonitis or spontaneous bacterial peritonitis (e.g., cirrhosis) and patients with a history of multiple previous abdominal surgeries were excluded.

According to the inclusion criteria, patients who did not show improvement within 8-12 hours despite initial resuscitative efforts underwent primary peritoneal drainage. Subsequently, the patients were monitored, vital signs were recorded, and data was collected using a predetermined form. Risk stratification was performed, and outcomes were documented and assessed based on predetermined parameters.

In conjunction with conservative measures, percutaneous peritoneal drainage was performed under local anesthesia. This procedure involved making a 2-2.5cm incision on either flank, with the site and type of incision determined by clinical suspicion, ultrasonography reports, and prior surgical history. The external oblique aponeurosis, internal oblique, and transversus abdominis muscles were carefully separated using artery forceps. After entering the peritoneal cavity, the index finger was moved in various directions to ensure proper protection and drainage. Two wide-bored intra-abdominal tube drains (28/32F) were inserted through these incisions, with one drain directed towards the pelvic cavity and the other in an upward direction. Pus, fluid, or bile was drained and collected for culture and sensitivity testing. Patients who showed clinical improvement after percutaneous peritoneal

drainage and continued to have excessive fluid drainage underwent standard laparotomy for definitive surgical procedures.

Regular monitoring of vital signs and maintenance of the patients' physiological health were carried out. A nasogastric tube was inserted to decompress the stomach, and a Foley's catheter was used to monitor urine output during the post-operative period for a specified duration. Intravenous fluids and broad-spectrum antibiotics were administered until the culture sensitivity results of the fluid were available, and specific antibiotics were then prescribed accordingly. In selected cases, a central venous line was inserted for precise fluid resuscitation and monitoring. The drainage output was monitored daily, and its contents were recorded. Abdominal-pelvic ultrasonography was performed at 12 hours, 24 hours, and 36 hours to assess the amount of fluid in the peritoneal cavity. Total parenteral nutrition (TPN) was initiated for patients who had been on nothing-by-mouth (NPO) status for more than three days. Renal function tests, including serum electrolyte levels and complete blood count (CBC), were regularly monitored.

We calculated the sample size using openepi calculator, taking previous frequency of mortality 17.5%, margin of error 7% and confidence interval 95%. All the data was analyzed using SPSS 20. We used frequencies and percentages for qualitative variables and Mean with Standard deviation for numerical variables. Associations were assessed using Chi Square test keeping P < 0.05 as significant.

RESULTS

We conducted this study on 114 patients presenting with high risk perforated peritonitis. The mean age of the patients was 54.81±9.2 years. Regarding gender of the patients, male patients were 66 (57.9%) while female patients were 48 (42.1%). We observed that systolic BP was < 90 mmHg in 53 (46.5%) patients while systolic BP > 90 mmHg was observed in 61 (53.5%) patients.

Regarding the age distribution 52 (45.61%) patients belonged to the age group of 40 to 55 years while 62 (54.39%) patients were in the age group of 56 to 70 years.

Regarding the mortality after PPD we observed that 25 (21.9%) patients died after PPD, while 15 (13.2%) patients died after definitive surgery.

According to comorbid, COPD due to smoking was seen in 16 (14%) patients, ischemic heart disease was seen in 12 (10.5%) patients and long term steroid use was seen in 10 (8.8%).

Table 1: Demographics

Variables		Statistics
Age (Years)		54.81±9.2
Gender	Male	66 (57.9%)
	Female	48 (42.1%)
Systolic BP	< 90 mmHg	53 (46.5%)
	> 90 mmHg	61 (53.5%)

We found a significant association between those patients who had systolic BP < 90 mmHg with mortality. The difference was statistically significant (P = 0.01). Similarly we found significant association between comorbid with mortality (P < 0.05)

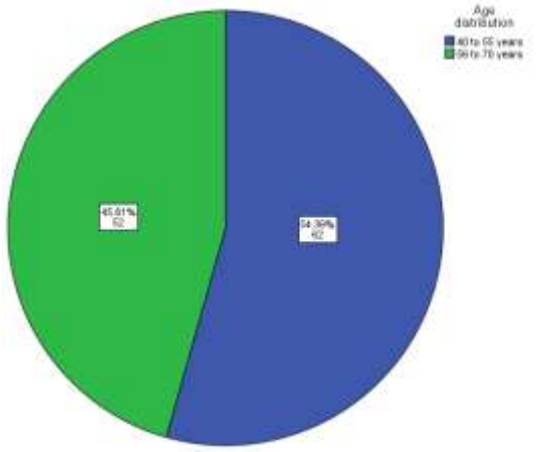

Figure 1: Age distribution

Table 2: Mortality after PPD and definitive surgery

		Frequency	Percentage
Mortality after PPD	Yes	25	21.9%
	No	89	78.1%
Mortality after surgery	Yes	15	13.2%
	No	99	86.8%

Table 3: Distribution of comorbid

		Frequency	Percentage
COPD due to smoking	Yes	16	14.0%
	No	98	86.0%
Ischemic heart disease	Yes	12	10.5%
	NO	102	89.5%
Long term steroid use	Yes	10	8.8%
	No	104	91.2%

Table 4: Association between morality after PPD with systolic BP

		Systolic BP		Total	P value
		< 90 mmHg	> 90 mmHg		
Mortality after PPD	Yes	17	8	25	0.01
		68.0%	32.0%	100.0%	
	No	36	53	89	
		40.4%	59.6%	100.0%	
Total		53	61	114	
		46.5%	53.5%	100.0%	

Table 5: Association of comorbid with mortality after PPD

		Mortality after PPD				
		Yes		No		P value
		Frequency	Percentage	Frequency	Percentage	
COPD due to smoking	Yes	7	28.0%	9	10.1%	0.02
	No	18	72.0%	80	89.9%	
Ischemic heart disease	Yes	8	32.0%	4	4.5%	0.001
	NO	17	68.0%	85	95.5%	
Long term steroid use	Yes	5	20.0%	5	5.6%	0.02
	No	20	80.0%	84	94.4%	

DISCUSSION

Emergency laparotomy refers to a surgical procedure in the abdomen where the initial presentation, location of the problem, and surgical approach vary significantly from patient to patient. This term encompasses more than 400 specific surgical procedures. Preparing and optimizing patients for emergency laparotomy within a short timeframe is challenging, especially in tertiary care hospitals in developing countries. Consequently, emergency exploratory laparotomy carries a high risk most of the time.[13]

While there is no single factor solely responsible for poor outcomes in patients with peritonitis, advanced age, comorbidities, medical conditions, and delays in presentation and diagnosis are among the most significant contributors. Of these factors, the modifiable ones play a crucial role in reducing morbidity and mortality. A study concluded that, apart from preoperative

optimization and postoperative care, the severity of septic shock upon presentation in patients with perforative peritonitis predicted their ultimate outcome.[14]

Exploratory laparotomy remains the definitive treatment of choice for abdominal infections such as peritonitis. Its core principles involve eliminating the septic source and removing purulent or fecal material. These principles have remained unchanged over time. However, achieving all of these goals in a single surgery may not always be feasible. To address this, primary peritoneal drainage was introduced as a close management approach for perforated peritonitis, allowing the removal of septic material without the need for general anesthesia.[15] Extensive research on this treatment modality has been conducted for premature neonates with NEC, showing comparable results to laparotomy. In adults, primary peritoneal drainage has demonstrated promising outcomes in perforative peritonitis, as it leads to better morbidity and mortality rates. Studies have shown that initial percutaneous peritoneal lavage followed by serial resuscitation and observation can improve the overall condition of patients, enabling them to undergo definitive surgery with better outcomes. In our study, we observed the effects of primary percutaneous peritoneal drainage in high-risk patients as a bridge to definitive surgery following adequate resuscitation and supportive therapy in cases of perforative peritonitis.[16]

The average age of patients in our study was 54.81±9.2 years, which was relatively higher compared to other studies. This suggests that older patients tend to have more advanced systemic diseases and weakened immunity. While a study had a similar age group in their study, other major studies included younger patients.[17]

The mortality rate after percutaneous peritoneal drainage in our study was 25 (21.9%), and after definitive surgery the mortality rate was 15 (13.2%). The overall mortality rate in our study was 35%. A study reported that the overall mortality rate 55% which is much higher than our study[18], this higher prevalence of mortality may be due to smaller sample size used in their study, however another study reported overall mortality 41.8%.

In our study we observed that 53 (46.5%) patients were presented with systolic BP less than 90 mmHg while 61 (53.5%) were presented with greater than 90 mmHg. Our study showed that there was a significant association between mortality after percutaneous peritoneal drainage with systolic BP less than 90 mmHg as majority of the patients who died had systolic BP less than 90 mmHg. Similar findings have been reported by a study[18] which showed that hypotensive patients had lower survival rate after PPD.

We identified several comorbid in our patients, COPD due to excessive smoking and ischemic heart disease were the most prevalent comorbid among the patients followed by long term use of steroids. We found a significant association between comorbid and mortality after PPD. Our results are in agreement with the aforementioned studies[15, 18] which also reported similar findings.

CONCLUSION

From our study we conclude that percutaneous peritoneal drainage is a lifesaving procedure which can result in better outcomes in high risk patients undergoing laparotomy and can improve their preoperative condition.

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