ORIGINAL ARTICLE

AN EXPERIENCE OF PERCUTANEOUS PERITONEAL DRAINAGE IN HIGH-RISK PERFORATED PERITONITIS IN GENERAL SURGICAL WARD OF TERTIARY CARE HOSPITAL LAHORE, PAKISTAN

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Background: Although conservative treatment has shown a good reduction in mortality and morbidity the majority of patients still need definitive surgery to get rid of the disease completely. It is of note that immediate laparotomy in high-risk patients who have a prolonged history or have multiple comorbidities or in organ failure is not advisable as it is associated with higher morbidity and mortality, besides improved postoperative intensive care. **Methods:** We categorized these high-risk patients based on their comorbidities and then performed percutaneous peritoneal lavage to reduce the septic load from the peritoneal cavity before performing the definite procedure. **Results:** Out of the high-risk patients who survived after the PPD and underwent definitive surgery, 61% survived (n=8/13) while the rest of these, 38.5% expired (n=5). **Conclusion:** Percutaneous peritoneal drainage initially instituted in high-risk patients to optimize their pre-op condition significantly, improves the outcome and has better results than to operate on such patients straightaway.

Keywords: Peritonitis; Peritoneal lavage; High risk; Laparotomy

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INTRODUCTION

Acute peritonitis due to gastrointestinal perforation is one of the most common emergencies presented to general surgeons.[1] Despite the recent advances in indefinite surgery, medical management, perioperative care, and intensive care, it continues to be one of the most difficult benign diseases to treat.[2] Most of the cases present late to the hospital with well-established generalized peritonitis having gross purulent or faecal contamination and varying degrees of septicaemia. The overall mortality rate is 30% and the mortality rate of cases that also have diffuse peritonitis is up to 70%.[3] Various factors resulting in intestinal perforation include peptic ulcer perforations, typhoid or Tuberculous perforations, ischemic colitis, intestinal obstruction, cancer, diverticulitis, trauma, and colonoscopy. Perforations due to cancer and infection have high mortality rates, however, iatrogenic perforation during colonoscopy has a low mortality rate.

Although conservative treatment has shown a good reduction in mortality and morbidity the majority of patients still need definitive surgery to get rid of the disease completely. Gold standard management of peritonitis has been the exploratory laparotomy for decades.[4] It is of note that immediate laparotomy in high-risk patients who have prolonged history or have multiple comorbidities or in organ failure is not advisable as it is associated with higher morbidity and mortality, besides improved postoperative intensive care. Various alternatives recommended for immediate laparotomy are percutaneous peritoneal drainage (PPD), laparoscopic sanitation; Taylor's conservative method, laparotomy, and planned re-laparotomies.[5,6]

This original study aims to find out the rate of morbidity and mortality of percutaneous peritoneal drainage under local anaesthesia, supported by conservative measures in high-risk elderly patients, with perforated gut peritonitis when surgery is indicated but carries a high risk of mortality.

MATERIAL AND METHODS

We performed a retrospective analysis of all the cases of acute peritonitis which were subjected to percutaneous peritoneal lavage after being labelled as high risk and unfit for general anaesthesia. The study was done between 10th July till 10th October 2019, i.e., 3 months.

We included all those patients from our data in the last 4 years who underwent percutaneous peritoneal drainage (PPD) in an emergency after being diagnosed with perforated peritonitis.

The pre-op diagnosis was made based on history and obvious abdominal signs and symptoms along with the required investigations like Complete blood count, Chest X-ray, Abdominal X-ray, and Ultrasound abdomen. Free air under the diaphragm and free fluid in the USG abdomen was the most reliable signs to diagnose perforated intestinal peritonitis. Other investigations included Liver function tests, renal

function tests, Serum Electrolytes, ECG helped to define specific organ disorders.

High-risk cases of perforated peritonitis were labelled with the help of Boey's score which is a frequently used scoring system to characterize high risk in these patients. It considers three parameters,

- Systolic Blood Pressure <100 mm/hg
- Initial Presentation to ER >24 hrs of pain abdomen
- Major medical comorbid illness.[7]

Patients were given one point for each parameter and an additional point for comorbid conditions.

- Long term steroid use
- Recent cerebrovascular stroke
- Patients on cardiac drugs/known ischemic heart disease.
- Smoker with interstitial lung disease like COPD
- Alcoholic/known chronic liver disease[8]

Based on ASA grading, we assigned ASA class to each patient, i.e., score 1 for ASA 1, score 2 for ASA 2, score 3 for ASA 3, and so on. Next 1 point was given to each point of Boey's score. So, scores were assigned to the patients and those above or equal to 6 are called high-risk patients. All our patients had scores of 6 or more and thus were high risk.

After making the diagnosis and assessing their risk, all patients were managed according to the local protocol. They were resuscitated by keeping the patient nothing by mouth, passing wide bore nasogastric tube for decompression and internal drainage (checked by abdominal radiograph for correct positioning along the greater curvature), strict input and output monitoring, IV fluids, pain relief, an intravenous broad-spectrum antibiotic, and proton pump inhibitors. Accurate tube placement in the distal greater curvature as confirmed by radiograph as it leads to better drainage and frequent re-assessment was mandatory in this regimen.[9]

All the patients gave informed consent to this specific procedure and exploratory laparotomy on admission. Under local anaesthesia 1 cm supraumbilical incision was placed, subcutaneous tissue split, and peritoneal cavity opened. After the peritoneal breach, a drain was inserted directed towards the pelvic cavity. This drain was attached to a continuous infusion of saline. Another incision was given in the right iliac fossa lateral to the lateral border of rectus abdominis and the peritoneal cavity was opened and a wide bore drains 32/F was inserted here, directed towards the pelvis. The same procedure was repeated on the left side and a drain of 32 Fr was placed in the pelvic region. These drains were attached to free drainage bottles. Serial examinations were performed to check the continuous lavage and contents in the bottles until the definitive surgical procedure. We recorded vitals and input and output half-hourly and observed their stability for undergoing the definitive surgery.

After drainage, patients who got hemodynamically stable and had significant urine output were taken for the definitive surgery. All the definitive procedures were done in an open manner and by the same team of surgeons.

RESULTS

The age group of our study comprised of elderly, i.e., mean 63.28 years with range 55–71. Sixty-one percent of patients belonged to the age group 56–65 and they showed better outcomes in both primary and secondary outcomes as shown by Table-1 and 2. There is improved survival as compared to the older age group, i.e., 66–75 years.

Systolic BP at presentation had a major impact on deciding the mortality in our patients. Those presenting with SBP more than 90 mmHg or more had better survival from disease after PPD and even definitive surgery while those presented with SBP lesser than that of 90 mmHg did not show much improvement in both the groups. There was a statistical significance between SBP >90 mm Hg at presentation and a better outcome both after PPD and definitive surgery, i.e., (p<0.05). Table-3 shows that there was increased mortality after PPD in those with SBP lesser than 90 mmHg at presentation (i.e, 14.3% vs 36.4% for SBP >90 mm Hg on presentation)

Amongst patients in whom definitive surgery was performed, only 28.6% of patients survived who presented with the shock while those who had SBP more than 90 mm Hg showed a 100% survival rate. So, shock is one of the most important factors in the presentation which can increase mortality and morbidity. Presentation in ER was almost delayed in all the cases. All the patients had presented more than 12 hours but very few patients, i.e., 16.7 % (n=3) came with a period less than one day since the start of symptoms otherwise 44.4% (n=8) came with a history of more than 1 day and 38% (n=7) presented with history more than 2 days. There was not much difference associated with the delay in presentation and overall mortality in the patients as there was a mixed trend seen in our study. Survival rates in delayed presentation patients were better in our study, only possible because we abridged PPD to definitive surgery.

Tuberculosis and COPD were the most common ones. The former is prevalent in this part of the world[22] while COPD is related to smoking habits. Half of the patients (n 9/18) had single comorbidities while the other half of patients had more than one comorbidity and these were responsible for the higher risk scores. Other comorbidities included Ischemic heart disease, chronic liver disease, Hypertension, Diabetes mellitus, etc.

The patients who had multiple comorbidities had poor survival, i.e., with more than one comorbidity

had an expiry rate of 36.4 % which increased to 50% for those with more than two comorbidities. Patients who had one comorbidity had much better survival, i.e., 100%. This survival decreased in the group of patients in which we performed definitive surgery. The following table shows that for one comorbidity survival was 80%, for more than one comorbidity it was 57% and it was zero percent for those with comorbidities more than two.

Finally, out of those patients who survived after the PPD and underwent definitive surgery, 61% survived (n=8/13) while res of these, 38.5% expired (n=5). Out of 18 patients, 5 (27%) expired after the lavage, n=5 (27%) expired after the definitive surgery (figure-2). This mortality is still less than the maximum mortality reported in the study.[10] The overall mortality in the high-risk patients in which we performed PPD was 10/18 (55.5%). There was a significant number of patients made stable with the help of drainage and underwent successful laparotomies to seal their perforations surgically, i.e., 8/18 (44%).

Table-1: Age groups

		Survived or Expired after PPD		Total
		Survived	Expired	
Age (years)	45–55	1	0	1
	56–65	7	4	11
	66–75	5	1	6
Total		13	5	18

Table-3: Systolic BP at presentation

		Survived vs Expired after PPD		Total
		Survived	Expired	
Systolic BP at presentation (mmHg)	>90	85.7%	14.3%	100.0%
	<90	63.6%	36.4%	100.0%
Total		72.2%	27.8%	100.0%

Table-5: Survival after PPD

		Survived vs Expired after PPD		Total
		Survived	Expired	
Presentation in ER (days)	<1 day	66.7%	33.3%	100.0%
	>1 day	87.5%	12.5%	100.0%
	2-4 days	57.1%	42.9%	100.0%
Total		72.2%	27.8%	100.0%

Table-7: Mortality after definitive surgery

		Survived vs Expired after Definitive Surgery		Total
		Survived	Expired	
Number of comorbidities	One	80.0%	20.0%	100.0%
	More than one	57.1%	42.9%	100.0%
	more than 2		100.0%	100.0%
Total		61.5%	38.5%	100.0%

DISCUSSION

Emergency laparotomy refers to the abdominal surgical procedure in which the initial presentation, site of pathology, and operative management are not well established preoperatively and thus all differ very much from patient to patient. Almost 400 and above definitive surgical procedures can be attributed to this specific term.[11] The required preoperative preparation and optimization to improve the outcome in a short period is not easy especially in a tertiary care hospital in a developing country and thus a challenge for the surgeon. Thus, emergency exploratory laparotomy is most of the time a high-risk surgery.

Although there is not a single factor that can be attributed to poor outcomes of the patients presenting with peritonitis but old age, comorbidities, and medical illnesses, delay in the presentation and diagnosis are the most important ones. Of all such factors, the ones that can be modified are those that help to reduce morbidity and mortality.[12] Moller *et al* concluded in their study that besides the preoperative optimization and postoperative care, the extent of the septic shock in the patients of perforative peritonitis at presentation predicted their true outcome.[13]

In abdominal infections like peritonitis, exploratory laparotomy is the definitive and treatment of choice.[14] Elimination of the septic source and removal of purulent/fecal material are the core principles of exploratory laparotomy. These principles of managing peritonitis have not changed till today. All of this may not be achieved in a single surgery.[15] Primary peritoneal drainage was introduced as a mode of close management of perforated peritonitis as it could wash away the septic load off a patient that helped in self-healing without any need of general anesthesia. This modality of treating peritonitis in premature neonates due to NEC has been studied on a large scale and its results are comparable with the laparotomy.[16,17] Primary peritoneal drainage as a modality of treatment depended on the same concept of self-healing and expected recovery in patient's status if sepsis causing peritoneal collection is drained away. Studies showed promising results in adults as they led to better outcomes in perforative peritonitis. They showed that preliminary percutaneous peritoneal lavage followed by serial resuscitation and observation may allow improvement in the general condition of patients who subsequently can undergo a definitive surgery with better morbidity and mortality.[18,19] We observed the effects of a primary percutaneous peritoneal drainage in high-risk patients as a bridge to definitive surgery after adequate resuscitation and supportive therapy in perforative peritonitis patients.

The age group in our study was more on the higher side as compared to other studies, i.e., the average age in our analysis (n=18) was 63.28 years, and its range being (55–71). This implied that the more aged the patients, the more advanced stages of

systemic diseases and weaken immunity. Saber *et al* had the same age group as in our study[18] but other major studies had lesser age groups[19,20].

We included all the patients who had a presentation in the ER for more than 12 hours. It was seen that presentation less than 1 day had better outcomes in making patients eligible for definitive surgery but we could not find any significant difference due to the smaller sample size. Other studies with larger sample sizes also showed better outcomes when patients presented earlier so their sepsis was tackled at the initial stages.[18,20,21] Delayed presentation has been a major factor in mortality in our research.

In our study group, 61% of patients (n=11) had SBP less than 90 mm hg at presentation. Bhasin SK *et al* reported that 100% of their patients were hypotensive at presentation.[4] Similarly, Bucher P *et al* reported 23% of patients with shock, whereas; in Saber A *et al* series 66.67% of patients presented with shock.[18,21] Our analysis showed that there is a statistical difference between the presenting SBP and patients undergoing definitive surgery and post-procedural recovery ($p<0.05$).

Regarding comorbidities, Tuberculosis and COPD were the most common ones. The former is prevalent in this part of the world[22] while COPD is related to smoking habits. Half of the patients (n=/18) had single comorbidities while the other half of patients had more than one comorbidity and these were responsible for the higher risk scores. This trend is opposite to other studies where patients included did not have much of these comorbidities.[18,20,21] One study showed that 66.6% of patients had single comorbidity and 33.3% had more than one, which is still lesser than that of ours.[4] It is evident that an increased number of comorbidities in patients play a major role in labeling them high risk and thus unfit for immediate surgery.

In our retrospective study, we included 18 patients and assigned them high risk according to their disease and sepsis. The overall mortality was 55% (n=10) but we were able to make 13/18 patients fit enough to undergo general anesthesia who were initially not fit for surgery by reducing their septic load under local anesthesia. Although the overall postoperative mortality in elderly high-risk patients is 41.8%[23], our study showed the postoperative mortality to be 27% which is significantly lower and shows better outcomes once the patient underwent surgery after an initial reduction of his septic load.

Those among those who survived after laparotomy were shifted toward and were managed with standard postoperative care. Their average hospital stay was around 6.8 days. In short, they had a smooth post-op recovery phase. Although other post-op complications like surgical site infection and chest infection occurred and were treated according to the local protocols. So, this study of previous cases and literature concluded that if high-risk patients were to be taken for percutaneous peritoneal drainage before they undergo laparotomy, they had better outcomes and prognosis. Therefore, improving the patient's hydration along with addressing medical comorbidities and draining the septic load significantly improved the outcome and prognosis in high-risk elderly cases.[24]

CONCLUSION

Percutaneous peritoneal drainage initially instituted in high-risk patients to optimize their pre-op condition significantly, improves the outcome and has better results than to operate on such patients straightaway.

Limitation of study

It was a retrospective study with small sample size.

Funding

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Conflict of interest

None declared

Ethical approval

Taken from the ethical committee before the study.

AUTHORS' CONTRIBUTION

MSA: Wrote initial draft write up of the article. AK: Data collection. BS: Data analysis. AA: Final write up and proof reading. SA: Literature search. SR: contributed in study design, reference writing and data collection.

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