ORIGINAL ARTICLE

LAPAROSTOMY: A LIFE SAVING OPTION IN PATIENTS WITH DELAYED PRESENTATION OF PERFORATED SMALL BOWEL IN THE EMERGENCY DEPARTMENT

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ABSTRACT

Objective: To evaluate the effectiveness of laparostomy as a life saving procedure in patients with late presentation for small bowel perforations in emergency.

Material and Methods: This comparative trial was conducted in the department of surgery at Lady Reading Hospital Peshawar Pakistan from January, 2014 till December 2016. Following ethical approval from the ethical committee of Lady Reading Hospital Peshawar all patients presenting to the emergency department with evidence of gas under diaphragm on chest X ray were admitted and resuscitated with intravenous fluids, analgesia and antibiotics. A detailed history and examinations were performed following which they were sent to the Operating room for laparotomy. Patients of all ages with evidence of severe peritonitis secondary to spontaneous perforation of the small bowel, perforated appendicitis and perforated duodenum were included in the study. Patients with evidence of malignancy or colonic/ gastric perforations were excluded from the study.Group A included patients that were primarily closed using polypropylene 0 or 1 en masse; whereas group B included patient that had their abdominal wall left open with covering of the wound with either a Bogota bag fashioned from a drainage bag or polyethylene sheet.

Results: During the period of three years 1123 laparotomies were performed out of which 561(49.95%) were performed in emergency department. 50 patients were place in each group with male preponderance (p value =0.51). Age of patients was between 16-58{mean age age equals to group A (31.3yrs vs, group B(33.8yrs)}.A significantly higher mortality was observed in patients not subjected to laparotomy. 3(6%) vs. 11(22 %) (p=0.778). Incisional hernia frequency was more in cases with infection and majority of closure of ventral wall defects were either achieved on completion of 1 year following failure of sequential facial closure or primary closure. The incisional hernias were performed by CST with or without re enforcement with poly propylene mesh. There was a significantly higher time spent by patients on ventilatory support following laparotomy in patients from group A (p=0.041)

Conclusion: Performing a Laparostomy in time can significantly reduce mortality with patients treated for secondary bacterial peritonitis. Fistulation is slightly greater in cases where the abdominal wall is closed primarily with re-laparotomy on demand but this can be reduced by decreasing the duration of exposure and use of a Bogota bag to cover the

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INTRODUCTION

Secondary (bacterial) peritonitis is common sequelae of perforated viscus, most commonly from the gastrointestinal tract. Such spontaneous perforations are commonly encountered in perforated appendicitis, perforated duodenum, enteric perforation of the terminal ileum, tuberculous abdomen and iatrogenic small bowel perforations[1,2]. Early part of the inflammation results in hyperemia of the peritoneum with later formation of fibrin strands and an outflux of leucocytes resulting in large quantities of exudates with macrophages. The initial role of the inflammatory response is to limit the bacterial damage, but inevitably a delay results in multiple abscess formation in hidden pockets of the peritoneal lining[3]. Further delay on part of local and surgical mech-

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anisms to limit infections results in huge loss of fluids into the third space, that culminates in hypovolemia and a circulation loaded with inflammatory cytokines[4,5].

The timing of the first laparotomy (index Laparotomy) is the detrimental factor in deciding the outcome, but in many cases a late presentation to the emergency factor requires more prolonged management with 're-laparotomy on demand' (ROD) at times of clinical deterioration or as part of a scheduled/planned laparotomy[6-8]. Knowing that the mortality of severe bacterial peritonitis ranges from 30-50%[9], suggests that repeated laparotomy in itself is a further insult to a clinically deteriorating patient, remains a matter of debate and some authors suggest decompression laparotomy as a more acceptable option to dealing with the situation[10-12].

The outcome of results from development of an Abdominal Compartment Syndrome (ACS) is even distressing as an already compromised patient is rushed as part of an emergency, presenting as deterioration of organ function or wound dehisence[13-15]. Further pitfalls include the lack of suspicion for such impending complications and the hastened attitudes of surgeons to indulge in further insults of attempts to reclose the abdominal defect with out dated tension free sutures. The suggested benefits of a timely decision of non-closure is not without constraints as many patients subsequently require prolonged hospitalization and an even greater challenge of wall closure at a later date. Majority of the patients in their series were inclined to undergo a procedure for the incisional hernia after 6-8 months[11-12].

Both ROD laparotomy and decompression laparotomy (Laparostomy) carry grave chances of the development of an entero-cutaneous fistula but with better care and patient education once the fear of a systemic inflammatory response has weaned, greatly reduces chances of mortality and a downward spiral. Use of better techniques like meshes and Vacpac can improve the results of decompression laparotomy by resulting in early repair of the defect and earlier resumption to activity following discharge.

MATERIAL AND METHODS

Severe peritonitis was characterized by hyperemia of visceral peritoneal lining, exudative fluids, adhesions between loops of small bowel, pockets of pus and or immobile mesentery. Following primary repair/ exteriorization of spontaneous perforations, graham patch omentopexy for perforated duodenum and appendectomy for perforated appendicitis; patients were alternately placed into one of two groups.

Following index surgery patients were sent to Intensive care/ high dependency units for post –operative care and stepped down only on improvement documented on parameters defined by the attending physician/surgeon. These parameters included total leucocyte count, Hemoglobin %, serum creatinine, LFT's, coagulation profile, serum electrolytes and correction of acid base disturbances. Patients from group A were subjected to imaging modalities like Ultrasonography and Computerized Tomography (when needed) to assess any collection that needed surgical or radiological drainage. Patients from Group B were assessed on a daily basis for condition of gut and wash of exposed bowel with normal saline without anaesthesia. The process of re-application of a Bogota Bag/ Institution of Suction dressings and/or gradual fascial closure under local anaesthesia was at disposal of the attending surgeon.

Re-laparotomy on demand for patients of Group A was decided by the general condition of the patient or any evidence of collection and was not scheduled/ planned by the attending surgeon. No limit to the number of laparotomies was deemed adequate in patients from Group A. Patients with either evidence of a missed pathology or entero-cutaneous fistula in either group was treated with Laparostomy. This was the end point for patient from either group, whereas all other cases were progressed till elimination of all collections/infection and complete abdominal closure.

All the data was collected on charts and note of the duration of hospitalization, institution of parenteral therapy, closure of wound technique, entero-cutaneous fistula, incisional hernia, mortality were all documented for statistical analysis.

Data collected in the process of the study was incorporated in to the SPSS version 16.0. Demographic data regarding gender, age, duration of treatment for entero-cutaneous fistula, cause for the first surgery were compared between groups to rule out a confounding factor, which was also followed with a multi variate analysis from results of the complications. All qualitative data such as seroma / hematoma formation, infections and mortality were compared using CHI square test. Continuous data was compared using student t test or Mann Whitney U test. Following comparison a p value of <0.05 was considered as significant.

RESULTS

From the start of 2014 till closing of 2016 at the surgical C unit, lady Reading Hospital 1123 laparotomies were performed that included both elective and emergency cases. In the described three years 561 cases (49.95%) were emergency laparotomies that included Gunshot injuries, Road traffic accidents, acute abdomen, referrals and calls from other units within the hospital and from other districts (most already operated). All surgeons were informed of the limitation of the inclusion criterion and only those acute abdomens with proof of per-operative perforated viscus without evidence of malignancy were considered for the interventional trial.

Following management of the pathology, patients were placed into either of two groups; thus fulfilling

the sample size allocated as 50 patients per group. Following allocation each patient was managed by the recommended methods described. Following a prolonged hospital stay no patients were lost during the follow-up of patients till achieving a closure of the ventral defect if any. With both groups evidently proving male dominance within groups the finding was not significant for any difference. Majority of the patients were of younger age with only 6 patients (12%) with acute abdomen over the age of 50 years or more. Most common presentation was of Enteric perforation (35%) followed by acute perforated appendicitis (29%) and Perforated Duodenum (23%). Worth mentioning is that all these cases were delayed presentation with obvious toxicity and systemic manifestations. Of the total number of patients 32 patients from both groups needed intensive care management in the postoperative period ($p=0.003$), but on following the number of hours from each group a significant number from Group A required ICU care as well as time on the ventilator.($p=0.041$)

Despite only 13 patients with evidence of a leak or enterocutaneous fistula from both groups, a total of 31 patients required total parenteral nutrition at some point but the difference between groups was not significant ($p=0.68$). Prolonged hospitalization and fistulation of small bowel were the more common reasons for instillation of parenteral Nutrition. Daily monitoring and charts were maintained to meet needs of individual patients and oral allowance was prioritized when feasible.

Amongst the patients from Group A, one hundred and eighty laprotomies including the index laparotomy were performed with little variation between individual cases (range: 01-08) (Standard deviation=+1.2). Laparotomies on demand were performed considering the clinical condition of patients such as following dehiscence or any evidence of collections and/or unexplained fever. Ileostomies were formed in all cases of enteric perforation (as part of a routine practice) and in few cases on re-look Laparotomies the patients with suspected appendicular stump leak were also subjected to formation of ileostomy. Not mentioned in tabulated form were the grave difficulties faced by patients from Group B maintaining an ileostomy (26 patients) considering non-applicability of stoma appliances resulting exaggerated excoriation and skin problems with retraction in some cases. Majority of patients from both groups were subjected to early closure of stoma when conditions permitted.

More important was observing the number of burst abdomens in group A during the course of treatment and repeated laparotomies that ended in another re-look (ROD), and most of them had very little fascia to consider fascial closure, ending the procedure in a tension free suturing at the end of a thorough peritoneal wash; amongst these 6 (12%) out of the 12 patients ended up in formation of an enterocutaneous fistula and thence Laprostomy. Apart from these patients two patients had repeated ROD's for which they were not suitable for a closure and ended with a Laprostomy as well. A very high number of patients had delayed oral allowance due to repeated bouts of vomiting, electrolyte imbalance and abdominal distension (76%), necessitating the need for total parenteral nutrition in patients from Group A. ($p=0.68$)

Prolonged hospitalization was observed in both groups with approximately 38 days in group B but the difference was not significant. Time till the last procedure in Group A was 21.6 days after the Index Laparotomy; whereas average time to definitive closure was 33.2 days in Group B, but this did not take into account cases that had evidence of Incisional hernia, as this was treated after 12 months. The frequency of incisional hernia in the first 12 months after the Index Laparotomy in both groups was similar with no significant difference. ($p=0.778$)

The most significant part of the study was the mortality figure where only 3 patients (6%) from group B succumbed to their grave condition in comparison to Group A (22%). This high figure in group A was of importance as 5 patients (83.3%) out of the 6 patients developing enterocutaneous fistulas or leaks succumbed to their condition, in comparison to the no mortality in the 7 patients from Group B developing Enterocutaneous fistulas in the first twelve months.

During the course of management serial tension on the fascial suture was able to attaining complete closure of fascia in 64% of cases, when 10 patients (20%) had formal closure under anesthesia during the same admission. Cases that were not amenable to closure by serial tension and facial closure were subjected to Component Separation Techniques (CST) with or without mesh reinforcement (10%). For clarity on the end point of the remaining 47 patients (94%) in group B, the 14 patients developing incisional hernia despite other closure techniques, had repair with a prosthetic mesh after one year as did the 13 patients (26%) from group A.

DISCUSSION

Secondary (bacterial) peritonitis withholds a high mortality rate from earlier studies, from sequences of SIRS to MODS, inevitably requiring a different approach than the ones suggested by literature from the past[17]. With improvements in post-operative care of these laprotomised patients, the need to define a more acceptable course of managing the peritoneal lining of these patients and their inherent probability to developing complications would necessitate treatment that withholds the lowest mortality.

To address the issue, many surgeons from the near past had reasons to indulge with repeated laparotomies with temporary closures such as towel clamp closures and zip closures as opposed to open midline wounds stuffed with gauze and a suction apparatus in-

stalled(eg. Vacpac)[18]. These were abbreviated attempts at consideration to reduction in the septic load from the peritoneal cavity by series of washes rendering a clean peritoneal lining for definitive closure. Unfortunately this too did not result in a significant reduction of the mortality rate.

The results from our study show a significant difference in the mortality figures of patients with open Laprostomy as compared to patients with Re-laparotomy on Demand (ROD). In a study conducted by Martinez et al.[19] 33 of 51 patients operated died during the course of their treatment resulting in a mortality rate of 58%. This was a very high figure considering the group of patients from our study that were from Group A had a mortality of 11 patients out of 50 patients (22%). In another study conducted by Lamme et al.[20] which was a retrospective analysis of laparotomy patients from 1994 till 2000 of 278 patients; it was proven that the mortality rate was significantly lower in patients that had ROD as opposed to those with scheduled/planned laparotomies. Here the mortality rate was comparable for ROD cases (21.8%) as was the case of our study.

A study with a similar study design and end points was conducted by Paruthy et al [21] recently that included 60 patients with acute abdomen had a mortality rate of 10% in the group with Laprostomy as opposed to those with repeated primary closures (13.3%). The difference was not significant in that study unlike our study where a p value of 0.02 was observed. More over the study had included patients of large bowel perforations and pre-pyloric perforations as well as liver abscess cases. Although the most common pathology was enteric perforation in their study the design lacked immaculate accuracy like patients from our study. The study also had a very high frequency of enterocutaneous fistula in the Laprostomy group that was 10 patients (33%), much higher than the 14 % recorded in our study.

Enterocutaneous fistula is one of the most feared morbidity of such cases when managed with a bogota bag but despite fears of managing a difficult incisional hernia, evisceration and fecal fistulation Kirshtein et al22. emphasized on the benefit of performing a Laprostomy as opposed to primary closure or use of a mesh. The results of our study differed from results of other studies as the number of enterocutaneous fistulas from both groups in our study was comparable. (p=0.85)

Yet another study on use of Bogota bag for management of a Laprostomy was performed by Nicholas et al.[23] where a fistulation rate of 18% was reported. The rate reported for eneterocutaneous fistula in our study in Group B could be explained by using a dynamic suture for gradual approximation of wound by serial increments of tension to the fascia that may have resulted in lesser exposure of the eviscerated small bowel. This procedure was performed in 32 patients (64%) from group B whereas 10 patients (20%) had achieved the same result by delayed closure of the fascia at a later date.

The duration of hospitalization was much higher in our study as compared to the study conducted by Paruthy et al. where they categorized patients into successful cases versus failed cases. This was not the case in our study where the mortality figures were convincingly improved than other studies already discussed. The mean hospital stay in their study[21] was 27.7 days in failed cases with a Laprostomy that was comparable to group A in our study (28.2 days). This could be explained for group B (38.6 days) as the phase for closure was a prolonged and slow phase of the management of these patients with achieving similar number of incisional hernia cases, requiring prolonged hospitalization.

The frequency of incisional hernia was observed as similar for both groups after a follow-up of 12 months 26% &28% respectively for group A and B. But in a study conducted by Moussavian et al.[24] in a long term follow up of all cases recovered from secondary bacterial peritonitis 54.3% patients from 92 surviving patients developed hernia after a duration of 6 years. This long-term follow-up study suggests that the duration of follow-up mentioned in the study could not predict the overall outcome of the repair of the midline incision.

CONCLUSION

Performing a Laparostomy in time can significantly reduce mortality with patients treated for secondary bacterial peritonitis. Fistulation is slightly greater in cases where the abdominal wall is closed primarily with re-laparotomy on demand but this can be reduced by decreasing the duration of exposure and use of a Bogota bag to cover the defect as a temporary measure. The use of serial staged closure of the fascia can reduce the exposure time of viscera and may reduce the rate of fistulation in patients with Laparostomy.

REFERENCES

1. Wittmann DH, Walker AP, Condon RE. Peritonitis, intra-abdominal infection, and intra-abdominal abscess. In: Schwartz SI, Shires GT, Spencer FC, editors. Principles of surgery. 6th. New York: McGraw-Hill; 1994.. 1449–84.
2. Wittmann DH, Shein M, Condon RE, et al. Management of secondary peritonitis. Ann Surg. 1996;224(1):10–8.
3. Marshall J, Innes M. Intensive care unit management of intra-abdominal infection. Crit Care Med. 2003;31(8):2228–37.
4. Baue AE. Multiple organ dysfunction syndrome. Arch Surg. 1997;132(7):703–07.
5. Merrell RC. The abdomen as source of sepsis in critically ill patients. Crit Care Clin. 1995;11(2):255–72.
6. Marshall JC, Christou NV, Meakins JL. The gastro intestinal tract: the “undrained abscess” of multiple organ failure. Ann Surg. 1993;218(2):111–19.
7. Wittmann DH, Aprahamian C, Bergstein JM, et al.

Etappenlavage, advanced diffuse peritonitis managed by planned multiple laparotomies utilizing zippers slide fastener, and Velcro for temporary abdominal closure. World J Surg. 1
990;14(2):218–26.

8. Hau T, Ohmann C, Wolmershauser A, et al. Planned relaparotomy vs relaparotomy on demand in the treatment of intra abdominal infections. Arch Surg. 1995;130(11):1. discussion: 1193–6, 1196–7.
9. Lamme B, Boermeester M, Belt E, et al. Mortality and morbidity of planned relaparotomy versus relaparotomy on demand for secondary peritonitis. Br J Surg. 2004;91(8):1046–54.
10. Adkins AL, Robbins J, Villalba M, et al. Open abdomen management of intra-abdominal sepsis. Am Surg. 2004;70(2):137–40.
11. Rakic M, Popovic D, Rakic M. Comparison of on-demand vs planned relaparotomy for treatment of severe intra-abdominal infections. Croat Med J. 2005;46(6):956–63.
12. Koperna T, Schulz F. Relaparotomy in peritonitis: prognosis and treatment of patients with persisting intra-abdominal infection. World J Surg. 2000;24(1):32–7.
13. Ivatury RR, Porter JM, Simon RJ. Intra-abdominal hypertension after life-threatening penetrating abdominal trauma: prophylaxis, incidence, and clinical relevance to gastric mucosal pH and abdominal compartment syndrome. J Trauma. 1998;44:1016–1021.
14. Nakatani T, Sakamoto Y, Kaneko I, Ando H, Kobayashi K. Effects of intra-abdominal hypertension on hepatic energy metabolism in a rabbit model. . J Trauma. 1998;44:446–453.
15. Diebel LN, Dulchavsky SA, Brown WJ. Splanchnic ischemia and bacterial translocation in the abdominal compartment syndrome. J Trauma. 1997;43:852–855.
16. Ordóñez CA, Arias R, Granados M, et al. Mortalidad y morbilidad de la peritonitis secundaria con re-laparotomía planeada. Rev Colomb Cir. 2006;21:124–32.
17. Schein M, Wittmann D H, Holzheimer R G. Condon RE Hypothesis; Compartmentalization of cytokines in intraabdominal infection. Surgery. 1996;119:694–700.
18. Holzheimer R G, Schein M, Wittmann D H. Inflammatory response in peritoneal exudate and plasma of patients undergoing planned relaparotomy for severe secondary peritonitis. Arch Surg. 1995;130:1314–20.
19. JL Martínez-Ordaz et al. Re-laparotomy on Demand: Factors Related to Mortality. Cir Cir 2005;73(3):175-8.
20. B Lamme et al. Mortality and Morbidity of Planned Relaparotomy Versus Relaparotomy on Demand for Secondary Peritonitis. Br J Surg 2004;91 (8): 1046-54.
21. Paruthy SB, Meena SK, Bhandari V. Efficacy of dynamic retention suture compared with open laprostomy in secondary peritonitis patients. Int Surg J. 2016 Nov;3(4):2058-65.
22. Kirshtein B, Roy-shapira A, Lantsberg L, Mizrahi S. Use of the "Bogota bag" for temporary abdominal closure in pateints with secondary peritonitis. Am Surg. 2007;73(3):249-52.
23. Jenkins TPN. The burst abdominal wound: a mechanical approach. Br J Surg. 1976;63:873-76.
24. Moussavian MR, Schuld J, Dauer D, Richter S. Long term follow up for incisional hernia after severe secondary peritonitis—incidence and risk factors. American journal of surgery 2010;200(2):229-34.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

Bangash A: Main Idea, Operating Surgeon
Arif A: Data Collection, Operating Surgeon
Gul A: Bibliography
Waheed MR: Data Collection and referencing
Hayat M: Data Collection
Mushtaq R: Statistics
Jan WA: Overall Supervision

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.