

Laparostomy: Three year experience in a Tertiary-Care Unit

Sheeraz Shakoor Siddiqui¹, Shams Nadeem Alam²,
Monis Jaleel Ahmad³, Muhammad Muneer⁴, Jahanzeb Haider⁵

ABSTRACT

Objective: Laparostomy is a temporary measure to avoid abdominal compartment syndrome as well as allow repeated and ready access to abdomen for lavage. This study was conducted to identify the indications and analyze the outcome of laparostomy in a tertiary care surgical ward.

Methodology: This prospective study was conducted on laparostomy cases between March 2008 and February 2011. Data was analyzed for the indication, clinical course and final outcome. Results were expressed as frequency-percentage, means, procedural morbidity and overall mortality.

Results: A total of 16 laparostomies were performed during the study period. All 16 patients were operated in emergency. Burst abdomen with impending intra-abdominal hypertension was the most common indication followed by "grossly edematous bowel" which made primary closure impossible. A delayed deep tension closure was possible only in eight patients. Four patients died in the postoperative period. Persistent wound sepsis was the most common morbidity.

Conclusion: Laparostomy is often necessitated by the desperate situations encountered in emergency surgery.

KEY WORDS: Laparostomy, Open abdomen, Abdominal compartment syndrome, Intra-abdominal hypertension.

Pak J Med Sci April - June 2012 Vol. 28 No. 3 450-454

How to cite this article:

Siddiqui SS, Alam SN, Ahmad MJ, Muneer M, Haider J. Laparostomy: Three year experience in a Tertiary-Care Unit. Pak J Med Sci 2012;28(3):450-454

1. Sheeraz Shakoor Siddiqui, Assistant Professor,
2. Shams Nadeem Alam, Professor and Incharge,
3. Monis Jaleel Ahmad, Post-Graduate Year IV,
4. Muhammad Muneer Senior Registrar,
5. Jahanzeb Haider, Senior Registrar,
- 1-5: Surgical Unit-6, Civil Hospital, Karachi. Pakistan.

Correspondence:

Sheeraz Shakoor Siddiqui,
Assistant Professor, Surgical Unit-6,
Civil Hospital, Karachi.
E-mail: drss_16@hotmail.com

- * Received for Publication: October 31, 2011
- * 1st Revision Received: November 16, 2011
- * 2nd Revision Received: March 1, 2012
- * Final Revision Accepted: March 9, 2012

INTRODUCTION

The incidence of sepsis in contaminated laparotomies may be as high as 40%.¹ Another aspect of these emergent operations is the tissue edema encountered.¹ Finally, the impending specter of abdominal compartment syndrome also factors in the decision-making vis-à-vis abdominal closure.² The recognition of these factors led to the evolution of laparostomy during the 1970s.³

Laparostomy is currently the treatment of choice in abdominal compartment syndrome.⁴ The growing indications also include damage control laparotomy in polytrauma patients⁵, peritonitis with extensive bowel edema⁶ and retroperitoneal edema⁷, all of which frustrate the attempt to close the abdomen primarily. The added advantages

include ready access for relook⁷, direct visualization of abdominal contents⁸ and fascial preservation for future definitive closure.⁸

However, the morbidity affiliated with the procedure may be as high as 25%⁹, and the management of a frankly open abdominal cavity is a challenge in its own right. Common complications include fistulas, bleeding and ventral hernias.^{6,10}

Several techniques for laparostomy have been advocated. The simplest, and possibly the most cost-effective, is to apply a plastic silo (mostly in the form of a Bogota bag) with suturing all around the fascia.³ This has been advanced to various vacuum-assisted contraptions that have been shown to promote healing and keep the wound extra-clean.^{11,12}

The prime objectives of this study were two-fold: identify the clinical situations/pathologies necessitating laparostomy in our Unit; and, determine the eventual outcome of this procedure. We thus present a prospective analysis of the precise indications, post-operative morbidity, overall mortality and eventual outcome of all laparostomies performed in a single surgical unit of the Hospital during the past three years. The exact technique, mostly uniform among all surgeons of the unit, has also been described.

METHODOLOGY

The study was conducted in Surgical Unit 6 of the Civil Hospital Karachi, Pakistan. A prospective database for laparostomy cases was established in March 2008. All patients undergoing laparostomy were included. Their demographic details, principal diagnoses, preoperative findings and indication for laparostomy were documented. Postoperative course was recorded in terms of complications, final outcome at the time of discharge, mortality and cause of death. Any patient who left against



Fig.1: Laparostomy wound closed with deep tension sutures.

medical advice, or was shifted to another Unit or hospital on request was excluded.

A written Informed Consent was obtained from all patients included in the study. In case the patient was too obtunded, it was signed by the next of kin.

The Technique: The standard technique followed in all patients, and practiced uniformly by all Consultant surgeons and Residents, has been described here.

After the completion of laparotomy, a standard (approx. 25 X 10 cms.) sized drainage bag of polyvinyl plastic was perforated with multiple cuts and spread out on the intestine in such a manner that the redundant portion intervened between the bowel and the retracted abdominal wall: it is important that the sheet was not tailored to the abdominal wound and the extra bit used to this effect, so that at the time of subsequent explorations/definitive closure, the abdominal wall would remain separate from the intestine. This near-complete silo-wrap was then sutured to the rectus sheath with non-absorbable polypropylene No. 1 in a simple interrupted fashion. The wound was then covered with iodine-soaked gauze and transparent adhesive sheet (moisture-permeable).

The wound was then dressed daily in sterile fashion, and laparostomy revised as indicated. The decision for definitive closure was based on following parameters:

1. healthy granulating wound;
2. abdominal pathology had abated;
3. respiratory status (based on clinical examination and recent chest xray) was satisfactory; and,
4. signs of systemic sepsis (fever and leucocytosis) had disappeared.

If any of the above criteria were not fulfilled, expectant management was continued till the wound became covered with granulation tissue, which was then allowed to close by secondary intention.

The definitive closure was undertaken in one of the two ways: a) interrupted deep-tension sutures



Fig.2: Post-laparostomy skin-only closure.

Table-I: Demographics, diagnoses, indications of laparostomy, morbidity and mortality.

Age	Gender	Primary Diagnosis	Indication/s for laparostomy	Complications	Mortality and Cause
20	F	Enteric Perforation	Burst abdomen	Pelvic abscess	–
55	M	Obstructed carcinoma rectum	Burst abdomen	–	Septic shock
47	F	Gossipibioma; Post-hysterectomy	Burst abdomen	Persistent wound sepsis	–
25	M	GSW; Grade IV Liver trauma	Burst abdomen	Wound sepsis	–
29	F	Blunt trauma; multiple bowel injuries	Impending compartment syndrome	–	–
38	F	TB perforation	Compartment syndrome	Intraabdominal and wound sepsis	–
75	F	Acute Mesenteric Ischemia	Bowel edema	–	Septic shock
40	M	Gun-shot: Multiple bowel perforations	Burst abdomen	–	–
56	F	Strangulated incisional hernia	Retracted/attenuated sheath	Wound sepsis	–
37	F	TB perforation	Bowel edema; intra-abdominal sepsis	Sub-phrenic abscess	–
16	M	Necrotising pancreatitis	Retroperitoneal edema	Colocutaneous fistula	–
36	M	Ruptured liver abscess	Compartment syndrome; respiratory embarrassment	–	–
42	M	GSW; injury to duodenum, ileum, colon	Retroperitoneal and bowel edema	Duodenal fistula	Multi-organ failure
34	M	GSW; multiple bowel injury	Sever intra- abdominal sepsis	Enterocutaneous fistula	–
23	F	TB Abdomen	Compartment syndrome; retroperitoneal edema	–	–
66	F	Blunt trauma; multiple injuries	Impending compartment syndrome	–	DIC

of non-absorbable polypropylene No.1 (Fig.1); or b) if the rectus sheath had retracted farther apart, skin was undermined and approximated over the wound (Fig.2).

RESULTS

A total of 16 laparostomies were performed from March 2008 till February 2011. Mean age was 39.9 years (range, 16-75 years). Male/female ratio was 1:1.2. The commonest principle diagnosis was trauma, occurring in six patients (37.5%, n=16), of which two were blunt and rest penetrating gun-shots. The most frequent indications for laparostomy were 'burst abdomen' and 'compartment syndrome/impending compartment syndrome', documented in ten cases (62.5%, n=16). Table-I summarises the demographics, diagnoses, indication for laparostomy and complication of each of the individual patients. **Morbidity:** Overall morbidity was 68.7% (11 complications in 16 patients). Persistent suppuration and sloughing of the wound was the commonest complication, occurring in four patients. All of these patients required repeated revision of the laparostomy (average of 2 revisions per patient) under general anesthesia, and settled there-of. Three

patients developed intra-abdominal abscesses that required open drainage. Table-I.

Enterocutaneous fistulae were encountered in three patients. Two of these were polytrauma cases, one of whom expired on 23d post-operative day while the other one closed spontaneously. The third patient developed colonic fistula after pancreatic necrosectomy and settled on conservative treatment. **Definitive closure:** A definitive primary closure was obtained in only 50% patients (8 of 16 cases). Of these, five were full-fascial closures with deep-tension suturing. In the other three patients, the rectus sheath had retracted far laterally and only a skin cover was obtained after liberal undermining. All closures were affected under general anesthesia. The mean duration from laparostomy to definitive closure was 21.5 days (range 14-34 days).

In four patients, wound was allowed to heal secondarily. Two had enterocutaneous fistulae, thus necessitating expectant approach; while in another two the bowel had become 'fixed' with healthy granulation, obviating the need for closure.

Mortality: Four patients expired, three in the immediate post-operative period in the intensive care unit. Of these, one patient with polytrauma

developed disseminated intravascular coagulation (DIC) after multiple per-operative transfusions, while two patients died in septic shock after undergoing surgeries for mesenteric infarct and obstructed rectal growth respectively. The fourth patient with multiple gun-shots to the abdomen developed duodenal fistula after two weeks and died due to multi-organ failure on 23d day after the first surgery. Table-I.

Hospitalisation time: The mean hospitalization time for the 12 surviving patients was 25.5 days (range, 14-40 days).

DISCUSSION

The Civil Hospital Karachi is a tertiary care facility providing emergency cover to a large swathe of the population all the year round. The average number of emergency laparotomies in a 24-hour call is around four, and includes such diverse presentations as gun-shots, tuberculous and enteric perforations, and perforated or obstructed colonic malignancy. Quite a few of these patients present late, mostly due to logistic delays, from far-flung areas. It is thus not uncommon for the emergency surgeon to encounter an obscenely contaminated abdominal cavity, where either the edema or the chances of relaparotomy compel him/her to leave "the gates open". Also at times a post-operative exigency, such as burst abdomen, creates a scenario whereby laparostomy is necessitated.

Laparostomy is a somewhat desperate solution for equally desperate circumstances. The difficult dilemma arises as a result of grossly deranged physiology with impending compartment syndrome and multi-organ failure. Past decade has witnessed a profusion of studies recommending and often condemning the practice but proving nevertheless that the concept is still being considered as an option, albeit a questionable one.

Table-I outlines the wide spectrum of pathologies in which we were pressed to resort to laparostomy. It also represents an evolution in our choice of laparostomy: the first four laparostomies were done as second operations after the patient had shown signs of compartment syndrome or developed evisceration. Thereafter, only one laparostomy was performed as the second surgery; remaining eleven were pre-emptive decisions at the time of first surgery. The literature also holds testimony to this change in perception: the procedure was first introduced almost forty years earlier³, and revived in the early 90's, parallel to the concept of damage-control.¹³ As a result, most of the studies

reporting laparostomy in that decade were on trauma patients.^{5,13,14} The paradigm shift came in the last decade, when quite a few surgeons reported employing the concept in a wide variety of disease pathologies.^{1,4,6,7} Wilde and Loudon¹⁵ have categorically favored prophylactic laparostomy in critically ill patient; their decisions were more objective since they had P-POSSUM scores for all patients at the time of first surgery, while we mostly relied on subjective decision by the senior consultant.

However, none of the pre-emptive laparostomies in the current data was performed in anticipation of re-look. The decision was only taken once a decent attempt to primarily close the abdomen had failed. The current consensus does not approve of laparostomy as a pre-emptive tool for second-look laparotomy in secondary peritonitis.¹⁶

The technique employed in the current study is a customized one, taking into consideration the financial constraints of our set-up. The bag used was not a standard Bogota, nor a suction device implanted underneath, as has been recommended by Horwood¹¹ and Chen.¹² Instead, the wound was dressed daily with sterile precautions. Still, the high rate of wound suppuration (4 of 16 patients, 25%) may be attributable to this repeated change of dressings.

Wound suppuration after laparostomy also adversely affected our overall rate of definitive closure: fascial closure was possible in only 5 of 16 patients. Wilde and Loudon¹⁵ maintain that laparostomy with suction tubes and Opsite preserves fascial integrity and ensures high rates of final definitive closure. In their series of 11 patients, they achieved definitive closure in all during index admission.

The specter of enterocutaneous fistula always looms large in the open abdomen. Desiccation and erosion under the laparostomy have been implicated in the causation of fistulae.¹⁷ The reported incidence of this complication is as high as 25%.⁹ We encountered it in three patients, of which the duodenal fistula was least likely to be a direct complication of laparostomy, and was possibly the result of drain eroding into the duodenum. This patient succumbed to multi-organ compromise; the other two healed without any further surgical intervention.

Definitive fascial closure as early as possible is probably the most desirable outcome in laparostomy.⁴ We were able to achieve it in only half the patients. Using novel techniques to minimize wound suppuration and promote drainage, other studies have reported promising rates of definitive

closures.^{15,18} The current data, although small in number due to use of the technique based on precise indication, is the preliminary result of an evolving experience, we hope to be able to achieve better rates of final closure as the technique matures and apprehensions abate.

Mortality in the current series was 25%. Gonullu et al¹⁹ reported a higher mortality in patients with higher APACHE II (Acute Physiology and Chronic Health Evaluation) and MPI (Mannheim Peritonitis Index) scores; their mortality rate was 43%. Rakic et al²⁰ have documented a mortality of 59%. Although no objective parameter was computed in this study (e.g. APACHE, POSSUM etc), we believe that most patients undergoing laparostomy have severely deranged physiology to start with, and high mortality is more reflective of a compromised homeostasis than the procedure itself.

We have not included long-term follow-up, and these are preliminary results of a new practice consistently being employed in our unit. For future studies, we intend to analyze long-term complications, especially incisional hernias.

Limitations: This is a pilot study describing a modality which is still looked at with skepticism. The hesitation to go for the laparostomy, on part of both the surgeon and the patient/next of kin, thus partly accounts for a small series in the given duration. Additionally, the severity of the illness was not assessed with any objective scale (like the APACHE II), which may have provided practical information regarding the final outcome.

Ethical approval: There was no Institutional Review Board in the Dow University of Health Sciences, Karachi, at the time the research protocol was designed in March 2008, hence no approval was obtained but written informed consent of all patients or their kin was obtained.

CONCLUSION

Laparostomy is a useful emergency measure in desperate circumstances in the local setting which can be employed in a variety of situations that preclude abdominal closure, despite its association with a high morbidity and, consequently, long hospital stay.

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Authors Contribution:

SS Siddiqui: Research protocol/Study design, surgical procedure, data collection, data analysis and manuscript writing.

SNA: Research protocol/Study design, surgical procedure and manuscript writing.

MJ: Data Collection, analysis, surgical procedure and revising the manuscript.

MM and JH: Data interpretation, surgical procedure and reviewing of manuscript.