Still is there a Role of Diagnostic Peritoneal Lavage in the Management of Blunt Abdominal Trauma?

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ABSTRACT

Objective: To find out the role of diagnostic peritoneal lavage (DPL) and need of explorative laparotomy after blunt abdominal trauma.
Methodology: This study was done in Combined Military Hospital Pano Aqil and Combined Military Hospital Kohat from October 2002 to September 2006. All patients presented with blunt abdominal trauma and evaluated with DPL were included in the study. The standard open technique of DPL was used. All patients with positive DPL were undergone explorative laparotomy while patients with negative DPL were admitted and observed and operated if signs of peritonitis were evident. Data was analyzed by descriptive statistics.
Results: During the study period total 51 patients fulfilled the inclusion criteria and included in the study. Of 51 patients, the tests on 25 (49.0%) patients were considered positive; 26 (51.0%) were negative. The 25 patients with positive tests were operated upon and liver was the commonest organ injured in 11 (47.8%) patients. Two (8.0%) of the 25 had a false positive test, a result of bleeding from the incision. Of 26 patients with negative tests, one was operated upon because of evidence of peritoneal irritation but had negative operative findings.
Conclusion: DPL is an important tool in the evaluation of the blunt abdominal trauma patients. When indications of urgent surgery were not clear, a positive test allows for prompt intervention. A negative DPL test supports observation and subsequent discharge.
Key words: Blunt abdominal trauma, diagnostic peritoneal lavage, explorative laparotomy.

INTRODUCTION

Blunt abdominal trauma is a common surgical emergency in the Emergency Department of general hospitals with a leading cause of morbidity and mortality among all age groups[1]. The abdomen of blunt abdominal trauma patients is routinely evaluated with physical examination, however, identification of serious intra-abdominal pathology is often challenging even for the surgical consultants as many injuries may not obvious during the initial assessment and treatment period[2]. Many patients suffer other injuries that may distract the physician's attention from potentially life-threatening intra-abdominal injuries[3]. Moreover, under the influence of alcohol or illicit drugs and in patients with associated injuries to the head or spinal cord, physical examination may be unreliable[4]. Rushing a patient to what proves to be a nontherapeutic laparotomy leads to increasing morbidity and mortality and inappropriate utilization of hospital resources.[5] Alternatively, failure to identify the need for urgent laparotomy has even more serious consequences.

Thus, in multi-system blunt abdominal trauma, many diagnostic studies are commonly indicated.

Diagnostic peritoneal lavage (DPL) focused abdominal sonography for trauma (FAST), and computed tomography (CT) are usual tests used for abdominal evaluation after blunt abdominal trauma[6]. Each of these diagnostic modalities has unique advantages and disadvantages. DPL is an invasive, rapid, and reliable test for evaluating intra-peritoneal hemorrhage or a ruptured hollow viscus[7]. DPL plays a role in both blunt and penetrating abdominal trauma. DPL, first described in 1965, replaced the four-quadrant abdominal tap, with a higher sensitivity and specificity in identifying intra-abdominal injury[8].

With the increasing availability of either trained ultrasonographer or emergency physician or surgeon-performed FAST or availability of CT scanner, it has been suggested that diagnostic peritoneal lavage is now obsolete. However, still there are places in our country where both FAST and CT scan are not available, especially in out of hours' time. In these places and times, DPL still have a role and utilized by trauma surgeons in deciding the need of urgent laparotomy after equivocal physical examination. In this

study, the role of Diagnostic Peritoneal Lavage and need of explorative laparotomy after blunt abdominal trauma was evaluated.

PATIENTS AND METHODS

This study was done in Combined Military Hospital Pano Aqil and Combined Military Hospital Kohat from October 2002 to September 2006. All patients presented with blunt abdominal trauma and evaluated with DPL were included in the study. The blunt abdominal trauma patients were subjected to DPL on the following indications:

1. Equivocal abdominal findings
2. Un-explained hypotension
3. Altered sensorial due to head injury, shock or drugs
4. Spinal cord injuries
5. Patients in whom a prolonged anaesthesia was likely to make further examination unreliable.

The standard open technique of DPL was used after emptying stomach with nasogastric tube and urinary bladder with foley's catheter.

Criteria for positive diagnostic peritoneal lavage was a) aspiration of 10ml or more of gross blood or intestinal contents; b) A red blood cell count greater than 100,000 cells/mm^3; c) a white blood cell count greater than 500 cells/mm^3; d) amylase level greater than 100 units/ml'; e) bilirubin level greater than the serum bilirubin level; f) creatinine level greater than serum creatinine level and; g) bacteria found on gram's stain.

All patients with positive DPL were undergone explorative laparotomy while patients with negative DPL were observed for at least 24 hours and operated if signs of peritonitis were evident. All the findings were recorded in a specially designed proforma. Data was analyzed by descriptive statistics.

RESULTS

During the study period, total 51 patients fulfilled the inclusion criteria were included in the study. Demography of the patients is shown in Table-I. Of the 51 patients with DPL, 43 (84.3%) patients had equivocal abdominal findings on clinical assessment whereas 5 (9.8%) had a low blood pressure that could not be explained on the basis of other injuries; 2 (3.9%) patients were unconscious with head injury and one (1.9%) had spinal cord injury which made the clinical evaluation unreliable.

Table-II summarizes experience with diagnostic peritoneal lavage. Of 51 patients, the tests on 25 (49.0%) were considered positive; 26 (51.0%) were negative. The 25 patients with positive tests were operated upon and findings are listed in Table-III. Liver was the commonest organ injured in 11 (47.8%) patients. There were three (12.0%) deaths all associated with severe head or post-operative pulmonary complications. Two (8.0%) of the 25 had a false positive test, a result of bleeding from the incision.

Of 26 patients with negative tests, one was operated upon because of evidence of peritoneal irritation but had negative operative findings (Table-II). All patients were admitted and followed for at least 24 hours in the hospital. There was no death in this group.

Table-I: Demography and reasons of blunt abdominal trauma of patients

Variables	**n(%)**
Age in years	
1-10	6 (11.7)
11-20	12 (23.5)
21-30	16 (31.3)
31-40	3 (5.9)
41-50	7 (13.7)
51-60	6 (11.7)
Gender	
Male	45(88.2)
Female	6(11.7)
Cause of blunt abdominal trauma	
Road Traffic Accident	23 (45.0)
Assault	19 (37.2)
Fall from height	5 (9.8)

Buffalo attack	4 (7.8)

Table-II: Results of Diagnostic Peritoneal Lavage (DPL)

DPL results	**n (%)**
Suspected abdominal injury	51 (100)
Positive lavage	25 (49.0)
Positive lavage with positive exploration	23 (92.0)
Positive lavage with negative exploration	2 (8.0)
Negative lavage	26 (51.0)
Negative lavage with -ve exploration	1 (3.8)
Negative lavage with positive exploration	0 (0)
Negative lavage with no exploration	25 (96.1)

Table-III: Abdominal findings in lavage positive patients (n = 23)

Organ injured	**n (%)**
Liver	11 (47.8)
Bowel	9 (39.1)
Spleen	4 (17.3)
Retroperitoneal hematoma	3 (13.0)

DISCUSSION

Findings of our study showed that Diagnostic Peritoneal Lavage has still a role in the management of blunt abdominal trauma when the indications for explorative laparotomy were not clear. About half of our patients were operated immediately because of positive result of DPL with only 8% negative exploration. Furthermore, only one patient need exploration after negative DPL but that patient too has nontherapeutic exploration. DPL in patients sustaining blunt abdominal trauma is rapidly performed and over 90% sensitive and specific for the presence of intraperitoneal bleeding.[9] Current guidelines as taught in Advanced Trauma Life Support (ATLS) courses throughout the world, suggest that "a positive test and the need for surgical intervention are indicated by >100,000 red cells/mm^3, >500 white cells/mm^3, or a Gram's stain with bacteria present" in the fluid obtained.[3] In our study, we used the same criteria to diagnose positive DPL. Most common injured organ was liver after blunt abdominal trauma in this study. Same findings were observed by another study from Lahore[10].

Focused abdominal sonography for trauma (FAST) is a rapid, noninvasive and can be repeated multiple times throughout the resuscitation period. However FAST is more user-dependent than DPL or CT scanning[11]. Both FAST and DPL ineffectively assess retroperitoneal and diaphragmatic injuries as well as solid organ damage. CT scanning requires a vitally stable patient, is expensive and carries a small but significant lifetime risk of malignancy[5,12]. However, as compared to DPL or FAST, CT scanning reliably diagnoses solid organ injuries and evaluates the retroperitoneum[13]. The sensitivity and specificity of CT for bowel and mesenteric injuries is not superior to DPL.[14] As a result of these differences, all three tests continue to play important roles when evaluating a trauma patient for abdominal injuries depending upon availability, experience of surgeon and patient's condition.

Continuing improvements in technology of CT scan (faster scan time, third generation of machines) and widespread acceptance of focused abdominal sonography for trauma (FAST) have prompted the suggestion that diagnostic peritoneal lavage (DPL) is obsolete. This feeling, combined with decreasing resident experience with DPL, has led to a poor understanding of the modern indications for DPL and no clear guidelines.[15] While its indications may have changed, DPL remains essential in the rapid, effective triage of the trauma patient, especially in under developed areas with limited recourses.

Since DPL is performed less commonly today, surgeons are not trained in performing DPL. A study from UK in 2005 showed that 53% of surgical trainees had either never performed and 38% never observed a diagnostic peritoneal lavage during their training. One third of trainees felt diagnostic

peritoneal lavage to be obsolete and would never consider using it[16]. Another study showed that surgeons have little experience in performing DPL, and even if they do there is a 75% chance that the hematology technician they contact will be unable to analyze the sample they send, especially if DPL performed in evening and night time. Reasons given by technicians for why the DPL fluid could not be analyzed included: fluid "blocking the machine", "never heard of the investigation", lack of guidelines[17].

The only absolute contraindication to DPL is previous abdominal surgery. Relative contraindications include preexisting coagulopathy, advanced chronic liver disease and morbid obesity. Relative contraindications to the standard infraumbilical approach include patients with a pelvic fracture or females beyond the 1st trimester of pregnancy[7].

Most complications occur when principles are ignored. Not decompressing the urinary bladder or stomach increases the chances of injury to either organ[7]. In our series, no complication was reported, the reason may be that we always follow the principles and routinely decompress stomach and urinary bladder.

In blunt abdominal injuries, DPL has still a number of indications but is dependent upon the patient's condition and availability of CT scanning and FAST. DPL is useful for patients who are in shock and when FAST capability is not available like in small trauma centers. DPL should be formally taught and all surgeons and emergency physicians should be trained to properly performed DPL so that patient care should be improved and all patients were not subjected to radiation of CT scan.

There is need of not only more large scale multi-centric studies to find out the efficacy of DPL but also to explore the surgeon's and emergency physician's opinion and training of DPL. Also, evidence is required that our labs have proper facilities both in term of human resource, guidelines and equipment to analyze sample of DPL round the clock.

CONCLUSION

DPL continues to be a vital tool in the evaluation of the blunt abdominal trauma patient. A positive test in the hemodynamically stable patient and hemodynamically unstable patients with potential multisystem trauma allows for prompt intervention. A negative test after blunt abdominal trauma supports observation and early subsequent discharge.

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