



Interpretation Challenge of Deep Peritoneal Lavage in a Trauma Patient with Liver Cirrhosis: A Case Report Study

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Abstract

Background: Trauma is one of the most common surgical emergencies. Deep peritoneal lavage (DPL) is an invasive rapid test for detecting intra-abdominal hemorrhage or hollow viscera damage. However, there seems to be a defect in the interpretation of DPL in cirrhotic patients.

Case Presentation: The authors reported a 54-year-old male patient who was a known case of cryptogenic liver cirrhosis and was referred due to falling. On the seventh day of admission, due to the persistence of abdominal distention and food intolerance, the medical team decided to conduct DPL to investigate hollow viscera damage. Since the peritoneum fluid analysis expressed a positive finding, the team decided that the patient should undergo explorative laparotomy. Intraoperative findings included cirrhotic liver with ascites without any evidence of bile secretions and intestinal contents. Unfortunately, however, the patient died on the 15th day.

Conclusion: The present case report is the first study on the false-positive DPL results in cirrhotic patients. It showed that positive DPL findings were untrustworthy in cirrhotic patients, and more powerful diagnostic tools are required for laparotomy decisions.

Keywords: Case report, Cirrhosis, Diagnostic peritoneal lavage, Trauma

1. Background

Trauma is one of the most prevalent surgical emergencies leading to morbidity and mortality (1). Timely diagnostic analyses, such as focused abdominal sonography for trauma (FAST), computed tomography (CT), and diagnostic peritoneal lavage (DPL), can prevent traumatic complications. The DPL is an invasive rapid test for detecting intra-abdominal hemorrhage or hollow viscera damage, which is used in both blunt and penetrating abdominal trauma (2).

Although currently, FAST and CT are used more frequently than DPL, it is still used in some cases (3). As a case in point, DPL (or laparoscopy) is necessary to rule out diaphragm injuries in left-sided thoracoabdominal penetrating traumas. Additionally, since FAST is not 100% sensitive, in hemodynamically unstable patients with blunt trauma, DPL can lead to a more accurate diagnosis. Moreover, in cases of head trauma that compromise the abdominal examination, DPL is efficient for investigating bowel injuries (4).

Although the obvious need for laparotomy is the only absolute contraindication of DPL (5), there seems to be a defect in this field. This study aims to report the pitfall of DPL in a cirrhotic patient with abdominal blunt trauma.

2. Case Presentation

A 54-year-old male patient who was a known case of cryptogenic liver cirrhosis was referred by the

Emergency Medical Services to the emergency department of our center due to falling from a height of three meters. Vital signs at the time of admission were normal (BP: 102/65 mmHg, PR: 72/min, RR: 19/min, T: 37.3°C, and GCS: 14). Abdominal tenderness, rebound tenderness, and guarding were absent, and physical examination revealed no abnormality in terms of general surgery, except for mild to moderate ascites. Laboratory data at admission time are presented in Table 1.

Considering the falling complaint and the presence of abdominal free fluid in the FAST exam, brain, and abdominopelvic CT scans were taken with contrast (4). A small-sized subarachnoid hemorrhage was seen in the brain CT scan. The abdominal CT scan showed a small-sized liver with an irregular border and mild splenomegaly with minimal intraperitoneal ascites. Despite the fat stranding observed in the root of the small bowel mesentery and the ascending colon, there was no evidence of pneumoperitoneum or solid organ injuries. Therefore, the patient continued to be under observation. Four days later, abdominal distention occurred, and the patient showed food intolerance. On the seventh day of admission, due to the persistence of abdominal distention and food intolerance, the medical team decided to conduct DPL to investigate hollow viscera damage. The aspirated peritoneal fluid had a blood color, but no obvious bile or fecal secretions were observed. Since the peritoneum fluid analysis indicated positive findings (Table 2) and considering

Table 1. Laboratory data at the time of admission, the fourth, and the seventh day

Measured factor	Patient's value at the time of admission	Patient's value on the fourth day of admission	Patient's value on the seventh day of admission
RBC ¹ count	4.81×10 ⁶ /μL	4.69×10 ⁶ /μL	4.86×10 ⁶ /μL
WBC ² count	15200/μL	5200/μL	34600/μL
Platelet count	95×10 ³ /μL	77×10 ³ /μL	94×10 ³ /μL
Hemoglobin level	10.3 g/dL	10.2 g/dL	11.3 g/dL
AST ³ level	58 IU/L	50 IU/L	169 IU/L
ALT ⁴ level	20 IU/L	40 IU/L	95 IU/L
Alkaline phosphatase level	143 IU/L	94 IU/L	154 IU/L
Total bilirubin level	4.6 mg/dL	2.9 mg/dL	3.5 mg/dL
Direct bilirubin level	0.5 mg/dL	0.8 mg/dL	1 mg/dL
INR ⁵ level	1.7%	1.94%	2.68%
Creatinine	0.5 mg/dL	0.8 mg/dL	3.5 mg/dL
BUN ⁶	21 mg/dL	39 mg/dL	63 mg/dL

1. Red blood cells, 2. White blood cells, 3. Aspartate transaminase, 4. Alanine transaminase, 5. International normalized ratio, 6. Blood urea nitrogen

previously mentioned evidence of CT scan, as well as physical examination, the team decided that the patient should undergo explorative laparotomy. Intraoperative findings included cirrhotic liver with ascites without any evidence of bile secretions and intestinal contents. However, the patient's consciousness gradually decreased and deteriorated toward uncompensated cirrhosis during the days after the operation (hepatic encephalopathy). On the 10th day of admission, laboratory findings and clinical examination were consistent with hepatorenal syndrome. Therefore, hemodialysis was planned for the patient. Unfortunately, however, the patient died on the 15th day.

Table 2. Peritoneum fluid analysis of the patient

Measured factor	Patient's value	Criteria for a positive finding	Simultaneous blood value
RBC ¹ count	1/mL	>100,000/mL	4.86×10 ⁶ /μL
WBC ² count	0/mL	>500/mL	34600 μL
Amylase level	63 IU/L	>19 IU/L	Not available
Alkaline phosphatase level	728 IU/L	>2 IU/L	154 IU/L
Bilirubin level	1.5 mg/dL	>0.01 mg/dL	3.5 mg/dL*

1. Red blood cells, 2. White blood cells, * Total bilirubin level

4. Discussion

Abdominal trauma is one of the most common surgical emergencies. Since 1965, when the DPL replaced the four-quadrant abdominal tap (6), several studies have reconfirmed the key diagnostic role of DPL over the years (1, 2, 7). The criteria for the positive test and the need for surgical intervention are represented in Table 1.

An obvious need for laparotomy is the only absolute contraindication of DPL (5). Other relative contraindications include coagulopathy, previous abdominal surgery, advanced cirrhosis, morbid obesity that were previously present, pelvic fracture, and females beyond the first trimester of pregnancy. However, the clinical judgment of the medical team has a priority (3). The DPL can be

helpful in various cases due to the CT limitations, such as expensive costs, high-dose radiation, usage constraints in end-stage kidney disease, and lack of access in all centers (8).

On the other hand, previous studies have shown that the overall mortality rate is higher among cirrhotic patients undergoing laparotomy for trauma, compared to that in non-cirrhotic patients (45% versus 24%, HR: 7.60). This comparison is also the same for a lengthier ICU stay and more costs (9). For this reason, patients with cirrhosis who need surgery should be chosen with more caution and accuracy. Considering low plasma oncotic pressure, the suppression of the sympathetic nervous system, a decrease in Renin-Angiotensin-Aldosterone System activity, and vasopressin release in cirrhotic patients (10), this population is more exposed to blood pressure drop during trauma. Therefore, it is essential to monitor these patients' vital signs regularly.

Whereas serum-ascites albumin gradient (SAAG) is predominantly high (>1.1 mg/dL) in cirrhotic patients because of portal hypertension (11), hollow viscus injury could make the ascites fluid exudative with a low SAAG (<1.1 mg/dL). It seems that using albumin and SAAG, as other measurable criteria in DPL, can efficiently detect bowel injuries, especially in patients with cirrhosis. Unfortunately, the albumin level was not checked in the patient under study, and the authors couldn't test this hypothesis. Therefore, more investigations are needed.

The reported patient was evaluated by physical examination and imaging during the hospital stay. Since the clinical findings were suspicious, it was decided to perform DPL to determine if laparotomy was needed. Although positive test results guided the team toward laparotomy, these findings were false. Accordingly, in patients with cirrhosis (especially at the end stages), DPL shows false-positive results and does not have diagnostic value. Since surgery in cirrhotic patients with a positive DPL is associated with a high mortality rate, it's necessary to interpret DPL findings in cirrhotic patients more accurately. Therefore, minimally

invasive techniques, such as diagnostic laparoscopy, has fewer complications than laparotomy in trauma patients with liver cirrhosis who have positive DPL findings or a suspicious abdominal examination.

Further studies are needed to investigate the use of DPL in general surgery patients and in those who underwent surgery for other reasons and showed sudden blood pressure drops.

6. Conclusion

The present case report is the first study on the false-positive DPL results in cirrhotic patients. It showed that positive DPL findings were untrustworthy in cirrhotic patients, and more powerful diagnostic tools are required for laparotomy decisions.

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None.

Footnotes

Conflicts of Interest: None to declare.

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