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Original Research Article

Diagnostic peritoneal fluid aspiration: a simple maneuver to diagnose a major question: a prospective study surgical point of view

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ABSTRACT

Background: A variety of fluids can accumulate in the peritoneal and pelvic cavities including ascites, blood, pus, bile, urine, lymph, cerebral spinal fluid, and mucin. The appearance of some of these fluids by imaging may suggest a specific etiology, but a diagnostic aspiration must be performed in the majority of cases. This review aims to assess critically the value of peritoneal fluid analysis in the diagnosis.
Methods: There was prospectively evaluated 80 patients presented with intraperitoneal fluid collection at Sohag University Hospital from July 2016 till July 2017. Physical, chemical, bacteriological and cytological properties of the aspirated peritoneal fluid was studied.
Results: The study included 80 patients with intra-peritoneal collection of surgical importance (due to trauma, inflammation, malignancy). Diagnostic aspiration from intra-abdominal collection was routinely done in all cases giving the following results: 20 cases (25%) showed blood in the aspirate, 18 cases (22.5%) showed pus, 11 cases (13.75%) showed bile stained fluid, 9 cases (11.25%) showed gastric contents, 8 cases (10%) showed serosangenous aspirate, 7 cases (8.75%) showed clear fluid aspirate, 4 cases (5%) showed turbid fluid and 3 cases (3.75%) showed small intestinal contents.
Conclusions: Diagnostic aspiration from intraperitoneal fluid collection is considered a simple available test that helps in diagnosis of major problematic cases.

Keywords: Aspiration, Intraperitoneal fluid collection, Peritonitis

INTRODUCTION

A variety of fluids can accumulate in the peritoneal and pelvic cavities including ascites, blood, pus, bile, urine, lymph, cerebral spinal fluid, and mucin.[1] The appearance of some of these fluids by imaging may suggest a specific etiology, but a diagnostic aspiration must be performed in the majority of cases.[2]

This review aims to assess critically the value of peritoneal fluid analysis in the diagnosis. Diagnostic Aspiration from intraperitoneal fluid collection is considered a simple available test that help in diagnosis of major problematic cases. The initial evaluation of the gross appearance of peritoneal fluid can offer useful information in the differential diagnosis. Under normal conditions, peritoneal fluid is clear to pale yellow.[3]

Hemoperitoneum is a characteristic of trauma, Rupture aortic aneurysm, hemorrhagic pancreatitis, rupture spleen,or ectopic pregnancy. Bloody peritoneal fluid "serosanginous" is characteristic of strangulated herniation, malignancy, mesenteric vascular occlusion or rupture ovarian cyst, whereas clear or straw-colored ascites is often associated with cirrhosis. Therefore, the

gross appearance of peritoneal fluid can provide preliminary clues regarding the etiology of the underlying disease.[3]

Diagnostic peritoneal aspiration is highly sensitive to help us making a good idea about the diagnosis, detecting its etiology and method of management.[4]

The aim of the study is Evaluate the sensitivity and value of peritoneal fluid aspiration in diagnosis of peritoneal collection.

METHODS

This prospective study was conducted in general surgery department at Sohag University Hospital at the period from July 2016 till July 2017. The study included 80 patients with suspected intraperitoneal collection of surgical importance at any age and sex presented with acute abdomen, history of trauma or previous operation.

Patients with intra-peritoneal collection due to liver cirrhosis, cardiac or renal diseases were excluded from the study.

Data on admission included history taking, clinical examination, laboratory investigations, and imaging. Diagnostic peritoneal fluid aspiration under US guide was done to detect the cause and nature of peritoneal collection, physical, chemical, bacteriological and cytological properties of the aspirate was studied.

Technique

- The aspiration done under US Guide
- Positioning of the patient was according to the site of collection; head up or down, right tilt or left tilt
- Select an appropriate point on the abdominal wall in the right or left quadrants, lateral to the rectus sheath under ultrasound guide to mark a spot
- Clean the site and surrounding area with 2% Chlorhexadine and apply a sterile drape
- Anaesthetise the skin and deeper tissue with Lidocaine
- Take a clean needle and 20ml syringe and insert through the skin advancing and aspirating until fluid is withdrawn
- Aspirate
- Remove needle and apply sterile dressing.

RESULTS

The study included 80 patients with intra-peritoneal collection of surgical importance (due to trauma, inflammation, malignancy). 65% were males and 35% were females. The age ranged from 6 months to 70 years old

Table1: Number and percent of cases according to aspiration and diagnosis.

Aspiration	Number 80 case	Pathological diagnosis	No (%)
Blood	20 cases	Splenic injury	13 (16.2%)
		Liver injury	5 (6.2%)
		Malignancy	1 (1.2%)
		Abdominal apoplexy	1 (1.2%)
Serosanguinous	8 cases	Strangulated intestinal obstruction	4 (4.8%)
		Rupture ovarian cyst	2 (2.4%)
		Malignancy	1 (1.2%)
		Acute hemorrhagic pancreatitis	1 (1.2%)
Pus	16 cases	Appendicular abscess	10 (12.5%)
		Abdominal abscess	6 (7.5%)
Bile	11 cases	Biliary leakage post-operative	11 (13.7 %)
Gastric contents	9 cases	Perforated peptic ulcer	9 (11.2%)
Clear Fluid	6 cases	Urinary bladder injury	5 (6.2%)
		Acute pancreatitis	2 (2.4%)
Turbid Fluid	7 cases	Strangulated Intestinal obstruction	2 (2.4%)
		Acute pancreatitis	3 (3.6%)
		Appendicular abscess	1 (1.2%)
		TB peritonitis	1 (1.2%)
Small intestinal contents	3 cases	Fecal peritonitis	3 (3.6%)

Diagnostic aspiration from intra-abdominal collection was routinely done in all cases. The aspirate was blood in 20 cases (25%), pus in 16 cases (20%), bile in 11 cases (13.75), gastric content in 9 cases (11.25%),

serosanginous in 8 cases (10%), clear fluid in 7 cases (8.75%), turbid fluid in 6 cases (7.5%) and small intestinal content in 3 cases (3.75%).

Table 2: Different diagnostic methods proved by the results.

Method of diagnosis	No.(percentage of cases)	Diagnosis
Aspiration	28 cases (35%)	Perforated peptic ulcer Fecal peritonitis Biliary leakage Urinary bladder injury
Abdominal plain X-ray	7 cases (8.75%)	Intestinal obstruction
Abdominal US	25 cases (31.25%)	Splenic injury Appendicular abscess Abdominal abscess
Abdominal CT	15 cases (18.7%)	Liver injury Acute pancreatitis, pancreatic cyst Malignancy
Diagnostic laparoscopy	3 cases (3.75%)	Malignancy
Intra-operativ diagnosis	5 cases (6.25%)	Intestinal injury Rupture ovarian cyst

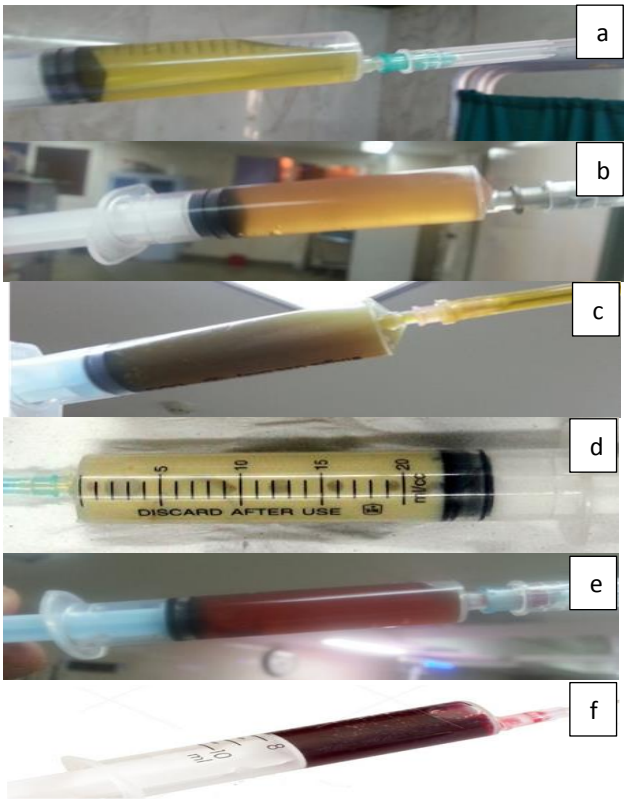

Figure 2: Gross picture of intra-peritoneal fluid; a) Clear fluid; b) Turbid fluid; c) Turbid bile; d) Pus; e) Serosangenous (bloody); f) Blood.

Number of cases diagnosed by aspiration 28 case (35%). There are 25 cases (31.25%) diagnosed by abdomen ultrasound US, 15 cases (18.7%) diagnosed by CT abdomen, 7 cases (8.75%) diagnosed by X-ray, only 5 cases (6.25%) diagnosed intra-operative, diagnostic laparoscopy was used in 3 cases (3.75%) to diagnose ascites of unknown etiology.

Cytology of malignant peritoneal fluid by papaniculaou stain

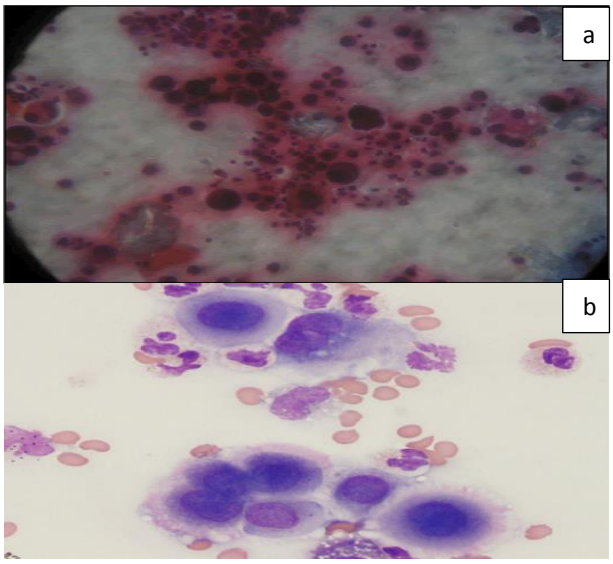

Figure 3 a) and b): Microscopic picture of malignant peritoneal fluid using papaniculaou stain showing cells with malignant criteria (pleomorphism, large nuclei, abnormal shape nuclei and high nuclear cytoplasmic ratio.

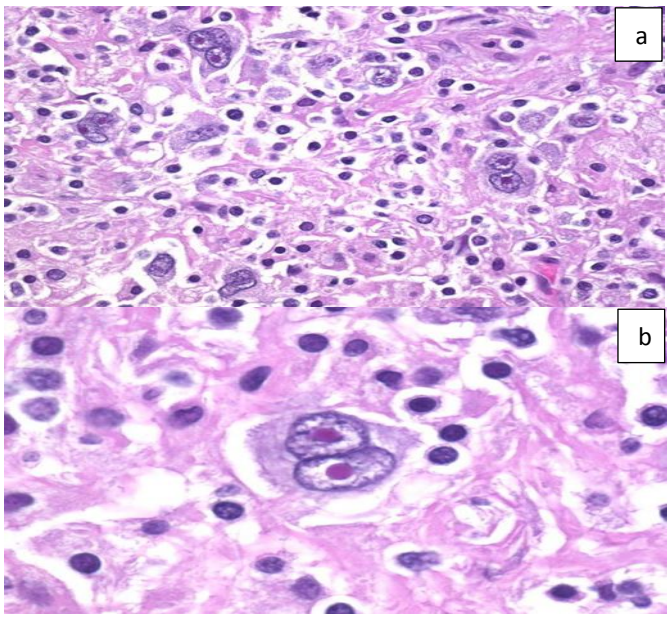

Figure 4 a) and b): Microscopic picture of Hodgkin Lymphoma showing the blue cells that have the appearance of owl's eyes are called Reed-Sternberg cells are the hallmark cells of Hodgkin lymphoma.

DISCUSSION

Peritoneal fluid is a liquid made in the abdominal cavity which lubricates the surface of tissue that lines the abdominal wall and pelvic cavity. It covers most of the organs in the abdomen and prevents adhesions.[5]

The peritoneum consists of serous membranes that line the peritoneal cavity through a network of mesothelial cells and collagen.

Intraperitoneal collection is a consequence or complication of a number of diseases, including hepatic, cardiac, and renal diseases, infection, and malignancy or trauma or rupture aortic aneurysm.[1]

The study evaluated all cases presented with intra-peritoneal collection presented in surgery emergency room, in the form of studying the presentation, aspiration, investigations and management.

In this study, a group of 80 patients with variable types of peritoneal collection were discussed, patients were on all age groups ranged from 6 months to 70 years.

Diagnostic aspiration from intraperitoneal fluid collection has routinely done to all cases included in the study as it is considered a simple available test that help in diagnosis of major problematic cases.

The most common cause of peritoneal collection in our surgery department is inflammation in the form of appendicular abscess, abdominal abscess, perforated peptic ulcer and Acute pancreatitis, usually the common presentation is acute abdomen, aspiration under US guide gives pus which is golden yellow, thick, offensive odour with high total leukocytic count, if the Aspiration shows gastric content it is diagnostic to perforated peptic ulcer ,inflammation management is either operative or conservative or pig tail insertion to drain pus in case of bad general condition patients.

Massimo et al, mentioned that Inflammation and intra-abdominal abscess are the most common cause for intraperitoneal collection in surgery.[6] Currently the commonest etiology of intra-abdominal abscess is post-surgery. The sub-phrenic abscesses in one series, 85% occurred in postoperative patients.

Abscesses can be located in any part of the abdomen and pelvis. Fluid in the abdomen moves along predictable pathways. Certain recesses and pouches in the abdomen are more likely to collect fluid or abscesses than other areas because of their size and dependent gravitational position. Douglas' pouch in the pelvis and the right posterior sub-hepatic space (Morison's pouch) are common sites.[7]

The second most common cause of intraperitoneal collection in our emergency room is trauma (27.5%) due to motor car accident, falling from height, blunt abdominal trauma, firearm or stab. The commonest presentation is acute abdomen. Diagnostic aspiration under ultrasound guidance is mandatory especially if the US showed collection with no evident organ injury. The aspiration is mostly blood due to organ injury (spleen or liver). 5 cases (6.2%) in our series presented by anuria and the fluid aspirate was amber yellow and showed high creatinine level (urine). This case scenario is common in case of rupture urinary bladder due to abdominal trauma. CTU is important to ensure the diagnosis showing extra-vastion or not.

Bladder injuries after blunt or penetrating trauma are rare, constituting less than 2% of abdominal injuries requiring surgery. Such rarity owes to the protected position of the bladder deep in the bony pelvis.[8]

Post-operative complications in the form of intraperitoneal collection represents 15% of cases in our study. It is usually biliary leakage or fecal peritonitis. Biliary leakage occurs post cholecystectomy or post repair of liver injury giving greenish bile in the drain in the first 48 hours postoperative. Total bilirubin in the drain is significantly high which is diagnostic for bile. Fecal peritonitis may occur post any resection anastomosis operation presented in the form of leakage of small intestinal content in the drain.

Significant postoperative bile leaks occur in up to 1% of patients undergoing laparoscopic cholecystectomy compared to 0.5% in open cholecystectomy. Usually present within first week but can manifest up to 30 days after surgery.[9]

Williams et al, said that biliary leaks after cholecystectomy include iatrogenic injury to the common bile duct, insufficient management of the cystic duct stump, or anatomic variants, including the accessory ducts of Luschka, which are small biliary ducts in the gallbladder fossa that drain into the biliary system.[10]

Biliary leakage isn't only iatrogenic but also may be due trauma to gall bladder or CBD or inflammatory perforation of gall bladder due to acute gangrenous cholecystitis.[10]

Malignancy represents 3.7 % of intraperitoneal collection cases: the aspirate is serosanguinous, cytology was positive for malignant cells: diagnostic laparoscopy identified the tumour with biopsy taken from the abdominal mass. Later on, the biopsy showed lymphoma in one case and adenocarcinoma in the other. Usually the presentation of the patient is ascites of unknown etiology. Ayantunde et al, reported that intraperitoneal collection is the first detected sign in malignancy.[11]

Malignancy accounts for approximately 10% of all cases of intraperitoneal collection.[12]

Aspiration from intraperitoneal collection proved to be diagnostic in 35% of studied populations especially those with perforated peptic ulcer, fecal fistula, biliary leakage, the gross picture, physical and chemical characters of the aspirate will give us a great idea about the diagnosis. Gerzof et al, reported that aspiration under US guide is mandatory either as a diagnostic tool or even therapeutic in certain situations.[13]

Aspiration is accurate, rapid and safe for the diagnosis of abdominal collections.[4]

CONCLUSION

Diagnostic aspiration from intraperitoneal fluid collection is considered a simple available test that help in diagnosis of major problematic cases.

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