Clinical audit on diagnosis of ascites in infants and children in Assiut University Children Hospital

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Background
Ascites is pathologic fluid accumulation within the peritoneal cavity. The peritoneum generates a fluid that acts as a lubricant. It allows the abdominal organs to glide smoothly over one another. Ascites is that excess of this fluid that can build up between visceral and parietal layers.

Objective
A clinical audit was done to assess the degree of adherence of medical physicians at Assiut University Children Hospital to protocols for diagnosis of ascites according to Tomar 2016 guidelines.

Patients and methods
The study included 60 infants and children admitted to Assiut University Children Hospital with ascites.

Results
The study included 60 infants and children admitted to Assiut University Children Hospital with ascites during a period of 1 year. Overall, 33 cases were males and 27 cases were females. All studied cases presented with ascites at the time of diagnosis.

Conclusion
Regarding this initial audit about diagnosis of ascites in infants and children in Assiut University Children Hospital, there is no complete adherence to Tomar 2016 guidelines.

Keywords:
ascites, audit, children, diagnosis, infants

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Introduction

Ascites is a pathologic fluid accumulation within the peritoneal cavity.

The peritoneum generates a fluid that acts as a lubricant. It allows the abdominal organs to glide smoothly over one another. Ascites is that excess of this fluid that can build up between visceral and parietal layers [1].

Varied pathophysiologic mechanisms lead to the development of ascites. These mechanisms include increased hydrostatic pressure and decreased colloid osmotic pressure within hepatic and splanchnic blood vessels, increased permeability of peritoneal capillaries, and direct leakage of fluid into the peritoneal cavity from different sources of origin. Portal hypertension and sodium and fluid retention are key factors in the pathophysiology of ascites [2].

Peripheral arterial vasodilatation hypothesis is the most agreeable mechanism for inappropriate sodium retention and formation of ascites [3].

Etiology of ascites includes gastrointestinal, genitourinary, cardiac, and metabolic disorders; infections; and hematologic and chromosomal abnormalities [4]. Most cases of ascites are due to liver disease or due to some precipitating factors deteriorating liver functions [5]. Ascites is the most common complication that leads to hospital admission [6].

Hepatic causes include cirrhosis, congenital hepatic fibrosis, portal vein obstruction, fulminant hepatic failure, Budd–Chiari syndrome, and lysosomal storage disease. Renal causes include nephrotic syndrome, obstructive uropathy, perforation of urinary tract, and peritoneal dialysis.

Cardiac causes include heart failure, constrictive pericarditis, and inferior vena cava web.

Infectious causes include abscess, tuberculosis, chlamydia, and schistosomiasis.

Neoplastic causes include lymphoma and neuroblastoma.

Gynecological causes include ovarian tumors, ovarian torsion, and rupture.

Pancreatic causes include pancreatitis and ruptured pancreatic duct.

Miscellaneous causes include systemic lupus erythematosus, ventriculoperitoneal shunt, eosinophilic ascites, chylous ascites, and hypothyroidism.

Traditionally, ascites is classified into two types: transudative and exudative ascites. This classification is commonly based on how much is the protein that exists in the ascitic fluid. A more helpful system has been developed. It was based on the quantity of albumin in the ascitic fluid compared with the serum albumin (measured in the blood). This is called serum ascites albumin gradient (SAAG) [1].

SAAG is a more sensitive and specific measure for the differentiation of ascites due to portal hypertension from ascites due to other pathophysiological mechanisms (e.g. peritoneal inflammation). SAAG is calculated by subtracting the ascites albumin concentration from the serum albumin concentration. In a prospective study, it was shown to be a better discriminant than the older criterion (transudate versus exudate). SAAG is generally low (<1.1 g/dl) in ascites not owing to portal hypertension, as in cases of infection or malignancy [7].

SAAG is high (≥1.1 g/dl) in portal hypertension-related ascites, as in cases of liver cirrhosis or congestive heart failure. The British and American guidelines have adopted SAAG as an initial testing strategy. SAAG is the only best test for classifying ascites into portal hypertensive (SAAG > 1.1 g/dl) and nonportal hypertensive (SAAG < 1.1 g/dl) causes. The result showed that the accuracy of the SAAG is 97% in classifying ascites [8].

Determination of the cause of ascites is important in staging disease and management of patients. The clinical approach includes the history, physical examination, and investigations, including diagnostic paracentesis with protein content, and biochemical and cytological analysis of the ascitic fluid obtained by paracentesis [9].

Abdominal paracentesis is the most important element in the diagnostic workup. It is indicated in every patient with new-onset ascites (as fluid evaluation helps to determine etiology, differentiate transudate versus exudate, detect the presence of cancerous cells, or address other considerations), suspected spontaneous or secondary bacterial peritonitis, and in refractory ascites [10].

Patients and methods

A clinical audit with data recording using checklist aimed to assess the degree of adherence of medical physicians to Assiut University Children Hospital protocols for diagnosis of ascites in infants and children, Assiut, Egypt. Our study was conducted on 60 patients with ascites who attended Assiut University Children Hospital during a period of 1 year. This study was approved by the Ethical Committee of Faculty of Medicine, Assiut University, IRB no 17100373.

Inclusion criteria

The following were the inclusion criteria:

(1) Age 1 month to 18 years.
(2) Infants and children with ascites (hepatic, cardiac, renal, malignant, or tuberculous).

Exclusion criteria

The following were the exclusion criteria:

(1) Age > 1 month.
(2) Surgical conditions as ruptured viscous or located abscess.

Results

Our study was conducted on 60 patients with ascites who attended Assiut University Children Hospital during a period of 1 year. Their ages ranged from 1 month to 18 years. Overall, 33 (55%) cases were males and 27 (45%) cases were females. Our results are shown in Tables 1–9 and Figs. 1–12.

Discussion

According to Guidelines of Tomar 2016 for diagnosis of ascites in infants and children, the following data regarding history and examination should be assessed in all patients, but in our study, they were assessed as follows:

(1) Data regarding the history assessed were as follows:

Table 1 Sociodemographic characteristics of patients

Parameters	*n* (%)	*P*
Age (years)		0.045*
<1	1 (1.7)	
1-5	35 (58.3)	
6-10	15 (24.9)	
>10	9 (15.1)	
Sex		0.439
Male	33 (55)	
Female	27 (45)	

Table 2 Recorded data about symptoms of studied patients (*n*=60)

Symptoms	Number of cases assessed (%)
Abdominal swelling	60 (100)
Jaundice	60 (100)
Change of urine and stool	40 (66.7)
Bleeding	60 (100)
Growth failure and malaise	48 (80)
Abdominal pain	50 (83.3)
Steatorrhea	27 (45)
Fever	60 (100)
Cyanosis	41 (68.3)
Dyspnea during suckling	9 (15)
Fatigue during activity	51 (85)
Lower limb swelling	60 (100)
Orthopnea	38 (63.3)
Nocturnal dyspnea	38 (63.3)
Chest pain	38 (63.3)
Recurrent attacks of cough and chest wheezing, with or without fever	43 (71.7)
Puffy eyes	60 (100)
Anorexia	47 (78.3)
Hematuria	44 (73.3)

Table 3 Recorded data about clinical examination of studied patients (*n*=60)

General examination	Number of cases assessed (%)
Vital signs	
Arterial pulse	60 (100)
Arterial blood pressure	60 (100)
Respiratory rate	60 (100)
Temperature	60 (100)
Serial measurement of the abdominal girth	28 (46.7)
Serial measurement of weight	48 (80)
Pallor	60 (100)
Jaundice	60 (100)
Cyanosis	60 (100)
Palmar erythema	45 (75)
Spider nevi	45 (75)
Lymph node enlargement	52 (86.7)
Congested neck veins	34 (56.7)
Clubbing of fingers	37 (61.7)
Edema	60 (100)

Table 4 Examination of chest and heart in studied patients

Local examination	Number of cases assessed (%)
Chest examination	60 (100)
Cardiac examination	60 (100)

Table 5 Recorded data regarding inspection of abdomen in studied patients (*n*=60)

Local examination	Number of cases assessed (%)
Abdominal distention	60 (100)
Site and shape of the umbilicus	60 (100)
Dilated abdominal veins and its direction	60 (100)

Table 6 Recorded data regarding abdominal palpation of studied patients (*n*=60)

Local examination	Number of cases assessed (%)
Abdominal tenderness	60 (100)
Hepatomegaly	60 (100)
Liver size	60 (100)
Liver surface	60 (100)
Liver consistency	60 (100)
Liver border	60 (100)
Tender or not	60 (100)
Splenomegaly	60 (100)
Palpable kidneys	40 (66.7)
Palpable abdominal masses	39 (65)

Table 7 Recorded data regarding abdominal examination

Local examination	Number of cases assessed (%)
Detection of degree of ascites by percussion	60 (100)
Auscultation of intestinal sounds	60 (100)

Table 8 Recorded data about Investigations for studied patients

Investigation	Number of cases assessed (%)
Complete blood counts	60 (100)
Complete urine examination	60 (100)
Liver function tests	60 (100)
Plasma proteins	60 (100)
Renal function tests	60 (100)
Clotting screen	60 (100)
Tuberculin test	29 (48.3)
Chest and plain abdominal films	23 (38.3)
Abdominal ultrasound	60 (100)
Upper gastrointestinal endoscopy	15 (25)
CT and MRI	16 (26.7)

CT, computed tomography.

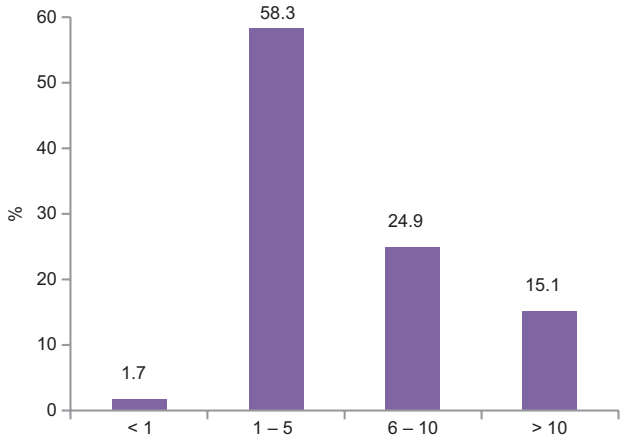
Table 9 Recorded data regarding to abdominal paracentesis

Abdominal paracentesis (ascitic fluid analysis)	Number of cases assessed (%)
Cell count/cytology	22 (36.7)
Gram strain and culture	22 (36.7)
Total protein (albumin/globulin ratio)	22 (36.7)
Serum ascitic albumin gradient	22 (36.7)
Glucose	0
Amylase	0
Lactate dehydrogenase	0
Triglycerides	0
Bilirubin	0

There was an insistence to ask about abdominal swelling, jaundice, bleeding, fever, lower limb swelling, and puffy eyes in all the 60 (100%) cases. Some deficiency was observed regarding asking about change of urine and stool color; they were recorded in 66.7% of the cases. Growth failure and malaise were recorded in 80% of patients but not in 20%. Most cases complained of abdominal pain (83.3%). Steatorrhea was recorded in 45% of cases but not in 55%. Cyanosis was recorded for 41 (68.3%) cases but not recorded for 19 (31.7%) cases. Of 60 cases, 51 (85%) cases were not asked for dyspnea during suckling, whereas only nine (15%) patients

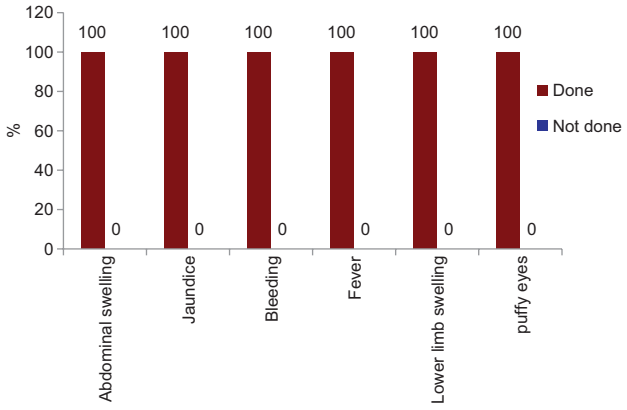
were asked. Orthopnea, nocturnal dyspnea, and chest pain were recorded in 38 (63.3%) cases but not in the other 22 (36.7%) patients. Recurrent attacks of cough, chest wheezing, with or without fever were recorded in 71.7% of patients, whereas 28.3% were not recorded.

Figure 1



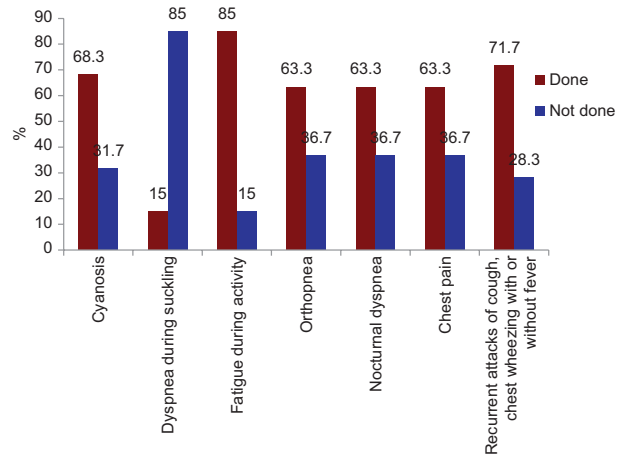
Age distribution of the studied patients with ascites.

Figure 3



The unmissed symptoms which were asked about in every patient.

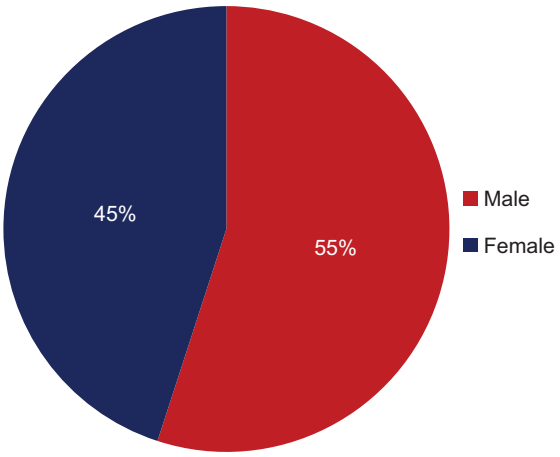
Figure 5



Some symptoms regarding cardiac problems.

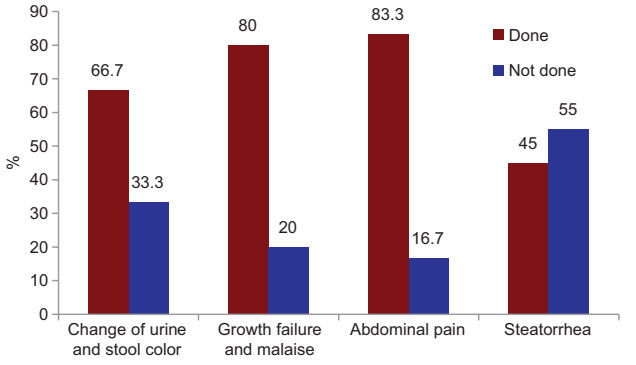
Anorexia also was recorded in most cases (78.3%), whereas not recorded in the other 13 (21.7%) cases. It was observed that 44 (73.3%) patients were asked for hematuria, and the remaining 16 (26.7%) were not asked.

Figure 2



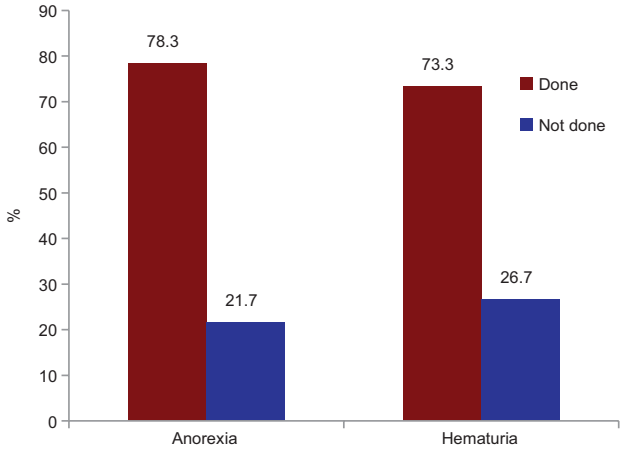
Sex distribution of the studied patients with ascites.

Figure 4



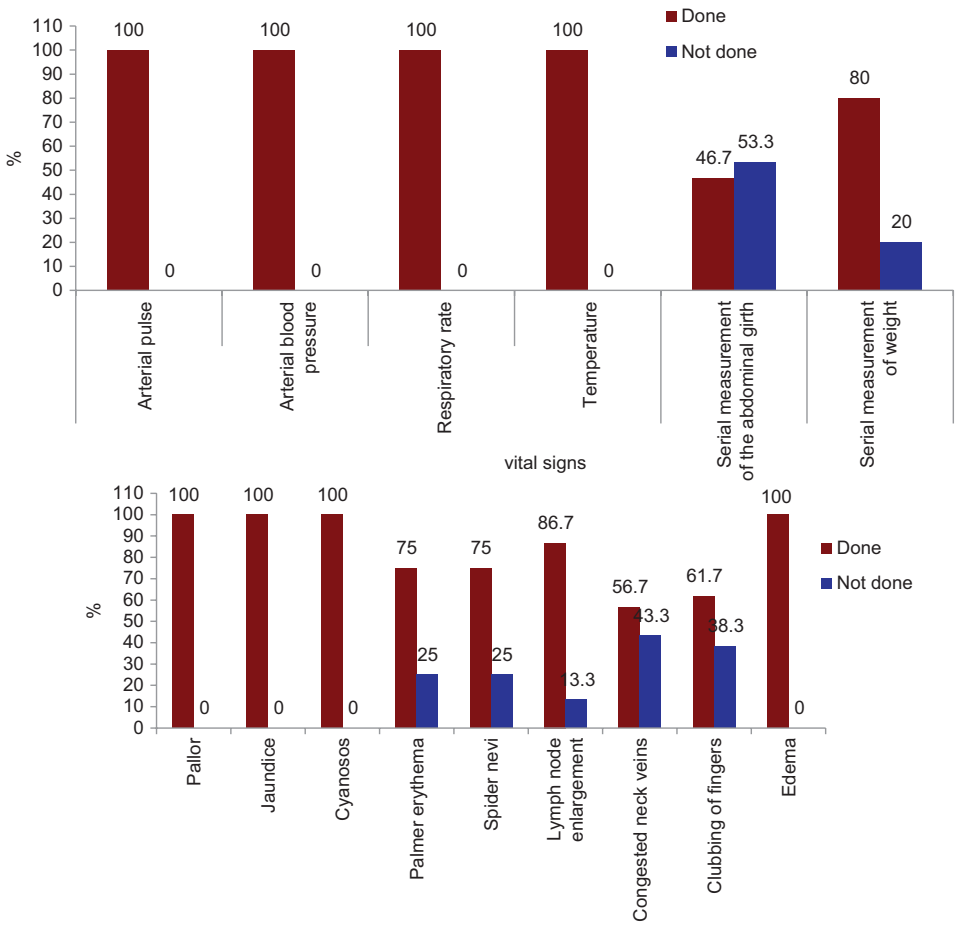
Some symptoms regarding GIT problems. GIT, gastrointestinal tract.

Figure 6



Distribution of recorded data regarding anorexia and hematuria in studied patients.

Figure 7



Recorded data regarding general examination of studied patients.

(2) Data regarding examination:

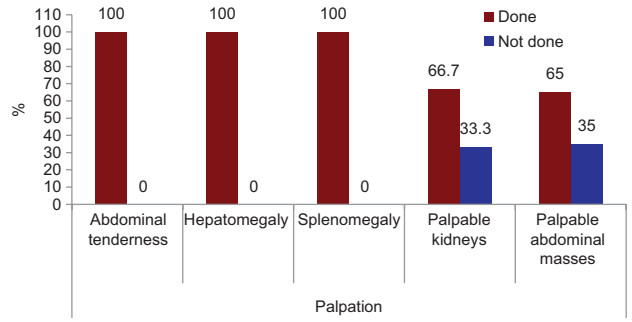
It was observed that analyses of all vital signs (arterial pulse, arterial blood pressure, respiratory rate, and temperature) were done for all patients. Moreover, pallor, jaundice, cyanosis, and edema had the same result. Lymph node enlargement was recorded in a large percentage of the studied patients (86.7%). Serial measurement of weight was perfectly done in 80% of patients, whereas serial measurement of the abdominal girth was deficient, being only recorded in 46.7%. There were 45 (75%) cases examined for palmar erythema and Spider nevi, whereas not done for the others (15%). Examination for congested neck veins was done for 34 (56.7%) patients, whereas examination for clubbing of fingers was done for 37 (61.7%) patients.

Chest and cardiac examinations were done for all patients (100%). Regarding abdominal inspection, it was observed that all 60 patients were examined for presence of abdominal distention, for site and shape of the umbilicus, and for presence of dilated abdominal veins and its direction. According to palpation of the abdomen, all patients were examined for abdominal tenderness, hepatomegaly, liver size, liver surface, liver consistency, liver border, liver tenderness, and splenomegaly. Overall, 66.7% of patients were examined for palpable kidneys, whereas 33.3% were not. Moreover, 65% of the patients were examined for palpable abdominal masses and the others (35%) were not done. Percussion and auscultation of the abdomen were done for all patients.

(3) Data regarding investigations:

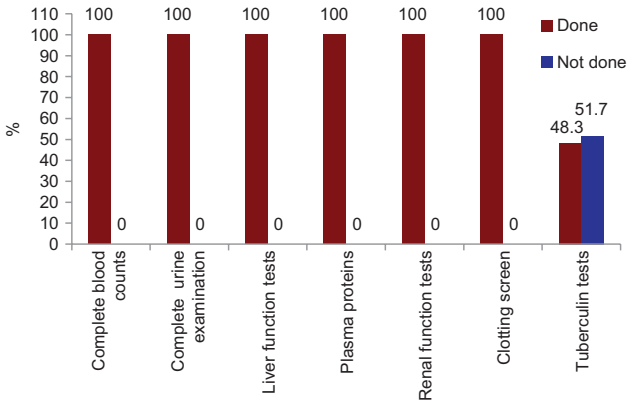
According to the guidelines, the following investigations should be assessed as indicated, but they were done as follows: it was observed that complete blood counts, complete urine examination, liver function tests, plasma proteins, renal function tests, and clotting screen were done for all patients (100%), whereas tuberculin test was done for 48.3% of cases. Chest and plain abdominal films were done for 23 (38.3%) cases, whereas abdominal ultrasound was done for all patients (100%). Upper gastrointestinal endoscopy was done for only 15 (25%) patients, whereas computed tomography and MRI were done for 16 (26.7%) patients.

Figure 8



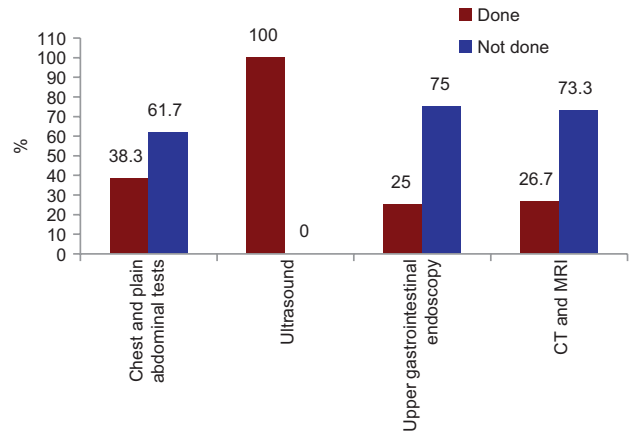
Recorded data regarding imaging studies for diagnosis of ascites.

Figure 9



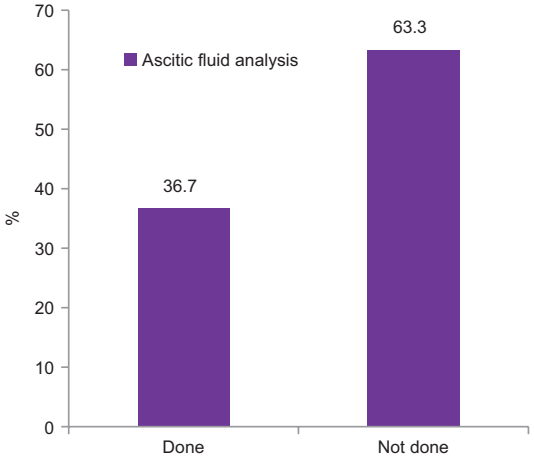
Recorded data regarding the abdominal examination.

Figure 10



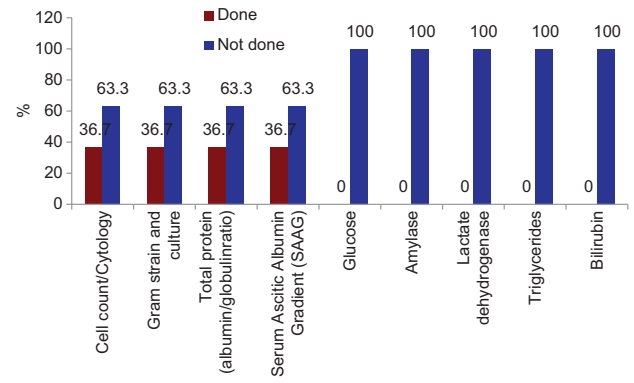
Recorded data regarding abdominal paracentesis for studied patients.

Figure 11



Recorded data regarding laboratory tests for diagnosis of ascites.

Figure 12



Recorded data regarding ascitic fluid analysis for studied patients.

It was observed that abdominal paracentesis was done for 22 (36.7%) cases. Ascitic fluid cytology, Gram stain and culture, total proteins, and SAAG were done for all cases of abdominal paracentesis (22 cases out of total 60 studied cases), whereas ascitic fluid glucose, amylase, lactate dehydrogenase, triglycerides, and bilirubin were missed in the reports.

Regarding the data for the diagnosis of the patients, with the use of the guidelines, our study revealed the following: 24 cases were diagnosed as liver cirrhosis, 20 cases were diagnosed as nephrotic syndrome, nine cases were diagnosed as congestive heart failure, five cases were diagnosed as tuberculous peritonitis, and two cases were diagnosed as systemic lupus erythematosus.

Conclusion

Regarding this initial audit about diagnosis of ascites in infants and children in Assiut University Children Hospital, we concluded that there is no complete adherence to Tomar 2016 guidelines. Our study demonstrated lack of complete adherence to the protocol of diagnosis of ascites regarding history and general examination. On the contrary, local examination and investigations seemed to be done properly, which were reflected in our study's outcome. SAAG was calculated for all cases who underwent abdominal paracentesis; it helped us to differentiate between cases of ascites due to portal hypertension and cases of ascites due to other causes.

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Nil.

Conflicts of interest
There are no conflicts of interest.

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