Ascites in the Elderly

24

Contents

Abstract

The pathophysiology of ascites is complex. The complications of cirrhosis include ascites, varices, hepatic encephalopathy, hepatocellular carcinoma, hepato-pneumonic syndromes, spontaneous bacterial peritonitis and hepatorenal syndrome. The review discusses the pathophysiology of ascites and the recent advances in the clinical management.

Keywords

Ascites · Cirrhosis of the liver · Spontaneous bacterial peritonitis · Malignant ascites

Introduction

The complications of cirrhosis include ascites, varices, hepatic encephalopathy, hepatocellular carcinoma, hepato-pneumonic syndromes [1], spontaneous bacterial peritonitis and hepatorenal syndrome [2]. Ascites is the accumulation of fluid in the peritoneal cavity due to a wide range of causes. In a study of 107 patients over 5 years, 52% of the patients presented with ascites at the time of initial cancer diagnosis, 20 had cancer of the pancreas, 18 ovarian and 18 that of the colon. Cytology evaluation of the ascitic fluid was positive for tumour cells in 51%, and a high protein content was seen in 65% [3]. Approximately 10% of all ascites is malignant [4] and the remaining due to heart failure (3%), tuberculosis (2%) and pancreatitis (1%) [5]. Ascites is an important complication of cirrhosis (70%) [5] and occurs in about half the number of the patients within the 10 years of diagnosis [6].

The pathophysiology of ascites is complex, and there is more than one theory to explain the ascites formation. The first abnormality to occur in the cirrhotic patient is the increase in the portal vein pressure due to resistance of blood flow within the liver. As a result blood is shunted into the splanchnic and systemic circulation which in turn may influence renal function [7]. The arterial

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blood flow and arterial pressures are decreased due to release of vasodilators with vasodilator effect on the splanchnic arterial circulation and which may act as a trigger for nitric oxide (NO), the likely vasodilator mediator [8]. Portal hypertension also plays a role in sodium retention which occurs in the setting of increased renin-angiotensin aldosterone system (RAAS) [9] and sympathetic nervous system (SNS) activity [10, 11]. The mechanism by which portal hypertension leads to activation of these systems and sodium retention is not clear [12]. There is also an overall activation of the renal prostaglandin system [10] which probably acts to maintain renal haemodynamics and glomerular filtration rate by counteracting the vasoconstricting effects of AII and noradrenaline in the renal circulation. In advanced cases there is marked vasoconstriction of the renal arteries and the opening of intra-arterial-venous shunts due to reduced renal synthesis of vasodilating prostaglandins [7] leading eventually to acute renal failure, the so-called hepatorenal syndrome [10].

The pathophysiology of malignant ascites is not clear. Mechanisms involved are increased vascular permeability, metalloproteinases that degrade the extracellular matrix [13, 14], tumour-related obstruction of lymphatic drainage and overactive renal-angiotensin-aldosterone system [14], among others. It has been surmised that the biologically active peptides produced by the tumour cells such as vascular endothelial growth factor and basic fibroblast growth factor may be the cause of the increased intraperitoneal oncotic pressure. This is the result of an increased net filtration brought about by an overall increase in the capillary membrane surface and increased capillary permeability and a consequential increase of intraperitoneal protein concentration [15]. Spontaneous bacterial peritonitis usually occurs in patients with cirrhosis of the liver and portal hypertension [6] and in ascites with high serum-ascites gradient [16] and occasionally in malignant ascites [17].

Ascites occurs in chronic liver disease, peritoneal disorders and systemic diseases (Box 1). It is a common complication of cirrhosis of the liver [6]. Peritoneal involvement due to carcinomatous peritonitis occurs in another 10%, and congestive heart failure may be ranked third. Less common hepatic causes are chronic hepatitis, alcoholic hepatitis, fulminant hepatic failure and Budd-Chiari syndrome and system diseases such as SLE, constrictive pericarditis, pancreatitis, myxoedema or infective peritonitis. Malignant ascites is seen most commonly in patients with ovarian, endometrial, breast, colon, gastric and pancreatic cancers [18].

Box 1 Causes of Ascites in the Elderly

i. Cirrhosis of liver
ii. Malignant ascites
Ovarian, endometrial, breast, gastric, colon and pancreas
iii. Non-hepatic
Congestive heart failure
Severe hypoalbuminaemia
Nephrotic syndrome

Symptomatology

The patient may be asymptomatic with small amount of fluid; with moderate amounts, there may be weight gain and increase in the girth of the abdomen. In increased amounts the abdominal wall will be tense with flattening of the umbilicus. Infection of the ascitic fluid without any apparent cause is called spontaneous bacterial peritonitis. It is common in cirrhotic ascites and in alcoholics and is often the cause for unexplained clinical deterioration. It is usually associated with lethargy, fever, encephalopathy, worsening hepatic failure and abdominal tenderness.

Diagnosis

History, physical examination, diagnostic paracentesis, cell count, cytology, protein content, lactic acid dehydrogenase and culture will usually provide the diagnosis. Physical examination findings parallel the amount of fluid. In significant amounts there will be abdominal fullness with fullness in the flanks

and shifting dullness. If physical examination is not definite, ultrasonography may be used.

Diagnostic paracentesis should be performed if the cause is not known, is newly diagnosed or if spontaneous bacterial peritonitis is suspected. The ascites may be differentiated by the nature of the fluid. It is more useful to calculate the serum albumin gradient (serum albumin-ascites albumin) (SAAG) rather than differentiating into 'transudate' and 'exudate' [4, 19, 20]. The SAAG is based on the concept that if there is high portal pressure, there will also be a high oncotic gradient with albumin contributing to the major component of the serum proteins. Evaluating the SAAG is a better way in the differential diagnosis distinguishing [20] and separating the causes [21]. An elevated SAAG correlates with portal hypertension [19]. Low gradient ascites is associated with tuberculous peritonitis, malignancy, pancreatic, renal and biliary-induced ascites [22]. A high gradient ascites occurs with uncomplicated cirrhosis of the liver, fulminant hepatic failure and extensive liver metastases [23, 24]. See Box 2.

Box 2 Classification of Ascites Based on SAAG

High gradient >1.1 g/dL	Low gradient <1.1 g/dL
Cirrhosis	Pancreatic induced
Carcinomatosis	Malignancy
Cardiac	Tuberculosis
Massive liver metastases	Nephrotic syndrome
Other hepatic causes*	Connective tissue
Myxoedema	Disorders

Information sources: Mansour-Ghanaei et al. [22]; Chung and Podolsky [23]; Glickwan [24]

Prognosis and Treatment

The occurrence of ascites in the patient with cirrhosis is a prognostic sign with 85% and 56% surviving for 1 year and 5 years, respectively [6]. Dietary sodium restriction (20–40 mEq/day) and bed rest are the judicious treatment for ascites due to portal hypertension [10]. If rigid sodium restriction and conscientious adherence to a diet are unsuccessful or if the ascites is massive, intervention with diuretics may be necessary. Spironolactone is usually effective (50–200 mg bid) and a loop diuretic such as frusemide added (20–100 mg bid) if spironolactone alone fails. The combined provides optimal diuresis with low risk of potassium abnormality. A weight loss of 0.5 kg/day is aimed at or diuresis of less than 900 ml per day. More aggressive diuresis will be at the expense of the plasma compartment and volume contraction resulting in renal failure or electrolyte imbalance and precipitate portosystemic encephalopathy.

Because of the possible risk of renal failure, electrolyte imbalance and encephalopathy abdominal paracentesis had not been favoured. More recently abdominal paracentesis has been evaluated by several investigators who have suggested that in cases of refractory ascites either repeated removal (about 4 L/day is safe) or total removal will have to be associated with concomitant intravenous infusion of albumin of ascitic fluid removed [6]. Transjugular intrahepatic portosystemic shunt (TIPS) was devised to treat complications of portal hypertension. According to Boyer and Haskel Ziv [25], TIPS should not be considered as primary therapy for any complication of portal hypertension except for bleeding gastric or ectopic varices. It can be associated with a number of complications.

Abdominal paracentesis is done if the ascites is causing respiratory difficulty or pain or as treatment for chronic ascites. It is absolutely contraindicated when there is severe uncorrectable disorder of blood coagulation, infected abdominal wall and intestinal obstruction. Haemorrhage and prolonged leakage of the ascitic fluid are a common complication. If spontaneous bacterial peritonitis is suspected, an antibiotic like cefotaxime 2 g iv q4 to 8 hourly can be given (pending culture results and Gram stain) for at least 5 days. About 75% of the patients with spontaneous bacterial peritonitis have a recurrence within a year, and a prophylactic antibiotic will be needed [6]. An antibiotic like norfloxacin 400 mg once a day has been recommended [16].

Impact

Ascites is an important complication of cirrhosis (70%) [6]. About half the number of patients with cirrhosis of the liver die within 2 years [26]. It is believed that there will be a huge increase in burden of liver disease in the coming years due to the increasing frequency of alcoholic and non-alcoholic fatty liver disease [27] with an increase in complications of cirrhosis which not only impair quality of life but also decrease survival [1]. The survival rates are worse in patients with cirrhosis in the presence of ascites [28] (Box 3).

Box 3 Key Points: Ascites in the Elderly

Ascites is an important complication of cirrhosis (70%) [5] and occurs in about half the number of the patients within the 10 years of diagnosis [6].

Malignant ascites is seen most commonly in patients with ovarian, endometrial, breast, colon, gastric and pancreatic cancers [18].

It is more useful to calculate the serum albumin gradient (serum albumin-ascites albumin) (SAAG) rather than differentiating into 'transudate' and 'exudate' [5, 19, 20].

High gradient ascites is due to cirrhosis of the liver, massive liver metastases and fulminant hepatic failure [23, 24]).

Low gradient ascites includes tuberculosis, nephrotic syndrome, pancreatic, biliary, bacterial-induced and peritoneal carcinomatosis [22].

The occurrence of ascites in the patient with cirrhosis is a prognostic sign with 85% and 56% surviving for 1 year and 5 years, respectively [6].

Dietary sodium restriction (20–40 mEq/day) and bed rest; spironolactone is usually effective (50–200 mg bid); a weight loss of 0.5 kg/day is aimed at or diuresis of less than 900 ml per day.

More recently abdominal paracentesis in cases of refractory ascites either repeated

Box 3 Key Points: Ascites in the Elderly (continued)

removal (about 4 L/day is safe) or total removal will have to be associated with concomitant intravenous infusion of albumin of ascitic fluid removed [6].

If spontaneous bacterial peritonitis is suspected, an antibiotic like cefotaxime 2 g iv q4 to 8 hourly can be given (pending culture results and Gram stain) for at least 5 days.

Multiple Choice Questions

1. The following in relation to ascites are true, except:

A. Eighty percent of the ascites in cirrhosis of liver is due to portal hypertension.
B. Spontaneous bacterial peritonitis usually occurs in cirrhosis of the liver with portal hypertension and ascites with high serum-ascites gradient.
C. Seventy-five percent of spontaneous bacterial peritonitis will recur within the year, but prophylactic antibiotic is not needed.
D. Total removal of ascitic fluid has to be associated with concomitant intravenous infusion of albumin of ascitic fluid removed.

MCQ Answers

1 = C

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