Ascites Tapping

Synonym: paracentesis

A general discussion of ascites is found elsewhere, including the medical management.

Ascites tapping is usually undertaken to take off small volumes of ascites for analysis. This is in comparison to paracentesis where a drain is inserted so larger volumes can be removed.

Indications

Diagnostic (via either ascitic tap or paracentesis)

- New-onset ascites:
  - To determine aetiology.
  - To differentiate transudate versus exudate.
  - To detect cancerous cells.
- Suspected spontaneous or secondary bacterial peritonitis

Therapeutic (usually via paracentesis)

- To relieve respiratory distress or abdominal pain resulting from ascites.

Contra-indications

- An uncooperative patient.
- Skin infection at the proposed puncture site.
- Pregnancy.
- Severe bowel distension.
- Coagulopathy: opinion is divided - some feel only precluded where there is clinically evident fibrinolysis or disseminated intravascular coagulation (DIC).

Investigations

Prior to tap

Before tapping there are certain investigations that should be undertaken:

- FBC and clotting screen - if thrombocytopenia is present and severe, most clinicians would give pooled platelets to reduce the risk of bleeding. Fresh frozen plasma may be used if there is evidence of coagulopathy.
- U&E, creatinine, and LFTs.
- Abdominal ultrasound - this is not always necessary prior to tap. It is used to review liver, pancreas, spleen and lymph nodes. Ultrasound is a very sensitive means of assessing the extent of ascites and may also show the causative pathology such as carcinoma of ovary or metastatic liver disease.

Following the tap

After a diagnostic tap the following investigations may be requested.

Microscopy: white cell count, red cell count, Gram stain

- Spontaneous bacterial peritonitis (SBP) can occur in patients with cirrhosis and ascites admitted to hospital[1]. Neutrophil count of >250 cells/mm³ is diagnostic of SBP.
- The red blood cell count is is usually <1,000 cells/mm³; higher levels raise the suspicion of an underlying malignancy - eg, hepatocellular carcinoma.
- Gram stain of ascitic fluid is a quick process but rarely helpful. Samples should also be sent for culture and sensitivity. These should be inoculated into blood culture bottles as soon as the sample is taken. This has almost double the yield of ascitic fluid sent in sterile containers.
Albumin or protein levels
Traditionally ascites was labelled as an exudate if the protein levels were >25 g/L, or a transudate if protein levels were <25 g/L. This has been superseded by the serum ascites-albumin gradient (SA-AG) which is a better measure.

**SA-AG = serum albumin concentration - ascitic albumin concentration**
- **SA-AG ≥11 g/L**: likely causes - cirrhosis, cardiac failure, nephrotic syndrome
- **SA-AG <11 g/L**: likely causes - malignancy, pancreatitis and tuberculosis

Amylase
This will be high in pancreatitis-associated ascites.

Cytology
The yield is greater with larger-volume samples (>100 ml), especially when concentration techniques are used. It is not so valuable for the diagnosis of primary hepatocellular carcinoma.

Risks
Paracentesis is a relatively safe procedure. Complications are more likely to occur when other comorbidities are present. Currently the risk of serious complications of paracentesis for cirrhosis is estimated to be about 1 in 100\(^2\) for minor complications to less than 1 in 1,000 for major events\(^3\). Risks include:
- Significant bleeding
- Infection
- Renal failure\(^4\)
- Hyponatremia
- Hepatic encephalopathy
- Complicated bowel perforation
- Paracentesis leak

Precautions
Paracentesis for symptom relief is common, especially if there is tense ascites. Patients requiring frequent paracentesis need to be reviewed by specialists for consideration of transjugular intrahepatic portosystemic shunt.

Paracentesis is performed under aseptic conditions, as there is a risk of introduction of infection into the peritoneal cavity. Infection risk can also be reduced by limiting catheter drainage time to less than 6-8 hours (some authorities suggest four hours).

Paracentesis can be performed in a hospice or in an ambulatory setting, provided that sterile precautions are taken preventing the need for admission to hospital.

Technique
- Check that the correct equipment has been assembled\(^3, 5\):
  - Needles (25 gauge for infiltration, 22 gauge for fluid collection), syringes and local anaesthetic (may not be necessary for a tap).
  - Antiseptic skin preparation (value unproven) and drapes.
  - A very wide bore IV cannula, IV giving set and a urine bag of the type attached to a catheter.
  - Adhesive tape.
  - Surgical gloves.
- Explain the procedure to the patient, including risks, and obtain consent.
- Position the patient, usually in the supine position with the head of the bed elevated to allow fluid to accumulate in the patient’s lower abdomen.
- Position of the tap:
  - Locate area of flank dullness lateral to the rectus abdominis muscle and go approximately 5 cm superior and medial to the anterior superior iliac spines.
  - Avoid the inferior epigastric vessels which run up the side of the rectus abdominis to anastomose with the superior epigastric vessels coming down.
  - Avoid the pelvic area, solid tumour masses, prominent superficial veins (caput medusa) and scars (may have collateral vessels close by or adherent bowel beneath).
- Using local anaesthetic if needed, the needle is inserted and fluid aspirated.
- If this does not work then ultrasound guidance may help, especially for a small amount of ascites.
- 10-20 ml of fluid can be aspirated for diagnostic purposes.
- If a therapeutic tap is required, an IV cannula is placed using the Z-track technique. This involves puncturing the skin perpendicularly and advancing the needle obliquely in subcutaneous tissue. This reduces leakage following the procedure, as the puncture site on the skin and the peritoneum are not adjacent.
Once the cannula is in place, the needle is withdrawn and a giving set and collection bag connected. Drain for 6-8 hours and then remove the cannula or catheter and cover with a simple adhesive bandage. Swift drainage is safest but if the patient develops symptoms of hypotension then the drainage may need to be slowed or prematurely terminated. Large volumes can be taken off within 2-4 hours but this can reduce both the intra-abdominal and inferior vena cava pressure. In response the cardiac output may increase. This may lead to a reduction in blood pressure and should be anticipated at the outset. In practice colloid replacement is usually given.

**Aftercare**
- Ascites may recur requiring repeated paracentesis.
- Look out for intraperitoneal infection - eg, signs of peritoneal irritation and fever.

**Post-paracentesis circulatory dysfunction**
Withdrawal of 5 L or more of ascites can precipitate post-paracentesis circulatory dysfunction (PPCD):
- Hepato-renal syndrome and hyponatraemia[1].
- Acute kidney injury.
- Increased plasma renin activity.

Current guidelines suggest that albumin (as 20% or 25% solution) should be infused after paracentesis of ≥5 L is completed, at a dose of 8 g albumin/L of ascites removed. There is no conclusive evidence that albumin or artificial plasma expanders prevent complications or improve outcomes[8].

**Palliative care**
The underlying disease is an important confounding factor and in terminal care, the prime concern must be patient comfort. In malignant disease, tapping ascites brings some relief to about 90% of patients. Where frequent drainage is required, a permanent drain can be left in place[7]; although this increases the risk of infection, there is a notable reduction in symptom burden in most patients.

**Further reading & references**

3. Diagnostic Ascitic Paracentesis (Tap) Sampling Standards; Yorkshire and Humber Liver Network (2012)

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