How to care for patients undergoing paracentesis for the drainage of ascites
Grace Robinson

Rationale and key points
Ascites is the excessive accumulation of extracellular fluid within the peritoneal cavity, which usually develops as a result of cirrhosis of the liver. Paracentesis is the procedure for removing ascitic fluid from the transabdominal peritoneal cavity via a temporary ascitic drain. This article aims to support nurses in providing safe and effective care for patients undergoing paracentesis.

» Paracentesis is used to reduce intra-abdominal pressure and to relieve the symptoms of abdominal ascites, such as severe abdominal distention, pain and dyspnoea (difficulty breathing). The removal of at least 5L of ascitic fluid is considered large-volume paracentesis.

» The role of the nurse is usually to monitor the patient throughout the procedure, administer treatment as directed by the medical team and, depending on local policy, remove the drain at the end of the procedure.

» Knowledge of the benefits and risks of this procedure is essential to provide safe, evidence-based care for patients undergoing paracentesis.

Reflective activity
‘How to’ articles can help to update your practice and ensure it remains evidence-based. Apply this article to your practice. Reflect on and write a short account of:
1. How reading this article will change your practice in caring for patients undergoing paracentesis.
2. How this article could be used to educate patients who are due to undergo paracentesis.

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Paracentesis is the procedure for removing ascitic fluid from the transabdominal peritoneal cavity via a temporary ascitic drain. In contrast to its diagnostic uses, which investigate the cause of the ascites, therapeutic paracentesis aims to remove as much fluid as possible, usually over a six-hour period. It is used to reduce intra-abdominal pressure and to relieve the symptoms of abdominal ascites, such as severe abdominal distention, pain and dyspnoea (difficulty breathing). The removal of at least 5L of ascitic fluid is considered large-volume paracentesis (Figure 1), and the removal of the total volume of ascitic fluid is known as total paracentesis.

Asctic drain insertion
Preparation and equipment
The role of the nurse in large-volume paracentesis is usually to monitor the patient throughout the procedure and to administer treatment as directed by the medical team, although in some clinical settings appropriately trained advanced nurse practitioners may undertake the procedure. Therefore, it is essential that the nurse has the required skills and knowledge associated with this procedure to provide safe, evidence-based care for patients undergoing large-volume paracentesis (Royal College of Nursing 2015).

» Ensure that the following equipment is set up on a clean procedure trolley:
- Sterile gloves.
- Disposable apron.
- Sterile dressing pack.
- Iodine cleansing solution.
- Sterile applicator.
Figure 1. Large-volume paracentesis

1. Ensure that the patient is wearing a hospital gown and has emptied their bladder. Check that the patient is comfortable and lying at a 45-90-degree angle on the bed, then expose the patient’s abdomen.

2. Put on sterile gloves and a disposable apron.

3. Using a sterile dressing pack, prepare a sterile field. Sterilise the insertion site by applying iodine cleansing solution with a sterile applicator and allow to air dry.

4. Administer local anaesthetic by infiltrating the skin and subcutaneous tissue with 20mL 1% lidocaine using a filtered drawing-up needle, a 20mL syringe and green (21G) needle, until ascitic fluid is aspirated.

6. Using a coaxial insertion technique (where the needle is directly inserted, as opposed to a Z-tract insertion technique, where the skin is pulled 2cm to one side), insert the paracentesis catheter into the peritoneal space in either the left or right lower abdominal quadrant. Take care to avoid an enlarged liver or spleen and the inferior and superior epigastric arteries, as well as any areas of scar tissue.

7. Obtain three samples of the ascitic fluid by using a 20mL syringe to aspirate each sample then adding these to three sterile sample pots. The samples are to be sent for microbiological examination to assess for spontaneous bacterial peritonitis (an infection of ascitic fluid without an apparent source).

8. Attach the tubing and drainage bags to the catheter, then secure the catheter in place using a large adhesive dressing. Fix the drainage bags onto the catheter stand. Using the roller clamp tubing set, leave one drainage bag unclamped at a time to enable close monitoring of the drain output.

9. Dispose of all clinical equipment in a clinical waste bin or sharps bin, according to local policy.

10. The following equipment should be set up for ascitic drain removal on a clean procedure trolley:
   - Sterile gloves.
   - Disposable apron.
   - Stitch cutter.
   - Sterile gauze.
   - Sterile waterproof dressing.
   - Sharps bin.
   - Clinical waste bin.

Procedure

1. Explain the risks, benefits and details of the procedure to the patient, and obtain written consent from them.

2. Ensure that the patient is wearing a hospital gown and has emptied their bladder. Check that the patient is comfortable and lying at a 45-90-degree angle on the bed, then expose the patient’s abdomen.

3. Put on sterile gloves and a disposable apron.

4. Using a sterile dressing pack, prepare a sterile field. Sterilise the insertion site by applying iodine cleansing solution with a sterile applicator and allow to air dry.

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type of patient observations undertaken, and the bed rest instructions given.

8. Undertake standard hourly patient observations and drain site checks for two hours, followed by four-hourly observations if the patient is stable.

**Evidence base**

Ascites is the excessive accumulation of extracellular fluid within the peritoneal cavity, which in most cases (75%) develops as a result of cirrhosis of the liver. Less common causes of ascites include malignancy (10%), heart failure (3%), tuberculosis (2%), pancreatitis (1%) and other rare causes (Moore and Athial 2006).

Serial (repeated) therapeutic large-volume paracentesis is considered as a second-line treatment option when ascites fails to respond to first-line treatments such as dietary sodium restriction, dual diuretic therapy (spironolactone and furosemide) to mobilise the ascites and the cessation of non-steroidal anti-inflammatory drugs (NSAIDs) (Runyon 2012). Serial therapeutic large-volume paracentesis should be offered alongside the cessation of beta-blockers, angiotensin-converting-enzyme (ACE) inhibitors and angiotensin-II receptor-blockers, supporting the patient to abstain from alcohol, and discussing other treatment options including suitability for liver transplant and transjugular intrahepatic portosystemic shunt (TIPS) (a procedure whereby an artificial drainage channel in the liver is created by connecting two veins) (Runyon 2012). One third-line treatment option is a peritoneovenous shunt (a procedure that allows peritoneal fluid to drain from the peritoneum into the venous system) (Runyon 2012). Because of the complexity and suboptimal prognosis in patients with ascites, eligible patients should be encouraged to have a liver transplant wherever possible (Nadim et al 2012).

For patients with diuretic-resistant ascites, this marks the transition from compensated to decompensated liver disease (marking a progression to severe cirrhosis), and paracentesis will not correct the underlying issue of sodium retention, which will have led to the patient’s ascites. By this stage in the patient’s liver disease, the ascites will have become refractory to routine medical therapy and there is a 21% mortality rate at six months (Runyon 2012), and a 50% mortality rate at two years (Singhal et al 2012). Paracentesis can be undertaken as often as necessary, sometimes as often as every two weeks (Moore and Van Thiel 2013); therefore, it is not uncommon to see the same patient on a regular basis. At all times, nurses must provide care that is compassionate, patient-centred and evidence-based (Nursing and Midwifery Council 2018).

**Complications of paracentesis**

Paracentesis carries a <1% risk of complications, which include leakage of ascitic fluid, infection, bladder and bowel perforation and bleeding (Mc Gibbon et al 2007). Some of these complications can be prevented at the drain insertion stage of the procedure. One randomised controlled trial by Shriver et al (2017) demonstrated that the risk of persistent leakage at the site of puncture can be reduced by using the coaxial needle insertion technique, where the needle is directly inserted, thereby reducing the distance between the cutaneous tissues, peritoneum and ascites. In addition, McGibbon et al’s (2007) study demonstrated that the risk of infection can be minimised using a sterile technique, and the risk of bladder or bowel perforation can be minimised by ensuring that the patient has an empty bladder before the procedure and by selecting insertion sites away from areas of scar tissue. Furthermore, the risk of incorrect catheter insertion can be minimised by undertaking paracentesis on larger volumes of ascites, typically greater than 5L (Mc Gibbon et al 2007). The probability of the development of a significant bleed, such as an abdominal haematoma, pseudoaneurysm (a breach in a blood vessel wall such that blood leaks but is contained by surrounding tissue) or haemoperitoneum (the presence of blood in the peritoneal cavity), is 0.2% (Pache and Bilodeau 2005). Should this occur in practice, the nurse must escalate to the medical team immediately because the patient may require emergency blood transfusions.

Other complications can arise as a result of ascitic fluid loss when the drainage is taking place. Paracentesis aims to remove as much ascitic fluid as possible over a six-hour period, and the procedure can remove as much as 20L of ascitic fluid in one session (Moore and Van Thiel 2013). Such a large reduction in peritoneal fluid volume can compromise systemic haemodynamics and lead to paracentesis-induced circulatory dysfunction (Wong 2012). Where fluid loss in excess of 5L are expected, it is recommended that patients are given IV plasma protein therapy (Bernardi et al 2012). The recommended policy is to give 8g 20% human albumin per 1L of drained fluid (European Association for the Study of the Liver 2010, Arroyo et al 2014), which usually comes as a pre-mixed bag of 20% human albumin containing 20g in 100mL or one

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**Key points**

- **The role of the nurse in large-volume paracentesis is usually to monitor the patient throughout the procedure and to administer treatment as directed by the medical team, although in some clinical settings appropriately trained advanced nurse practitioners may undertake the procedure**

- **Paracentesis can be undertaken as often as necessary, sometimes as often as every two weeks (Moore and Van Thiel 2013); therefore, it is not uncommon to see the same patient on a regular basis**

- **It is essential that nurses have sufficient knowledge and skills to provide evidence-based care for patients undergoing paracentesis**

- **An awareness of the potential complications of paracentesis will enable nurses to recognise them as they occur and escalate accordingly**
The usual administration regimen is to give one unit of 20% human albumin for every 2.5L of ascites drained, to reduce the risk of developing volume depletion complications such as water retention, hypotalaernia and renal dysfunction (Garcia-Martinez et al 2013). If a patient already has significant renal failure, one unit of 20% human albumin may be required before the procedure (Runyon 2012).

A full set of observations – including drain site checks, fluid balance, blood pressure, heart rate, respiratory rate and temperature – should be recorded hourly following paracentesis. Patients should be instructed to remain on bed rest until they are stable enough to move, and even then, mobilised only slowly. Some patients with liver failure have abnormal coagulation profiles, for example prolongation of the prothrombin time (a test measuring the amount of time it takes the blood to clot) and some degree of thrombocytopenia (abnormally low platelet levels) (Moore and Aithal 2006). While this is not a contraindication to paracentesis, it may put patients at increased risk of bleeding, and they should be monitored accordingly.

An awareness of the potential complications of paracentesis will enable nurses to recognise them as they occur and escalate accordingly. Regular observations and fluid balance monitoring must be recorded as determined by medical staff, and any IV infusions should be given as prescribed during drainage. It is essential that nurses have sufficient knowledge and skills to provide evidence-based care for patients undergoing paracentesis. Nurses also have an important role in supporting patients and providing patient education and health promotion, to ensure optimal care.

References


