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Techniques and Procedures

LARGE-VOLUME PARACENTESIS: A FAST, CONVENIENT, AND SAFE TECHNIQUE

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□ **Abstract—Background: Ascites is a common complication of liver cirrhosis, malignancy, cardiac failure, pancreatitis, and tuberculosis, with cirrhosis of the liver being the most common cause. Onset of ascites in cirrhosis of the liver is associated with worsened quality of life, increased risk of spontaneous bacterial peritonitis, and renal failure. Management of ascites caused by cirrhosis requires sodium restriction in diet, sodium excretion with diuretics and, in refractory cases, large volume paracentesis. Technique: We describe a simple adjustment to the standard paracentesis technique that does not require additional equipment or manpower. Conclusion: Removing over 5 L of ascitic fluid can become a time-consuming and labor-intensive process. We describe a setup that makes this commonly performed procedure fast, convenient, and safe.** © 2009 Elsevier Inc.

□ **Keywords—paracentesis; large volume; drainage; ascitic fluid; fast; technique**

INTRODUCTION

Accumulation of fluid as ascites is the most common complication of cirrhosis. This occurs in about 50% of patients within 10 years of the diagnosis of cirrhosis. It is a prognostic sign with 1-year and 5-year survival rates of 85% and 56%, respectively (1). Once ascites is present, most therapeutic modalities are directed at maintaining negative sodium balance, including salt restriction, bed rest, and diuretics. Paracentesis and albumin infusion is applied to tense ascites. Transjugular intrahepatic portosystemic shunt or, in its absence, large-volume paracentesis (LVP), is considered for refractory ascites (2). With worsening of liver disease, fluid retention is associated with other complications such as spontaneous bacterial peritonitis. Diagnostic paracentesis and antibiotic therapy plus prophylactic regimen are mandatory in this case (3).

Diagnostic paracentesis is a common procedure, performed frequently in ambulatory or in-patient settings across all specialties. It requires removal of up to 20 mL of peritoneal fluid. This can be accomplished simply with a needle, an angiocatheter, or with the use of a paracentesis kit. LVP refers to situations where more than 5 L of ascitic fluid must be removed for therapeutic purposes to improve pulmonary status, decrease intra-abdominal hypertension, and eliminate, though temporarily, abdominal discomfort (4). Removal of 5 or more liters by manual aspiration with a 60-mL syringe and deposition into a bag can become a very labor-intensive process, whereas drainage by gravity is quite time-consuming. We see a considerable number of patients in our Emergency Department (ED) and clinics who require routine LVP, and therefore have adapted a technique that allows us to perform LVP quickly, conveniently, and safely.

TECHNIQUE

The initial stages of the procedure are performed in a standard fashion. The patient is positioned comfortably in a

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semi-recumbent or supine position. A standard midline or lateral approach for the puncture site is identified. Because the abdominal cavity contains a large amount of fluid, the use of ultrasound guidance is not necessary. The entry site is cleaned with 2% chlorhexidine and draped. Sterile technique is observed. Local anesthesia of the puncture site is performed in a standard fashion. For LVP, a catheter-over-needle device is used. After a small skin incision, the paracentesis needle attached to a 60-mL syringe is advanced through the skin and subcutaneous tissues with the Z-tract technique, with constant aspiration applied to the syringe. When the fluid is aspirated into the syringe, the catheter is advanced over the needle into the peritoneal cavity and the aspirated fluid is deposited into dedicated containers that will be sent for evaluation as needed. Until this point, the standard paracentesis technique and equipment have been used and are then followed by the use of drainage systems like bags or, typically, vacuum bottles.

With our technique, after the paracentesis catheter is successfully placed in the peritoneal cavity with a good return of the ascitic fluid, we attach a 5-mL syringe without the plunger to the catheter through a three-way stopcock; into the syringe we insert the sterile end of the suction tubing extension connected to the wall suction device, making sure not to contaminate the puncture site. The tubing fits tightly in this size syringe, as depicted in Figure 1. After the setup is arranged, the wall suction is turned on to remove as much fluid as necessary. After the completion of the LVP procedure performed with our modified technique, the patient will require the same level of monitoring and observation as if the procedure was performed in a standard manual aspiration fashion, hence not increasing the observation time or compromising the patient flow and ED stay.

DISCUSSION

We choose to attach the syringe to a three-way stopcock, rather than directly to the catheter, in order to be able to easily manipulate the flow of ascitic fluid. Having the three-way stopcock attachment allows the operator to have more precise control over the timing and flow of ascitic fluid without breaking sterility. It becomes necessary from time to time to stop the flow of fluid to adjust the patient's position or to change the drainage container when it is full. It is not unusual to change the drainage containers several times during LVP, because the capacity of standard containers is 2 L and it is not uncommon to aspirate close to 10 L or more during LVP.

One concern that may be raised with the use of this setup is the breaking of the sterile field and increased rate of infectious complications. This has not been the experience at our institution over the years. The only serious complication to watch for, as with the standard manual technique, is hypotension related to the removal of a large volume of ascitic fluid. This is easily prevented by simultaneous administration of intravenous albumin infusion (5). Albumin infusion during LVP is beyond the scope of this article, but is covered in the article by Appenrodt et al. (6).

CONCLUSION

The fast and safe removal of a large volume of fluid through the use of this technique will be beneficial for all teaching and non-teaching institutions, EDs, intensive care units, or general medical floors, and ambulatory settings alike. The flow of patients will be improved without added expense. This setup can be used even for quick aspirations and drainage of large collections of fluid above and beyond paracentesis and, furthermore, will replace the use of vacuum bottles, hence providing added cost savings as well. We find this technique particularly beneficial in our ED, a fast-paced county facility with limited resources and time, where efficiency is part of the equation in delivering safe and appropriate health care.

Figure 1. Equipment setup for large volume paracentesis.

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