Large Volume Paracentesis: Safer, Faster, and More Cost-Efficient with Automated Pump

Introduction
There are several methods for managing refractory ascites, but the standard therapy continues to be serial large volume paracentesis with administration of intravenous albumin. Traditional paracentesis using glass bottles or gravity fed waste bags has been described as “time consuming” and therefore can be costly to perform by taking up valuable clinic time. Patients may also be inconvenienced by the amount of time spent at the clinic, often requiring multiple visits per month. A unique automated paracentesis pump (GI Supply, Camp Hill, PA) has been shown to decrease procedure time while safely and effectively draining ascitic fluid from the abdomen. Several clinicians comment on their use of the pump.

Large Volume Paracentesis (LVP)

Ascites, an accumulation of fluid in the peritoneal cavity, is most often the result of cirrhosis but can also be due to congestive heart failure, kidney failure and cancer. Patients with ascitic fluid overload have reported abdominal discomfort, weight gain, shortness of breath, early satiety and dyspnea. These patients have an increased risk of infections and renal failure, and a poor long-term outcome. A patient is said to have refractory ascites when the fluid buildup is either unresponsive to a sodium-restricted diet and high dose diuretic treatment, or recurs rapidly after therapeutic paracentesis.

Large volume paracentesis (LVP) is the “treatment of choice” for the management of patients with grade 3/large ascites and refractory ascites. LVP has been defined as the removal of >5 liters of ascitic fluid, and is considered safe with a very low rate of serious complications. Patients requiring serial LVP typically undergo the procedure every two-weeks, but more frequent sessions may be required to relieve abdominal pressure. The American Association for the Study of Liver Disease (AASLD) Practice Guidelines and the European Association for the Study of Liver Disease Clinical Practice Guidelines both recommend an albumin infusion of 6-8g per liter of fluid removed during LVP to improve survival and prevent post-paracentesis circulatory dysfunction.

The specific technique recommended for LVP is not as clearly defined. Glass vacuum bottles, gravity fed waste bags and wall suction have all traditionally been used to remove ascitic
fluid, with glass bottles seeming to be the most commonly used equipment. However, these traditional methods are time consuming and can take up valuable clinic time. Additional disadvantages include:

- **Safety:** Glass bottles have been reported to break at the patient’s bedside and during transport.
- **Accessibility:** Wall suction must be done in a dedicated procedure room, taking up valuable space that could otherwise be used for another procedure.
- **Availability:** Nurses have reported shortages in vacuum bottles, leading to much longer paracentesis times and postponed appointments.

A paracentesis pump is now available that helps improve the ease and speed of LVP, while helping to decrease costs.

### RenovaRP™ Paracentesis Pump

The RenovaRP (GI Supply) is a portable, automatic paracentesis pump that safely and effectively removes ascitic fluid from the abdominal cavity, often in less than 30 minutes per LVP session. The automated pump and corresponding paracentesis kit are currently being used by radiologists, gastroenterologists, and hepatologists to more efficiently manage their liver, cancer, heart, and pancreatic patients.

Features of the paracentesis kit include a custom designed stainless steel, multi-hole cannula that improves fluid flow and helps prevent the cannula from being clogged against tissue. And because the cannula is metal, there is no danger of kinking or shaving off part of the sheath like plastic catheters. A pre-assembled tubing set is also provided that quickly and easily connects to the patient and the pump. Another highlight is the use of two disposable heavy-duty drainage bags that hang off both sides of the unit. A stop-cock feature on the pre-assembled tubing allows the clinician to change out bags as the procedure is progressing, allowing for continuous pumping.

The RenovaRP has an adjustable pump rate to maximize patient comfort and speed. When used as intended with the GI Supply Paracentesis Kit, the pump is capable of removing fluid at a maximum rate of approximately 600ml/minute. An easily opened compartment is located...
on the front of the pump for positioning of the tubing, and posts are located on each side of the pump for hanging the drainage bags. Operation of the pump is initiated with a control knob on the front panel.

The main advantages of the pump over traditional paracentesis include its portability, shorter procedure times, and subsequent cost-savings. Clinicians may safely perform paracentesis in an office-setting, or anywhere in the clinic or hospital where there is space for the patient. This can help free up exam rooms for other patients and procedures. And because the flow rate is faster than traditional glass vacuum bottles and gravity bags, procedure times are much shorter. Both the time and space savings offer a more cost-effective paracentesis solution.

**Clinician Experience**

**Bruce Runyon, MD | Santa Monica, CA**

Dr. Runyon is a Clinical Professor of Medicine within the Division of Digestive Diseases and Director of Hepatology at UCLA Santa Monica Medical Center. He is recognized as a world-renowned expert in the field of liver disease. His research and publications have focused on and improved the treatment of ascitic fluid analysis, spontaneous bacterial peritonitis, and hepatorenal syndrome.

“I helped develop and validate this multi-hole needle and pump system. It pulls out ascitic fluid smoothly and safely at a rate of about 1000 ml in 2 minutes, in my experience. This is twice as fast as vacuum bottles. Patients and providers who have undergone/performed taps with this pump, and taps using vacuum bottles, uniformly want only ‘the pump’ for subsequent taps.”

**Ho Chong Gilles, RN, MS, FNP | Richmond, VA**

Ms. Gilles specializes in care of patients with hepatic cirrhosis undergoing liver transplantation. She performs about 20 large volume paracentesis procedures a month with the RenovaRP pump. She says, “The RenovaRP has been a great tool. It cuts paracentesis time down by more than half compared to systems using vacuum bottles and gravity bags. It’s also safer than the glass bottles that I’ve seen break at the patient’s bedside.” Ms. Gilles reports that other specialties such as oncology and cardiology are now referring their patients with ascites to her for paracentesis.

She’s been able to develop an outpatient paracentesis-on-demand program that helps save costs by eliminating the need for patients to be admitted to the hospital or ER for the procedure. “This rapid paracentesis pump allows me to quickly and effectively manage my ascites patients. I can perform total paracentesis in the office setting, removing volumes of ascites up to 29 liters, from the set-up to discharge in under an hour. And this includes intravenous albumin infusion and ultrasound guided site selection.” Additionally, she says, “Paracentesis is the one thing I do that makes my patients feel better immediately. It relieves their abdominal pain and respiratory distress and improves their quality of life. Patients are comforted knowing that we can decompress their ascites quickly and efficiently, without disrupting their lives, and they are very grateful.”
Kaushik M. Patel, MD | Cape May, NJ

Dr. Patel is board certified in Diagnostic Radiology and Vascular & Interventional Radiology, and has been using the RenovaRP paracentesis pump for twelve years. Dr. Patel feels efficiency is the pump's greatest advantage for managing ascites. He says, “The larger needle and automatic pump allows fluid to drain much faster. My patients are happy that they’re ‘in-and-out’ of the hospital for the procedure, and my staff and I are happy that we can turn patients around quickly.” Dr. Patel has experience with glass bottles, but feels the pump is safer and saves time and cost by being much more efficient.

Nancy J. Murphy, NP | Burlington, MA

Ms. Murphy works in Gastroenterology at a clinic and has been using the RenovaRP rapid paracentesis pump for over six years. One of the most important reasons she likes using the pump is safety and ease-of-use. She says, “It is easy to do the procedure while maintaining sterility in one hand and changing over the bags with your ‘dirty’ hand by yourself. No additional personnel necessary.”

Ms. Murphy had previous experience with vacuum bottles, and feels the RenovaRP is much more user-friendly. She notes, “The vacuum bottles are more cumbersome to store and dispose of. Using the RenovaRP pump and bags for paracentesis is much simpler.”

Monica Choi, RN | Orange, CA

Ms. Choi has been using the RenovaRP paracentesis pump for a couple of years, and has only performed paracentesis using glass bottles when the pump was unavailable. She stresses that using the RenovaRP pump “is a lot quicker than glass bottles. My patients are in and out, which we both like.” She also points out that it’s safer than glass bottles because “you don’t have to continually puncture new bottles with a needle. You only have to change out the bags on the pump as they fill up.”

To request more information on the RenovaRP™ Paracentesis Pump, please visit

www.gi-supply.com/ascites

References


iii Senousy BE, Draganov PV.


vi Senousy BE, Draganov PV.

vii Runyon, B. AASLD Practice Guideline Management of Adult Patients with Ascites Due to Cirrhosis: Update 2012.

viii European Association for the Study of the Liver.


x Runyon, B. Diagnostic and therapeutic abdominal paracentesis. In: UpToDate, Feb 18, 2014, Waltham, MA. (Accessed May 12, 2014.)