

Paracentesis

Learning Objectives

- List indications and contraindications for paracentesis
- Obtain informed consent for paracentesis
- List steps in performing paracentesis
- Name appropriate ascitic fluid diagnostic studies to evaluate for new onset ascites and spontaneous bacterial peritonitis

Indications

Diagnostic

- Evaluation of new onset ascites
- Rule out spontaneous bacterial peritonitis (SBP) in a patient with preexisting ascites
- Monitor treatment success while treating for SBP

Therapeutic

- Symptomatic relief of large volume ascites, especially if respiratory compromise

Contraindications

- There are NO requirements for platelets or INR for procedure
 - No recommendations for prophylactic platelets or fresh frozen plasma before the procedure
 - No procedure complications in 600+ paracentesis where mean INR 1.7 and platelets 50K/ μ L (Grabau, 2004)
 - In case review of 4729 paracentesis procedures, only 9 cases of hemorrhage, 0.19% risk with 0.016% risk of death (Pache, 2005)
- Only absolute contraindications is DIC
- Relative contraindications:
 - Pregnancy
 - Organomegaly
 - Massive ileus with bowel distention or SBO
 - Abdominal adhesions

Risks/Benefits

RISKS

- Abdominal wall hematoma
- Transient hypotension
- Persistent ascitic fluid leakage
- Infection
- Damage to underlying tissue (bowel or solid organs)
- Death

BENEFITS

- Investigation of etiology of ascites
- Assess for infection
- Symptomatic relief

Obtaining Consent

Discuss name of procedure and reason for doing it

Brief outline of what procedure entails

Risks and benefits

Other procedure/treatment options

Who will be performing procedure

Obtaining Consent

- Consent must then be documented with a patient signature via these forms:



"CONORA"

UNIVERSITY OF CINCINNATI
MEDICAL CENTER
AUTHORITY FOR TREATMENT
CONSENT TO OPERATION OR OTHER
INVASIVE PROCEDURE ADMINISTRATION
OF ANESTHETICS AND RENDERING
OF OTHER MEDICAL SERVICES

PATIENT NAME: John Doe

UCMC-103, Rev. 10/13 Chart Place: Adm. & Consent Form Tab

I authorize Dr. Warm (lead practitioner/surgeon performing the procedure) and the associates or assistants of his/her choice to treat the following condition(s) (pre procedure diagnosis):

ABDOMINAL ASCITES

My physician/practitioner Dr. Warm has explained the procedure necessary to treat my condition as follows:

ABDOMINAL PARACENTESIS

Procedure Site (check all that apply): Right side Left side Other (specify) Multiple sites (specify) or multiple structures (fingers, toes), or levels (spine):

I understand that possible risks such as severe blood loss, infection, nerve damage, cardiac arrest and even death, among others, may occur in any surgical procedure. My physician has explained the material risks and benefits associated with this procedure and potential problems that might occur during recuperation. Additional risks include:

HYPOTENSION, ABDOMINAL WALL HEMATOMA, DAMAGE TO BOWELS/ORGANS, PERSISTENT ASCITIC FLUID LEAK
(optional description of additional risks) or supplemental page attached

My physician has discussed appropriate alternatives and their associated benefits and risks. This includes the possible results from not receiving the recommended care, treatment, and services.

The likelihood of achieving the goals of this procedure is: Poor Fair Good Unknown due to:

I understand that during the course of the operation, unforeseen conditions may become apparent which require an extension of the original procedure, an additional procedure or a different procedure. I authorize my practitioner, his/her associates or assistants to perform such procedures, as they, in the exercise of their professional judgment, deem necessary and advisable.

I consent to the administration of anesthetics. I understand that an anesthesiologist will direct my anesthesia care unless an anesthesiologist is not required because of the type of procedure or the medication to be used. I understand the nature of the proposed anesthesia, as well as any risks, benefits and alternatives. Risks of anesthesia include but are not limited to: sore throat; hoarseness; injury to face, mouth or teeth; nausea; headache; injury to blood vessels or nerves; brain damage, paralysis, or death.

I understand that physicians and other practitioners in addition to the lead practitioner/surgeon may be involved in my treatment, including Resident physicians and other trainees. They may perform such tasks only within their scope of practice and license, and as set forth in the privileges granted by the hospital. Residents may participate under the oversight of the Attending physician/surgeon, depending on their level of education and skills, and the patient's condition. The names of these individuals will be identified in the operative record.

I consent to the transfusion of blood or blood products from a community donor pool and as may be available from other sources arranged by my practitioner. I understand that there are potential risks and side effects from blood transfusions, though rare, and that some of these include transfusion reaction, viral hepatitis and HIV infection.



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Page 2 of 2

Patient name and medical record number must be complete here when faxed.

UCMC-103, Rev. 10/13 Chart Place: Adm. & Consent Form Tab

I understand that my Advance Directive will be suspended during, and up to 24 hours after, an operative or high-risk procedure. (Please speak with your physician if you have any issues with this.)

The UC Medical Center is dedicated to advancing medical knowledge to improve care for its patients. I understand that the procedures outlined below are necessary to support this mission and I consent to them. **However, I may cross out either or both procedures if I do not consent and it will not affect my care.**

I consent to the photographing or televising of the operation or procedure to be performed, including appropriate portions of my/the patient's body, for medical, scientific or educational purposes as long as my/the patient's identity is not disclosed. I understand that: 1) if I am conscious during a procedure, I can ask that the recording stop and 2) I can rescind (take back) my consent for use of this media up to a reasonable time before the images are used.

All specimens or tissues removed from my body that would otherwise be disposed of may be used for genetic and other research, or for scientific or educational purposes as approved by the Institutional Review Board of the University of Cincinnati Academic Health Center. No one except specifically authorized persons will have access to the tissue samples or information derived from my medical records. Every reasonable effort will be made to maintain confidentiality.

Additional comments: Ø

All information concerning this procedure and necessary for my informed consent, including alternative or no treatment has been disclosed to me. Also, all my questions about the procedure, including the expected involvement of other practitioners and trainees, have been answered.

I understand that the practice of medicine and surgery is not an exact science and I acknowledge that no guarantees have been made to me about the results of this procedure.

I explained the risks, benefits and alternatives of this procedure, including the above, with the patient, or the patient's representative (Physician or other individual practitioner)

ERIC WARM MD ERIC WARM 8/31/16 1300
(Physician's/Credentialed Provider's Signature) (Printed Name) (Date and Time)

I give my permission and consent to the treatment or procedure specified above:

John Doe JOHN DOE 8/31/16 1300
(Patient's Signature) (Printed Name) (Date and Time)

Patient is unable to consent, I therefore consent for this patient.

(Signature of Surrogate Decision-maker) (Printed Name/Relationship) (Date and Time)

(Signature of Witness if consent by telephone or otherwise not obtained at the time of the initial explanation) (Printed Name) (Date and Time)

Check if telephone consent Check if interpreter involved _____ (Name)

Position Patient

- Elevate the head of the bed (semirecumbent)
- May roll towel and place under opposite hip to help shift fluid towards needle insertion site

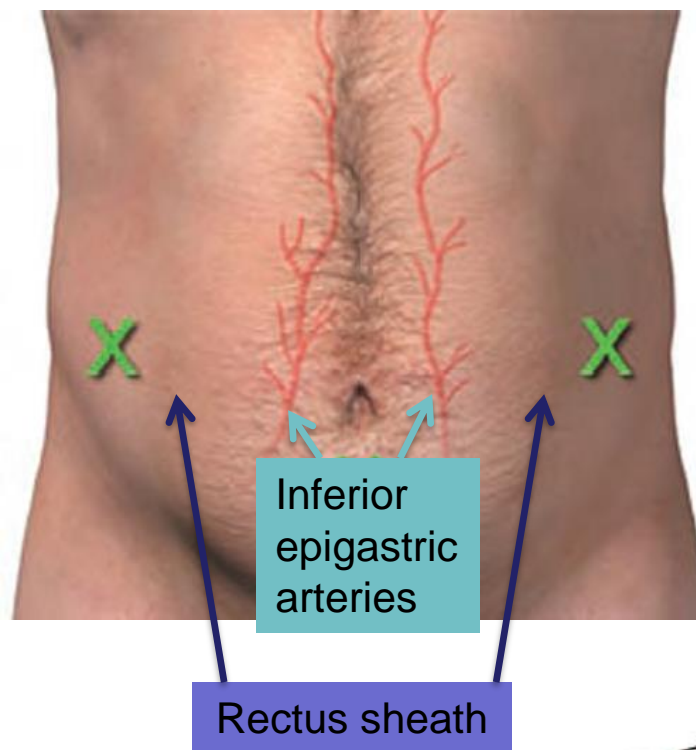
Procedure Location

– RLQ & LLQ:

1. LLQ is preferred
(because cecum more anchored so higher chance of bowel perforation, esp if pt on chronic lactulose which further distends the bowel)

2. Site should be 2 fingerbreadths (3 cm) medial and 2 fingerbreadths cephalad to anterior superior iliac spine

- Ensure you are lateral to rectus sheath to avoid injury to inferior epigastric artery



Procedure Location

- After physical exam, static ultrasound guidance may be used to:
 - Confirm presence of ascitic fluid and absence of nearby bowel or other intraabdominal structures
 - Measure distance of skin and subcutaneous tissue
 - [See separate ultrasound module for additional information]
- Once site is selected, mark with pen cap or sterile marker and instruct patient not to move

Other Site Considerations

- Needle should NEVER be advanced through:
 - Abdominal wall cellulitis/erythema
 - Engorged abdominal wall veins
 - Surgical scar
 - Abdominal wall hematoma or 3D ecchymosis

Preparation

- Paracentesis is a sterile procedure that requires:
 - Sterile gloves
 - Face shield
 - Sterile gown is not required

Materials

- Lavendar tube for cell count/differential
- Sterile container for culture collection
- Red tube for protein, albumin, LDH, and all other ascitic fluid studies
- Additional equipment for therapeutic paracentesis:
 - Adapter
 - Jug

Steps of Paracentesis

- After putting on sterile gloves, cleanse planned site with antiseptic solution and apply a sterile drape
- Using 25-gauge needle, place wheal of lidocaine anesthetic in epidermis at planned site of entry
- Anesthetize deeper tissue by inserting 22-gauge needle in anticipated tract and intermittently injecting lidocaine. Negative pressure should be applied at all times while advancing needle
- Once ascitic fluid returns, remainder of lidocaine should be injected into the peritoneal space

Insertion of Paracentesis Catheter

- ❑ Both strategies are meant to minimize the risk of ascitic fluid leak post-procedure

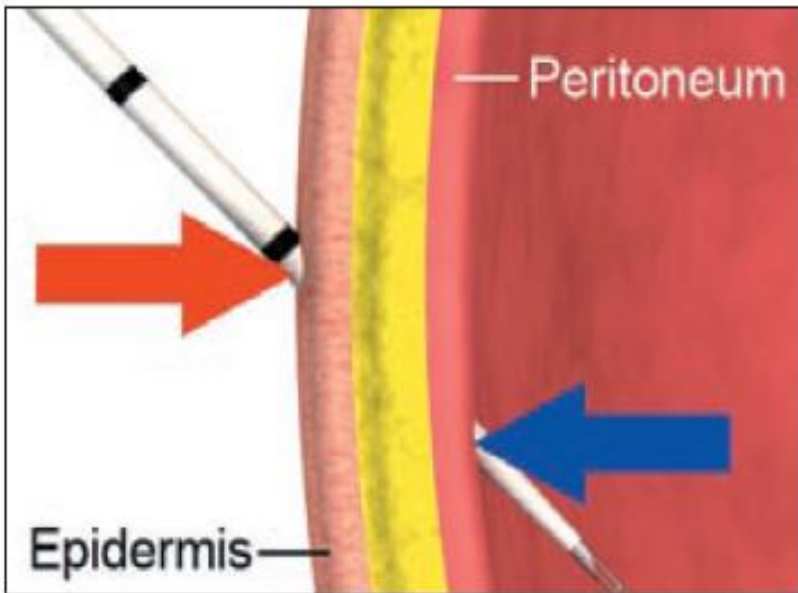
Angular Insertion

- Needle is held at 45-degree angle as it pierces the epidermis
- Continues on this angled trajectory through the subcutaneous tissue and into the peritoneal cavity

Z-Tract Technique

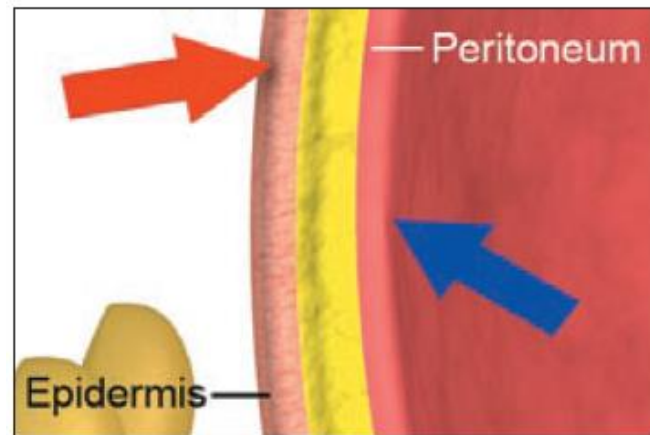
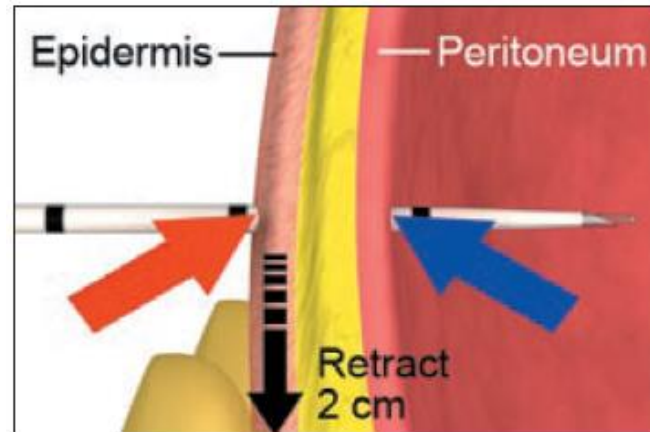
- Cutaneous tissues is pulled 2 cm caudad
- Needle is inserted and advanced at 90 degree angle
- Once needle is withdrawn, cutaneous entry site will retract to its original location

Angular Insertion



The angular insertion technique

Z-Tract Technique



The Z-tract technique

Steps of Paracentesis

- Holding the syringe in dominant hand and shaft of needle in non-dominant, advance paracentesis needle
- Advance needle in small 2-3 mm increments, intermittently pulling back on plunger of the syringe
- Once there is return of ascitic fluid, stop advancing needle
- Carefully advance catheter over the needle then withdraw the needle
- Attach syringe to catheter, collect 30-60 cc for diagnostic fluid
- Attach suction tubing to catheter and proceed with large volume removal
 - HR and BP should be monitored at all times during large volume removal

Large volume set up

- Please see supplemental video for questions of large volume equipment and set up

Steps of Paracentesis

- Once desired amount of fluid is removed, quickly remove catheter
- Apply sterile occlusive dressing to site
- Congratulations, the paracentesis is complete
- Now write a procedure note

Procedure Note

The image shows a screenshot of a medical software interface. At the top, a "New Note" window is open, displaying fields for "Type" (set to "Procedures"), "Service" (Medicine), "Date" (8/4/2016), and "Time" (01:24 PM). Below this, a "SmartText Selection - Patient" window is active. It features a search bar with "paracentesis" entered and a "Find" button. The search results are displayed in a list under the "Title" header, showing "OR PROC NOTE PARACENTESIS" and "PROC PARACENTESIS ED". The second item is highlighted in blue, and a green rectangular box highlights a button located below it. At the bottom of the "SmartText Selection" window, there are several control buttons: a checked checkbox labeled "= User's default tab", "Show Preview", "Make Tab Default", "Add Favorite", "Accept", and "Cancel".

New Note Bookmark Details

Type: Service: Date: Time:

Cosign Required Cosigner:

Please choose the associated orders: My Specialty Associated Orders Order Report

Date/Time	Order Name	Provider	Specialty	Status
<input type="checkbox"/> 08/03/16 1741	EKG REPORT - SCAN	Scanning Uchhim		Completed
<input type="checkbox"/> 08/01/16 1742	EKG REPORT - SCAN	Scanning Uchhim		Completed
<input type="checkbox"/> 07/31/16 1929	Insert peripheral IV	Sean Robert Malon		Sent

Procedure Name	Add to History
1 PARACENTESIS [PRO146 (Type: Custom)]	<input type="checkbox"/>
2	<input type="checkbox"/>

Pre-procedure Diagnoses		Post-procedure Diagnoses	
1	Ascites	1	Ascites
2		2	

Paracentesis Procedure Note
Indication: {INDICATION:24735}
Consent: {CONSENT:24470}
Procedure: The patient was placed in the {POSITION:24736} and the appropriate landmarks were identified. The skin over the puncture site in the {PUNCTURE SITE:24737} region was {PREP FOR PROCEDURE:24463}. Local anesthesia was {ANESTHESIA:24734}. {PUNCTURE METHOD:24738}. Fluid was {PARACENTESIS FLUID:24739}. The {NEEDLE/CATHETER:24740} was then withdrawn and a sterile dressing was placed over the site.
 The patient tolerated the procedure {TOLERATED:24436}.
Complications: {COMPLICATIONS:24741}

The screenshot shows a web-based medical note editor. At the top is a toolbar with icons for undo, redo, bold, italic, text color, background color, link, unlink, and insert smart text. The main text area contains the following content:

Paracentesis Procedure Note
Indication: Ascites

Consent: The patient was counseled regarding the procedure, it's indications, risks, potential complications and alternatives and any questions were answered. Consent was obtained.

Procedure: The patient was placed in the right lateral decubitus position and the appropriate landmarks were identified. The skin over the puncture site in the right lower quadrant region was prepped with chlorhexidine and draped in a sterile fashion. Local anesthesia was obtained by infiltration using 1% Lidocaine without epinephrine. A paracentesis catheter was then advanced into the abdominal cavity over a needle and the needle was withdrawn. Fluid was returned which was clear. A total volume of 2600cc was withdrawn which was sent to the lab for cell count and differential, total protein, albumin, LDH, gram stain and culture and cytology. The catheter was then withdrawn and a sterile dressing was placed over the site.

The patient tolerated the procedure well.

Complications: None

At the bottom right of the editor are four buttons: 'Pend' (with a checkmark icon), 'Share' (with a person icon), 'Sign' (with a checkmark icon), and 'Cancel' (with an X icon).

Colloid Replacement

- Goal is to prevent hypovolemia via significant fluid shifts after large volume paracentesis and its complications including hypotension & acute kidney injury
- If <5L removed:
 - no indication for albumin
- If >5L removed:
 - 6-8 g of albumin/L fluid removed

Rule Out Spontaneous Bacterial Peritonitis (SBP)

- All cirrhotic patients who present with ascites and decompensation should be ruled out for SBP at time of admission. All you need is:
 - Diagnostic paracentesis (<30cc)
 - Fluid cell count and differential
 - Fluid Gram stain and culture
- In patients with SBP, mortality increases by 3.3 percent/hour of delay in performing a paracentesis

Spontaneous Bacterial Peritonitis (SBP)

- Determined by cell count and differential of ascitic fluid
 - ≥ 250 absolute PMNs indicates SBP
 - To calculate, take total fluid leukocyte count and multiple by % neutrophils
 - May also see cloudy/turbid fluid
- Treatment = 3rd generation CSN
 - Cefotaxime
 - Ceftriaxone

Special Considerations for SBP

- Stop nonselective betablockers
 - Higher mortality in SBP pts in retrospective study compared to no BB use (HR 1.58, 95% CI [1.10-2.27])
- Give albumin 1.5g/kg on day 1 and 1.0 g/kg on day 3 when:
 - Creatinine > 1 mg/dl, or
 - BUN > 30 mg/dl, or
 - Total bilirubin > 4 mg/dl

When to give SBP prophylaxis

- History of SBP
 - So if you diagnose this in the hospital, make sure to discharge patient with trimethoprim-sulfamethoxazole 1 DS daily or Cipro 400 mg daily
- In patients with cirrhosis who present with GI bleed. Tx duration is 7 days.
 - Choices include: ceftriaxone, TMP-SMX, or cipro

Workup of New Ascites

- All patients with new ascites REQUIRE a paracentesis for fluid analysis
- Fluid testing should be guided by history and physical of patient as opposed to ordering all tests
- Important information for diagnosis includes:
 - Appearance
 - Serum-ascites albumin gradient (SAAG)
 - Cell count and differential
 - Total protein
 - Other: Gram stain, culture, amylase, cytology, triglycerides

Serum-Ascites Albumin Gradient (SAAG)

- Step 1 to new ascites diagnosis: Calculate SAAG
- This is done by subtracting the ascites albumin value from the serum albumin value:
- $SAAG = (\text{serum albumin}) - (\text{ascites albumin})$

SAAG Interpretation

≥ 1.1 g/dL indicates ascites secondary to portal hypertension (cirrhosis, Budd-Chiari, portal vein thrombus, heart failure)

- To further differentiate, check fluid total protein:
 - If ≥ 2.5 g/dL \rightarrow cardiac ascites
 - If < 2.5 g/dL \rightarrow cirrhosis

– < 1.1 g/dL indicates non portal hypertension related etiology

- Elevated amylase (~ 2000 IU/L) suggest pancreatitis
- Elevated TG suggests lymphatic leak
 - Chylous ascites if >200 mg/dL

Etiologies of Ascites

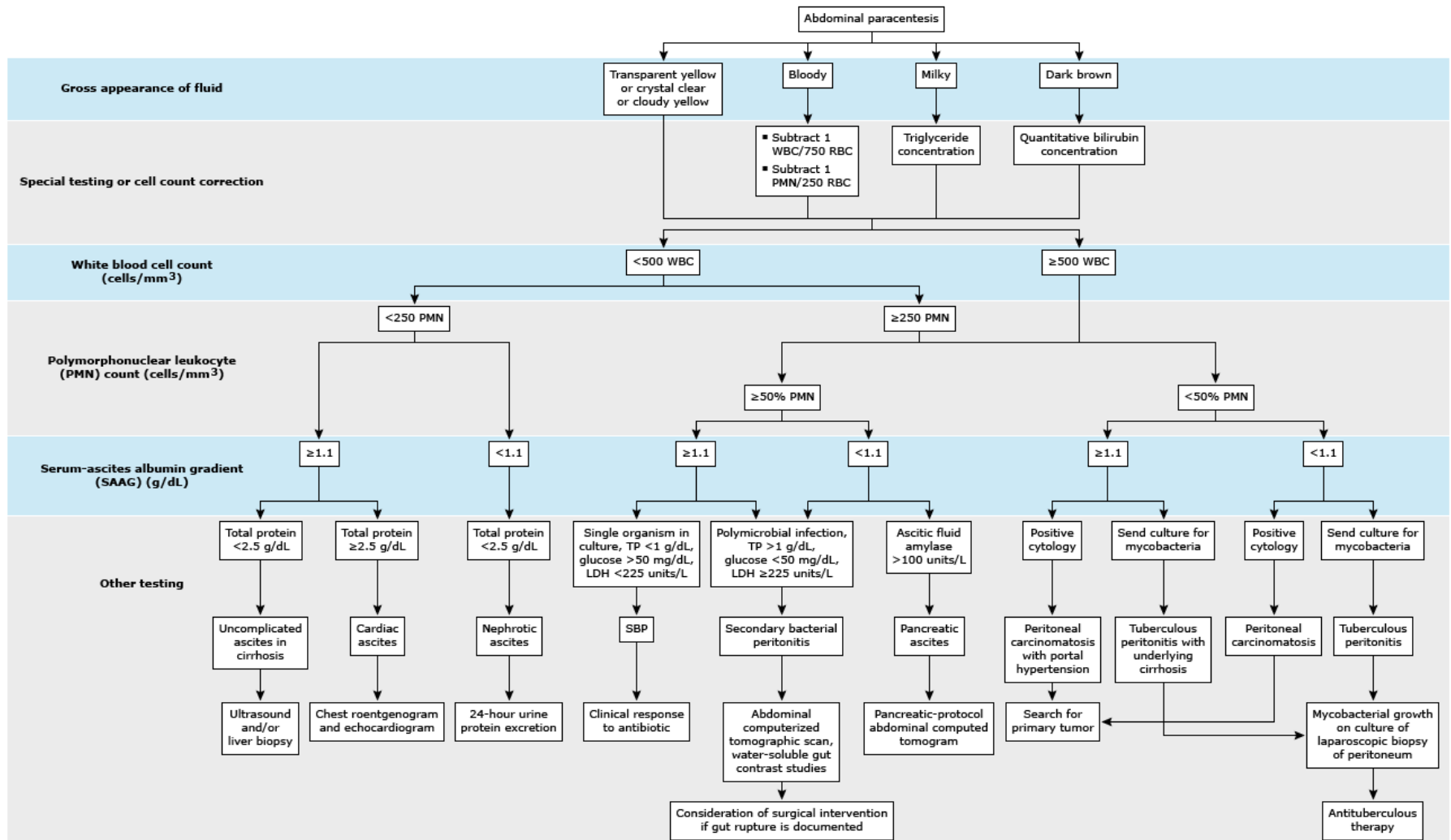
Portal Hypertension (SAAG \geq 1.1)

- Cirrhosis
- Portal vein thrombus/Budd Chiari
- Heart Failure

Nonportal hypertension related (SAAG $<$ 1.1)

- Pancreatitis
- Peritoneal tuberculosis
- Nephrotic Syndrome
- Post-op lymphatic leak
- Myxedema
- Malignancy/peritoneal carcinomatosis

Differential diagnosis of ascites



WBC: white blood cell; RBC: red blood cell; PMN: polymorphonuclear leukocyte; TP: total protein; LDH: lactate dehydrogenase; SBP: spontaneous bacterial peritonitis.

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Resources

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- Grabau CM et al. "Performance standards for therapeutic abdominal paracentesis." *Hepatology*. 2004; 40(2):484-8.
- Pache I, Bilodeau M. "Severe haemorrhage following abdominal paracentesis for ascites in patients with liver disease." *Ailment Pharmacology and Therapeutics*. 2005;21(5):525-9.
- Runyon BA et al. "Introduction to the revised American Association for the Study of Liver Diseases Practice Guideline management of adult patients with ascites due to cirrhosis 2012." *AASLD Hepatology*. 2013;57(4):1651.
- Thomsen, T et al. Paracentesis. *Videos in Medicine*. NEJM.
- Runyon BA. Spontaneous bacterial peritonitis in adults: Treatment and prophylaxis. UpToDate. Last updated: Jan 04, 2016.