

Ascites and Spontaneous Bacterial Peritonitis

A plain-English guide for you and your family

WHAT IS HAPPENING

Your peritoneum is the thin, slippery lining inside your belly that wraps around your organs. Normally it makes just a few drops of clean fluid so organs can slide past each other smoothly. When your liver gets scarred (cirrhosis), pressure builds up in the big vein that drains blood from your intestines to your liver. That high pressure forces water, salt, and a little protein out of your blood vessels and into your belly—that pooled fluid is called fluid buildup in the belly (ascites). At the same time, cirrhosis weakens your immune system so it cannot make enough infection-fighting proteins. Bacteria that live harmlessly in your gut (like *E. coli*) can now sneak through the gut wall and land in the fluid buildup in the belly. Once they are there, they multiply fast because the fluid does not have enough white blood cells or antibodies to kill them. This infection is called spontaneous bacterial peritonitis, or SBP. You get a fever, your belly hurts or feels tight, and you may feel confused or sleepy because toxins and ammonia build up in your blood. In severe cases, your blood pressure drops and your kidneys shut down. Doctors diagnose SBP by sticking a thin needle through your belly skin to draw out a sample of fluid (paracentesis) and counting the white blood cells under a microscope—250 or more fighter cells per microliter means infection, even if bacteria do not grow in the culture bottle. Treatment is an antibiotic shot (usually ceftriaxone) plus a bag of IV albumin (a protein solution) that pulls fluid back into your blood vessels and shields your kidneys. Early treatment can cure SBP; without it, the infection spreads into your bloodstream (sepsis) and can kill you in days. That is why any person with cirrhosis and fluid buildup in the belly who gets a fever, new belly tenderness, or sudden confusion should have a belly tap right away—waiting to see if it gets worse can be fatal.

What you might feel

- Fever (temperature ≥ 38.0 °C / 100.4 °F)
- Belly pain or tenderness
- Worsening confusion or altered mental status (hepatic encephalopathy)
- Low blood pressure (systolic <90 mmHg or a drop of ≥ 40 mmHg from your usual)

- Sudden kidney injury (creatinine rises ≥ 0.3 mg/dL or urine drops to < 0.5 mL per kilogram per hour)
- Very low body temperature (hypothermia < 36.0 °C / 96.8 °F)
- Few or no symptoms at all (happens in up to 30 % of people)
- A stalled gut (Ileus) (belly bloating, no bowel sounds, nausea, vomiting)
- Diarrhea

Call the doctor right away if...

- Low blood pressure (systolic < 90 mmHg) or signs of septic shock: cold arms and legs, blotchy skin, blood lactate > 4 mmol/L (waste acid building up because organs aren't getting enough oxygen)
- Sudden kidney injury: creatinine rises ≥ 0.3 mg/dL in 48 hours, or urine output drops below 0.5 mL per kilogram per hour for 6 hours straight
- Severe confusion or unresponsiveness (hepatic encephalopathy grade III–IV): very sleepy, can't be woken easily, or in a coma
- High kidney waste or liver breakdown markers at diagnosis—creatinine ≥ 1 mg/dL, blood urea nitrogen (BUN) ≥ 30 mg/dL, or total bilirubin ≥ 4 mg/dL—all predict high risk of death and mean you need IV albumin (a protein infusion) to support blood pressure and kidneys
- Seeing lots of bacteria on a Gram stain of the belly fluid, or free air on a CT scan—this suggests the infection is NOT spontaneous bacterial peritonitis but secondary peritonitis from a hole in the bowel or an abscess, and you need emergency surgery

What the care team will do

- Notify the physician immediately and prepare for diagnostic paracentesis within the next hour—gather sterile kit, position patient supine or slightly tilted, and have blood-culture bottles ready at bedside.
- Start intravenous antibiotics (ceftriaxone 2 grams every 24 hours or cefotaxime 2 grams every 8 hours) within 1 hour of suspected SBP, before culture results return.
- Administer intravenous albumin (a blood protein) 1.5 grams per kilogram of body weight within 6 hours of diagnosis, then repeat 1.0 gram per kilogram on day three.
- Monitor vital signs every 1 to 2 hours: blood pressure, heart rate, temperature, respiratory rate, and oxygen saturation—escalate immediately if systolic blood pressure drops below 90 mmHg or mean arterial pressure falls below 65 mmHg.
- Measure and record urine output every hour using a Foley catheter—notify the physician if output drops below 0.5 milliliters per kilogram per hour for six consecutive hours, or if creatinine rises ≥ 0.3 mg/dL from baseline.

- Assess mental status every 2 to 4 hours using a standardized tool (such as the Glasgow Coma Scale or the Hepatic Encephalopathy Grading scale)—watch for increased confusion, drowsiness, or inability to follow commands.
- Hold all diuretics (water pills such as furosemide and spironolactone) and nephrotoxic medications (drugs that harm kidneys, including NSAIDs like ibuprofen and aminoglycosides like gentamicin) until the infection clears and kidney function stabilizes.
- Educate the patient and family that after SBP resolves, lifelong daily antibiotics (norfloxacin 400 milligrams once daily or ciprofloxacin 500 milligrams once daily) are required to prevent recurrence, and discuss liver-transplant evaluation if not already listed.

Medicines you may be given — and why

Ceftriaxone IV (third-generation cephalosporin antibiotic)

Ceftriaxone locks onto tiny protein machines (called penicillin-binding proteins) that bacteria use to build their outer shell. When these machines stop working, the bacteria's wall gets weak and bursts open, like a balloon with a hole in it—and the bacteria dies. In spontaneous bacterial peritonitis (when bacteria from the gut sneak across the intestine wall into belly fluid and start multiplying), the most common invaders are gut bacteria such as *E. coli* and *Klebsiella*. Ceftriaxone kills these bugs in the belly fluid and stops the infection.

IV albumin (25% human albumin solution)

Albumin is a big protein that normally floats in your blood and acts like a sponge, holding water inside your blood vessels so your blood pressure and kidney blood flow stay steady. When you have spontaneous bacterial peritonitis, the infection makes blood vessels throughout your body relax too much (like a garden hose going limp), and at the same time the tiny arteries in your kidneys clamp down tight. Blood pressure drops and your kidneys get starved of blood. Giving IV albumin pulls water back into your blood vessels from the tissues, raises your blood pressure, and keeps blood flowing to your kidneys so they don't shut down (a dangerous complication called hepatorenal syndrome type 1).

Avoid nephrotoxic drugs, ACE inhibitors, ARBs, and NSAIDs

In cirrhosis, your kidneys are already struggling because blood vessels in your gut are too relaxed (from scar tissue blocking flow through the liver), so less blood reaches the kidneys. Your body tries to keep blood pressure steady by releasing hormones that squeeze kidney blood vessels, but this leaves your kidneys on the edge of shutting down. NSAIDs like ibuprofen block chemicals (prostaglandins) that normally keep the inflow pipe to the kidney filter open, so the filter clogs. ACE inhibitors and ARBs block a hormone (angiotensin II) that keeps the outflow pipe squeezed just enough to maintain filtering pressure—without that squeeze, pressure drops and the filter stalls. Other kidney-toxic drugs (certain antibiotics, IV

dye for CT scans, some transplant medicines) directly poison the delicate kidney cells. Any of these can tip you into sudden kidney failure (acute kidney injury) or hepatorenal syndrome.

Norfloxacin or ciprofloxacin daily (fluoroquinolone antibiotic prevention (prophylaxis))

Norfloxacin and ciprofloxacin jam the tiny molecular machines (called DNA gyrase and topoisomerase IV) that bacteria in your gut use to unzip and copy their DNA. When these machines break, bacteria can't multiply and they die off. The goal is to thin out the crowd of gut bacteria—especially the troublemakers like *E. coli* and *Klebsiella*—so fewer can sneak across your leaky gut wall into your belly fluid and cause another infection. This daily prevention antibiotic is given to people at high risk of getting spontaneous bacterial peritonitis again, such as those who've already had one infection, have very low protein in their belly fluid (less than 1.5 grams per deciliter), or had bleeding from varices.

Large-volume paracentesis with IV albumin replacement (8 g albumin per liter removed if >5 L)

Paracentesis means putting a needle through your belly wall into the fluid-filled space (peritoneal cavity) and draining the fluid out. Removing large amounts of belly fluid relieves the pressure that makes it hard to breathe and hard to eat (because your stomach gets squashed). But when you take out more than 5 liters (about 1.3 gallons), your blood vessels lose so much water so fast that your blood pressure can drop and your kidneys can fail. This happens because fluid in your blood vessels rushes into the belly to try to replace what was drained, leaving less blood for your heart to pump. Giving albumin through an IV—8 grams for every liter of fluid removed—keeps water in your blood vessels, props up your blood pressure, and protects your kidneys from shutting down (a problem called post-paracentesis circulatory dysfunction).

Spironolactone and furosemide (aldosterone antagonist and loop diuretic combination)

In cirrhosis, your body mistakenly thinks you don't have enough blood volume (because blood pools in your gut vessels), so it releases a hormone called aldosterone. Aldosterone tells the last part of the kidney's filter (the collecting duct) to pull salt and water back into your blood and throw potassium into the urine. This makes belly fluid and leg swelling worse.

Spironolactone blocks aldosterone's signal, so your kidneys dump salt and water into urine instead of saving it—and they keep potassium. Furosemide works earlier in the kidney filter (in a loop-shaped tube called the loop of Henle) and blocks a transporter that reabsorbs salt, chloride, and water—so even more salt and water leave in your urine, but furosemide also dumps potassium. Using both drugs together in a 100 mg spironolactone to 40 mg furosemide ratio mirrors how cirrhotic kidneys behave and keeps potassium balanced—spironolactone's

potassium-saving cancels furosemide's potassium-wasting. Together they shrink belly fluid and leg swelling without making electrolytes swing wildly.

Transjugular intrahepatic portosystemic shunt (TIPS)

TIPS is a small metal tube (stent) that a doctor threads through a vein in your neck and places inside your liver to connect the portal vein (the high-pressure vein draining blood from your gut, spleen, and pancreas) directly to a hepatic vein (the low-pressure vein draining your liver into the main vein returning to your heart). Normally, blood flows through the liver's tiny, delicate vessels (sinusoids), but in cirrhosis those vessels are choked by scar tissue, causing pressure to build up—like a dam in a river. The stent creates a shortcut around the dam, dropping the pressure in the portal vein from dangerously high levels (often above 12 millimeters of mercury) down toward normal (5 to 10 mmHg). Lower pressure means less fluid is squeezed out of blood vessels into your belly, and your body's stress hormones (renin-angiotensin-aldosterone) calm down. TIPS is used for belly fluid that won't go away despite the strongest diuretics (refractory fluid buildup in the belly (ascites)) or keeps coming back rapidly after needle taps, and for bleeding from varices that medicine can't control.

Where this information comes from

- AASLD Practice Guidance on Ascites, Spontaneous Bacterial Peritonitis, and Hepatorenal Syndrome (2021)
- European Association for the Study of the Liver (EASL) Clinical Practice Guidelines on Ascites (2018)
- Infectious Diseases Society of America (IDSA)
- Surviving Sepsis Campaign 2021

Last reviewed: 2026-07-07