
Gallbladder

The general function of the gallbladder is to store and concentrate bile. During digestion the gallbladder contracts and the bile passes through the bile ducts into the duodenum. Bile salts emulsify the fats which allows the enzyme lipase, coming from the pancreas, to more readily digest them. Bile salts are also necessary for the absorption of vitamin K and the digestive fats.

Like all structures and systems in the body, the biliary system is dependent upon a balance of pressures. If this balance of pressures is disrupted, normal function will be impaired. Something as seemingly insignificant as a small restriction of the common bile duct, for example, can lead to serious problems involving the gallbladder, biliary system, and even lead to pathologies of the pancreas.

The gallbladder is an organ that has a role of accepting overflow in all sense of the word. It is a primary organ for somatization of emotional and mental stress. For example, if a person is upset upon receiving bad news or witnessing an accident, the body's first reaction is often an intense contraction of the gallbladder.

With Visceral Manipulation we can have a great effect on the function and health of the gallbladder and biliary system.

Physiology

- relates to storage of bile
 - bile comes down from the liver through the hepatic ducts
 - Dumps into duodenum via Sphincter of Oddi to medial posterior side
 - Pressures in the tubes explain why the bile ends up in the gallbladder and doesn't just drip into the duodenum
- hepatic ducts
 - 4 cm long (1.5")
 - 20 cm H₂O
- gallbladder
 - 4 cm at widest point
 - 7-10 cm long (3-4")
 - 40-60 mL of bile storage capacity
 - When the gall bladder is relaxed
 - pressure is 10 cm H₂O
 - sphincter of Oddi is contracted
 - lower pressure than common bile duct so there is a suction of bile into the gallbladder
 - When the gall bladder contracts:
 - CCK secreted which causes gall bladder to contract, Oddi to relax
 - Gall bladder pressure goes to 30 cm H₂O
 - Bile pushed out of gall bladder
 - Aschoff's recesses absorb water from the bile in the gall bladder
 - When worked out, the gall bladder gets bigger but gets less efficient (similar to heart)
- cystic duct
 - 3-4 cm long (1.25")
 - 3-4 mm wide (0.25")
- common bile duct
 - 7.5 cm long (3")
 - 5-6 mm wide (0.25")
 - 15 cm H₂O

Function of Bile

- Thick yellowish substance that helps emulsify fats (better absorption (vitamins A, D, E, and K))
 - Vitamin D is very important to many functions
 - Bile needed to help emulsify D and the rest of fat soluble vitamins (A, E, K) so they can be absorbed by the small intestines
 - If you have gallbladder removed and don't have a high concentration of bile from liver, you can have problems with fat

soluble vitamins

- Route of excretion of bilirubin
- Neutralizes excess stomach acid before it enter jejunum
- Bacteriocidal to microbes entering alimentary canal with food
- Natural laxative (can have constipation after gall bladder removal)

Anatomy

- circular fibers of the sphincter of Oddi run into the common bile duct
- Firmly attached to liver (sometimes too firmly)

Topography

- sites under liver
- runs posterior, medial, superior direction along liver

Visceral Articulations

Gallbladder to Organs

- The gallbladder sits within the right quadrate lobe of the liver.
- Occasionally it is completely invested with peritoneum and may even be connected to the liver by a short mesentery.
- The anterior projection of the fundus is beyond the liver and relates to the 9th right costal cartilage.
- The cystic ducts and the common bile duct travel within the lesser omentum (hepatoduodenal ligament)
- The cystocolic ligament connects the inferior surface of the gallbladder with the right part of the transverse colon.
- The cystoduodenal ligament connects the inferior surface of the gallbladder with the superior part of the duodenum (D1).

Organs to Gallbladder

- liver, D1, pancreas, greater omentum relate to gallbladder

Vascularization

Gallbladder

- artery
 - cystic artery
- vein
 - cystic vein and directly to the liver

Common Bile Duct

- artery
 - cystic artery
 - posterior superior pancreaticoduodenal artery
 - right hepatic artery
- vein
 - posterior superior pancreaticoduodenal vein
 - directly to liver

Innervation

- sympathetic
 - cord level T7-T9
 - through greater splanchnic nerve to celiac plexus to hepatic plexus on to cystic plexus
- parasympathetic

- vagus nerve
- afferent impulses via phrenic nerve C4-C5 cord

Emotional/Physical

- The gallbladder is the organ of transient and superficial anger.

Signs and Symptoms

- Tired in the morning because the gallbladder lacks mobility
 - activity reduces fatigue as day goes by
- Sensitivity at 9th costal cartilage on midline and just right of there
- Headache
- constipation (due to restricted portal vein)
- cholecystitis – inflammation of the gallbladder
 - Majority of cases are due to a stone in the cystic duct
 - Can also be due to trauma or the effects of surgery
- when they do a gallbladder removal, they cut through lesser omentum/hepatoduodenal ligament
 - leads to lots of scarring
 - peeling the gallbladder off leads to adhesion on the liver
 - the body will try to create another gallbladder and will try to dilate the common bile duct to store—not that successful
 - Even after removing the gallbladder, you can still have the same problems as before since they are more from the adhesions of the tissue around the gallbladder than the stones themselves
- With gallbladder problems, the greater omentum will migrate up to towards the gall bladder to help wall it off
- Nausea, vomiting (of reflux of bile into stomach)
 - Bile causes inflammation of the lining of the stomach if it is refluxing
- Decreased breathing
 - inhale: pressure on organ
 - exhale: pulls of peritoneal attachments
 - may see clients taking deep inhales from moving the shoulder
 - C3-C6 (phrenic nerve travels along cervical vertebrae through thorax to gall bladder)

Gallstones

- gallstones made mostly of cholesterol
- Too much cholesterol and not enough bile salts
- Can be prestones – “gall sludge”
- Can be as small as a grain of sand
- Can be as large as golf balls
- You can have stones and not have problems
- It is the lack of the gallbladders ability to contract and the peritoneum that cause problems
- Risk Factors for Gallstones
 - Body chemistry – too high of blood cholesterol and too little bile salts
 - Efficiency of gallbladder contractions
 - Obesity and rapid weight loss
 - Increased age
 - Estrogen levels (female > male)
 - See it a lot of postmenopausal women because proestrogens no longer balancing estrogen
 - American Indian ethnicity
 - Western diet
 - Family history

Associated Skeletal Restrictions

- C4-C6 left side
- C4 transverse process
- T7-T9 right costovertebral articulations
- left frontal/temporal region
- Left neck pain (due to embryological development)
- Pain in right or left scapular area

Visceral Manipulation Techniques

General Listening

- The patient bends forward along with a slight left rotation and right side bending.

Local Listening

- With hand on patient's abdomen, middle finger along the midline and palm on umbilicus, the hand moves toward the surface projection of the fundus of the gallbladder. This is the right costal cartilage where the costal margin intersects the midclavicular-umbilical line. The hand is then pulled deeper in toward the gallbladder.

Palpation

- You can feel a little bump on the underside of the liver around the right midclavicular line, which is the fundus of the gallbladder.
- The gallbladder may feel like a soft bubble or it may feel denser if not functioning well

Mobility

General Gallbladder Techniques

1. Find the gallbladder
 - a. Seated position
 - b. Finger pads and ulnar surface of right hand subcostal and to right of right midclavicular line
 - c. Finger pads and ulnar surface of left hand subcostal and to left of right midclavicular line
 - d. Create "soft pillow"
 - e. Shear right and left to feel viscosity of gallbladder versus density of liver
2. Releasing tensions in tissues around GB
 - a. Walk your finger pads inferior to gallbladder (even as far as umbilical line if very sensitive)
 - i. Creating a nice little "V" shape with the hands
 - b. Gently compress around tissues and then have person fold over your hands (Create a "pillow" for the gallbladder)
 - i. Gathering up part of the greater omentum to cushion the GB
 - c. Induction technique (listen, follow, and encourage the listening)
 - d. Working on the peritoneum and all of the adhesions there as well as greater omentum
 - e. Meander around and let it continue to soften and allow hands to sink deeper and deeper as releases happen
 - f. If client has "yucky" pain, probably on right spot, if it is sharp, pushing too hard
 - g. Might have to continue this technique (over multiple sessions) till everything is soft
3. Drain/"milk" the gallbladder
 - a. Direct technique: you are asking the bile to move
 - b. Fundus → body → neck → cystic duct → common bile duct → Oddi
 - c. Encapsulate the GB with support (remember orientation of GB) – gather up a little bit of the greater omentum if needed (see technique 2)
 - d. motion sequence:
 - i. Superior
 - ii. Posteriomedial (one word and one direction)
 - iii. Inferior and anterior ("J" shape towards you)

- e. 8-10 cycles
- f. Rhythmic, smooth
- g. do not take hands off of their body between cycles
- h. you can use either your finger pads or thumbs to do the motion (RM uses thumbs)
- i. You may feel a squirt under your hands
- j. Not doing a big motion, just engaging the tissues
- k. you are not pushing, just engaging
- l. cholecystic evacuation – another name for technique
- 4. Stretching the common bile duct
 - a. Anchor Oddi: thumb just superior to Oddi
 - i. Fine tune anchor: 5,6,7 o'clock
 - 1. 5:00 → left ilium
 - 2. 6:00 → pubic symphysis
 - 3. 7:00 → right ilium
 - ii. Calibration by tuning the anchor point
 - b. Bring in long lever: palm on sternum to line up the tension or hands behind neck and L/R (to bring in a little more information – tube responds to the information by stretching and gaining tone)
 - i. Guide client into a little bit of extension, maybe R/L rotation and R/L side bending
 - ii. Stack all 3 planes in tension
- 5. Check sphincter of Oddi motion
 - a. Evaluate Oddi to make sure it is functional (step/Technique 5)
 - b. have client lay down and check/treat as normal
- 6. Motility
 - Can help prevent need for surgeries
 - Works really well on yourself
 - After GB work, RM has clients drink ½ lemon in hot water slowly, daily for 10 days to help with the bile

Demo: Gallbladder Techniques

- you can tell if you're too deep if the client's shoulders come up (essentially trying to push you out)
- RM always uses the umbilicus as a locator point for sphincter of Oddi and DJ

Motility

Gallbladder Motility

- Inspir
 - feels like “unscrewing a light bulb from the socket” as it pulls down away from midline (CCW)
- Expir
 - feels like “screwing a light bulb in a socket” as it pulls up toward the midline (CW)
- Same as liver motility but has a greater rotational component because of its shape
- Rotation is sort of mirrored on vertical axis
- Make sure hands are over the ribs and not the ab (heel of hand just at bottom of ribs, fingers pointing slightly towards left shoulder)
- A little bit different direction than other organs (based on migration during embryological development)

Gallbladder-Liver Paired Motility

- Bring in the motility of the liver (paired organs)
- Put liver hand over GB hand and feel through other hand