GALLBLADDER DYSFUNCTION

(--- GALLSTONES, BILLIARY STASIS, BILLIARY SPASMS)

Briefly --- the ANATOMY: From the liver to the gallbladder --- the right and left hepatic ducts combine to form the common hepatic duct that drains the hepatic system into the gallbladder. The common hepatic duct splits into two ducts --- the cystic duct and the common bile duct. The cystic duct is a very short duct that goes directly into the gallbladder. The common bile duct moves toward its union with the pancreatic duct, on its way to the duodenum.

Bile can flow in both directions between the gallbladder and the common bile duct and the common hepatic duct. This means that bile can flow directly from the liver to the common bile duct, skipping the gallbladder altogether --- or --- bile can flow into the gallbladder --- and then at the appropriate time be released back up through the gallbladder and the cystic duct into the common bile duct.

Bile is stored in the gall bladder between meals --- waiting for the meal-provoked stimulation by cholecystokinin (CCK). Cholecystokinin (stimulated by fat in the meal) activates bile secretion both by increased production of hepatic bile, and by contraction of the gallbladder. The flow is facilitated by relaxation of the Sphincter of Oddi that controls the Ampulla of Vater, where the pancreatic duct meets the common bile duct.

BILLIARY STASIS & GALLSTONES:

It is very important to keep the bile flowing from liver to gallbladder to duodenum. The way to do that is with adequate fat and not an excess of carbohydrate in the diet. High sugar meals or any low fat meals cause biliary stasis. Point of emphasis = fat in the meal is essential to stimulate cholecystokinin. A high carb meal stimulates little or no cholecystokinin, and the gallbladder is not activated. The absence of activation causes a thickened buildup of static matter in the gall bladder.

Eating high carb, low fat meals over a long period of time very often causes gallstones.

Women who are high in estrogen are particularly susceptible to formation of gallstones (= “Female, Fat, 40”).

For someone who is already suffering from a thick sludge in the gallbladder, the best way to get the system working again is simply to take a couple spoonfuls of olive oil with each meal (from 2 teaspoons to 2 tablespoons with each meal).

There are two distinctly different types of gallstones. One type is almost entirely cholesterol with very little calcification. The second type of gallstone has a very high percentage of calcium carbonate. The high cholesterol stones tend to be found in Dysaerobic patients. The calcium carbonate stones tend to be found in those who are Anaerobic or Alkaline.

For those who are Anaerobic, Oxy Tonic (sometimes with Taurine) has a nice cholagogue effect. That will sometimes soften the stones and push them through the bile duct. However, there is always some risk that activating the movement of stones will cause a lodging of stones at the opening of the duct, and thus acute gallbladder symptoms.

For those who are Dysaerobic, a combination of Oxy D-plus and Phos Drops will sometimes soften the stone.

For those who are Alkaline, Phos Drops along with either Oxy Tonic or Magnesium Chloride will sometimes soften the stones.

The various old remedies that went by the name "liver/gallbladder flush" were largely garbage. Some of them used Phos Drops and may have had some beneficial effect. Some of them used apple juice or apple cider, claiming that the malic acid in the apple juice softened the gallstones. If malic acid does soften stones it would take a whole lot more than you find in apple juice, and it still would not do the job as well as Phos Drops. [Another comment on "malic acid" --- most supplements that claim to be malic acid are actually not malic acid at all, but a malic acid salt --- usually magnesium malate --- which has no beneficial effect on gallbladder function.]

<u>BILLIARY SPASMS</u>:

[Historically] Acetic Acid (dilute) applied to the bile duct or orifice at the Ampulla of Vater causes relaxation of the Sphincter of Oddi. => release of pancreatic enzymes and bile (Claude Bernard, 1856)

Acid (Acetic A or HCl (Proton Plus) or Phos Drops) stimulates relaxation of the Sphincter of Oddi via stimulation of Cholecystokinin (CCK = entero-endocrine hormone produced by duodenal cells). The release of CCK is under minimal Vagal or Sympathetic control = mediated almost entirely by acid stimulus → = CCK released into blood → CCK to the Sphincter of Oddi, and to the brain.

- CCK function depends upon a <u>sulfate</u> group (attached to a Tyrosine)

- CCK → digestion; satiety via Hypothalamus and brain stem centers of appetite control; anxiety (= Schizophrenia = if CCK receptor is over-expressed)

- CCK → stimulation/release is mostly by dietary Fatty Acids and certain Amino Acids, plus the acid chyme entering the duodenum

- CCK → GB contraction; secretion of pancreatic enzymes and bicarb; inhibits gastric CCK-2 receptor, which decreases HCl secretion and slows gastric emptying; decreases food intake (satiety)

- CCK → appetite suppression mediated by Vagus

- CCK → GB contraction and increased production of hepatic bile, and relaxed Sphincter of Oddi.

- CCK → remains elevated in blood up to 5 hours after meals

- CCK → elicits sleep

Sphincter of Oddi:

- Normal basal pressure = 10 mm Hg, over which are superimposed contractions = 26/min and 50-140 mm Hg duodenal pressure

- CCK = decreased basal pressure and partial inhibition of phasic contractions

- Bile flow occurs between contractions when bile duct pressure > the low basal pressure --- so --- CCK promotes flow across the Sphincter.

- The phasic contractions expel small amounts of bile = maintains Ampulla free of crystals or debris.

- Food enhances bile flow with a decrease in overall Sphincter pressure and contraction amplitude.

- CCK stimulates neurons that are neither adrenergic nor cholinergic

- Parasympathetic is the main extrinsic innervation of the Sphincter. Sympathetic block does not influence Sphincter activity.
  Nitric Oxide donors relax the Sphincter.

- HCL (dilute) instilled into duodenum => Sphincter spasm

- Spasm = induced by opiate-like drugs

- Sphincter of Oddi dysfunction = basal pressure > 40 mm Hg

- Sphincterotomy/Sphincterotomy = only consistent Sphincter therapy (according to medical Standards of Care).