

Gut Pathology - Part Two

The risk factors for hypochlorhydria are mostly the same as general risk factors for a GI pathology, but specifically as I mentioned, PPIs or any acid-suppressing drugs, chronic stress, bacterial overgrowth which can be both a cause of low stomach acid and an effect of it, vegetarian diets which are low in protein and reduce acid production, because we need it primarily for protein. *H. pylori* infection, genetic factors such as polymorphisms and interleukin 1 that promote inflammation associated with hypochlorhydria. It's also possible that food poisoning and food intolerances play a role.

Another less common cause of hypochlorhydria is a condition called pernicious anemia, which is an autoimmune attack against the parietal cells in the stomach and/or an intrinsic factor that's produced by the parietal cells. And these cells are also involved in acid production, so when someone has pernicious anemia, they may end up with low stomach acid and by extension, all of the problems that are associated with that. In terms of testing for hypochlorhydria, the test that can be done to determine this is called the Heidelberg radiotelemetry test. It's certainly the most accurate way of determining stomach acid production, but it's not commonly used. I've only come across a few doctors over the years that do it; it's an in-office test that requires special equipment and unless you have access to that equipment or someone who does, you're not going to be able to recommend it to your patients. So what we ended up doing is kind of a guerilla method of clinical diagnosis which you may have heard about. First we look at symptoms like protein malabsorption or fullness in the stomach, belching, signs of indigestion that's happening in the stomach, and then we also may consider doing an HCL challenge, where we give the patient hydrochloric acid supplements, gradually increasing the dose until they feel a burning sensation, and then ask them to reduce the dose to the dose they were at just prior to that burning sensation. Now, admittedly there's no peer-reviewed research to support that, and it's definitely an empirical method, but we have found it to be useful with some caveats that I'll discuss later.

Impaired production of pancreatic enzymes and bile leads to malabsorption of protein, fat and carbohydrates, depending on which substance we're talking about there. Causes of problems with bile production or metabolism include impaired liver function, which is where bile is produced; gall bladder problems, gluten can be a major factor there; intestinal dysbiosis and GI pathology, although that's obviously a little bit of a chicken-and-egg situation, because pathologies can cause problems with bile production, but impaired bile production can cause GI pathology, and you'll see that everywhere with the various pathologies that we're going to talk about, this chicken-and-egg scenario. Causes of problems with enzyme secretion include low stomach acid, which we just talked about, celiac disease, chronic pancreatitis, and excess alcohol intake. Diagnosis of these bile and pancreatic enzyme production issues is mostly based on symptoms; we don't have a lot of good tests for those conditions. In the case of bile, you'd look for poor fat digestion, especially fish oil burps, if they're taking fish oil, that's one of the classic symptoms. A bitter, metallic taste in the mouth, itchy skin, clay-colored stools, stools that float, a history of gallstones, and then for enzymes there is actually one pretty good marker for poor enzyme production, and that's fecal elastase, which is part of the stool test that I'm going to be teaching later in this unit, and we'll discuss that in more detail then.

Next we're going to talk about small intestine bacterial overgrowth, or SIBO. This has received a huge amount of attention in the functional medicine community in the past few years. I've talked about it at length. There's a lot of misunderstanding about it, I've done a ton of research, it's something I've been interested in for years but I did a really deep dive into the literature in preparation for this training and learned a lot of new things, and the research is just evolving quickly, so I'm looking forward to sharing more detail about it when we talk at length about how to diagnose and treat it, but as we discussed in the basic physiology section, the small intestine is where food is digested and absorbed. There shouldn't be a lot of bacteria in there because that interferes with the key function of the small intestine.

In SIBO, what happens is bacteria can translocate from the colon, which is where it belongs and should be abundant, to the small intestines and then becomes overrepresented there. So risk factors for SIBO, again, are similar to the general risk factors for GI pathology, specifically poor diet, low stomach acid, antibiotic use or use of PPIs, acid-suppressing drugs, impaired function of the migrating motor complex, or MMC, which leads to reduced intestinal motility, constipation, gut infections of all types, structural abnormalities of the gastrointestinal tract which can be inborn or post-surgical, and immune dysfunction, which would include things like abnormal antibody or t-cell responses.

Decreased vitamin/mineral absorption and related conditions
(anemia, neuropathy, etc.)

Decreased fat absorption
(from bacterial deconjugation of bile salts)

Carbohydrate malabsorption
(leading to vicious cycle)

Protein malabsorption
(some bacteria may digest protein)

Gas production leading to bloating, pain, constipation, diarrhea *(or both)*

Intestinal permeability and damage to lining of small intestine mucosa

Autoimmunity
(from increased permeability and efflux of bacteria/LPS)

Neurological symptoms
(from toxins produced by bacteria)

SIBO is more likely in people with irritable bowel syndrome, although it's not entirely clear whether that's cause or effect or both, I think it's probably both. Metabolic disorders, the elderly, probably due to decreased stomach acid production, people with celiac disease, people with chronic constipation and diarrhea, people with other organ dysfunction, particularly liver disease and pancreatitis, both of which can alter the function of the migrating motor complex, and then people who are taking antibiotics over the long term. The consequences of SIBO, at least a partial list of them are here on this slide ...

... including decreased vitamin and mineral absorption and related conditions like anemia or neuropathy, carbohydrate malabsorption, and this of course leads to one of those vicious cycles because carbohydrate malabsorption is also a cause or contributing factor to SIBO, gas production which leads to bloating pain constipation or diarrhea or alternating diarrhea and constipation, which of course sounds a lot like IBS, not surprising given the connection we see between those conditions in the literature. Autoimmunity is a potential outcome of SIBO, and this is the result of increased gut permeability and a flux of bacteria and lipopolysaccharide endotoxins into the bloodstream. Decreased fat absorption that's from bacterial deconjugation of bile salts that happens with SIBO, malabsorption of protein because some bacteria may digest the protein instead of us digesting it, intestinal permeability as I mentioned, but specifically the damage to the lining of the small intestine mucosa, so SIBO can actually lead to intestinal permeability, and then neurological symptoms that result from the toxins that are produced by the bacteria that are present in the small intestine. So as you can see, a wide range of outcomes that can lead to an even wider range of clinical symptoms and presentations.

Acne vulgaris/rosacea	Hepatic encephalopathy
Anemia	Inflammatory bowel disease
Atrophic gastritis	Irritable bowel syndrome
Celiac disease	Intestinal permeability
Cystic fibrosis	Liver cirrhosis
Diabetes	Muscular dystrophy
Diverticulitis	Non-alcoholic fatty liver disease
Fibromyalgia	Parkinson's
Gastroparesis	Restless leg syndrome
GERD	

SIBO is associated with numerous diseases and health problems, again this is only a partial list on the slide... but there are new connections being made, seems like almost on a monthly basis. I have a research alert for SIBO set up, so I get notified when any new study is published, and I can tell you I get a lot of emails for this particular alert. So this can include things like acne vulgaris, or acne rosacea, anemia, atrophic gastritis, celiac disease, cystic fibrosis, diabetes, diverticulitis, fibromyalgia, gastroparesis, GERD, hepatic encephalopathy, inflammatory bowel disease, irritable bowel syndrome, intestinal permeability, liver cirrhosis, muscular dystrophy, non-alcoholic fatty liver disease, Parkinson's, and restless leg syndrome, just to name a few. Keep in mind that these are correlations and associations, so in some cases SIBO may be the cause, in other cases SIBO may actually be an effect, so for example in muscular dystrophy, it may be that

the muscular dystrophy is what's leading to the SIBO and not the other way around, and in still other cases, it might be a bidirectional relationship where SIBO is both the cause and effect, and some of the gastrointestinal conditions could fall into that category.