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Irritable Bowel Syndrome

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Introduction

Irritable bowel syndrome (IBS) has been defined as a poorly understood, chronic gastrointestinal (GI) disorder without clear physical or biochemical dysfunction, relating symptoms to psychological causes. Recent evidence proposes new understanding of the interaction between the gut and brain, with a focus on the gut microbiome and its role in the pathophysiology of the disorder (Ford et al., 2017).

IBS is a common condition presenting with persistent abdominal pain, altered bowel habits and often bloating. Diagnosis is based upon the Rome IV criteria and use of the Bristol stool form scale to categorize the appropriate IBS subtype: constipation, diarrhea, or mixed symptoms of both (Ford et al., 2017).

My husband has struggled with the disorder since he was a child. I have seen first-hand how IBS can impact quality of life and the frustration with finding adequate treatment. Commonly encountered in the primary care setting, the advanced practice nurse will have an opportunity to provide care to these patients. Understanding the current pathophysiology and diagnostic criteria can contribute to improved outcomes.

- Epidemiologists estimate IBS affects nearly 11% of individuals throughout the world. In the United States, it is as high as 20% (Canavan et al., 2014).
- 30% of those with IBS consult healthcare services (Canavan et al., 2014).
- IBS is more common in women, sex hormones may play a role (Kim & Kim, 2018).
- A recent nationwide prospective cohort study of >45,000 individuals in Sweden suggests that IBS is not associated with increased mortality (Staller et al., 2020).
- The impact of IBS on quality of life is significant and healthcare providers often underestimate the burden on patients (Lacy, 2019).

Clinical Manifestations

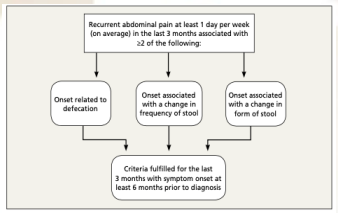
Abdominal pain- cramping sensation with variable intensity and location. Pain is often relieved with defecation. Stress and meals often affect pain intensity with bloating and gas commonly experienced (Wald, 2019).
Altered bowel habits- includes diarrhea, constipation or a combination of both, which can also alternate with normal bowel habits. The Bristol stool form scale is used to identify stool consistency (Wald, 2019).

IBS subtypes

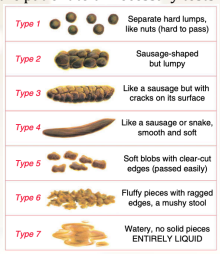
Based upon predominant bowel habit on days with abnormal bowel movements.

- IBS-D (diarrhea)- frequent small volume loose stools. Often accompanied by abdominal cramping and sensation of incomplete evacuation. 50% of patients report mucus discharge. Type 6/7 Bristol stool scale.
- IBS-C (constipation)- hard, pellet shaped stools often with sensation of incomplete evacuation. Type 1/2 Bristol stool scale.
- IBS-M (mixed)- combination of diarrhea and constipation
- IBS-U (unclassified)- meets diagnostic criteria but unable to fit into one of the three subtypes (Wald, 2019).

The Rome IV criteria serves as the national guideline for diagnosing IBS. In the absence of warning signs such as unintentional weight loss, recent change in bowel habits, positive fecal occult blood, overt GI bleeding or iron deficiency anemia, a positive diagnosis can be made without subjecting the patient to unnecessary tests (Ford et al., 2017).



Rome IV diagnostic criteria
(Heidelbaugh, 2017)



Bristol stool form scale
(Blake et al., 2016)

Gut Microbiome

Normal gut microbiota within the human intestine is complex, involving thousands of microbial species working together to maintain homeostasis and protect against pathogens. While in a constant state of change throughout the lifespan, environment, diet and stress can affect this balance. Recent studies suggest changes in the gut microbiome play a key role in IBS development (Chong et al., 2019).

Post infection: IBS is four times higher in those who have had acute gastroenteritis in the last year. Infection severity and female sex further increase the risk (Pimentel & Lembo, 2020).

Bacterial toxins following gastroenteritis lead to autoimmunity to vinculin, an intracellular protein responsible for neuronal cell motility and contractility in the GI tract (Pimentel & Lembo, 2020).

Dysbiosis: An imbalance of the microbial flora creates dysbiosis. This alteration affects gut integrity and modulation of the gut neuromuscular junction (Chong et al., 2019).

In glucose or lactose breath testing, small intestinal bacterial overgrowth is associated with IBS-D (Pimentel & Lembo, 2020).

Antibiotic treatment with broad spectrum antibiotics can contribute to dysbiosis leading to the development of IBS (Hellström, 2019).

Stool transfer studies from ISB-D patients into animals, elicits altered intestinal motility, permeability and visceral hypersensitivity (Pimentel & Lembo, 2020).

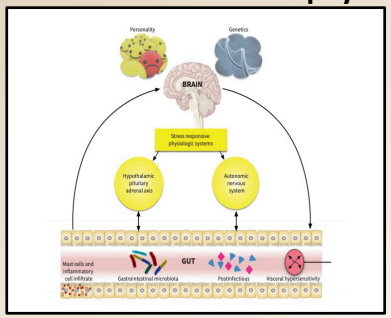
Excess colonization of *Methanobrevibacter smithii* in the gut, produces elevated methane gas leading to decreased intestinal motility and constipation (Pimentel & Lembo, 2020).

Inflammation/immune activation: Low grade intestinal mucosal inflammation can arise from a compromised mucosal barrier, dysbiosis, post infection and altered stress levels, stimulating abnormal immune responses found in IBS (Chong et al., 2019.)

Toll-like receptors are important mediators of intestinal immune response to gut microbes. Increased expression of intestinal Toll-like receptors is associated with IBS (Pimentel & Lembo, 2020).

Increased intestinal mucosal immune markers such as intraepithelial lymphocytes, T cells and mast cells are evident in patients with IBS. Mast cells release substances that can sensitize primary afferent neurons. Large numbers of mast cells found close to nerves in the gut, correlate with abdominal pain severity (Hellström, 2019).

Pathophysiology



Illustrated summary of IBS pathophysiology
(Farmer, 2020)

IBS is a complex disorder and is unlikely to be narrowed to down to one cause as pathogenic factors that produce symptoms vary among individuals (Chong et al., 2019). This functional disorder has long been considered a dysregulation between the brain and gut. Recent research provides new understanding of this relationship, with half of all cases originating in the gut and psychological symptoms following (Ford et al., 2017).

Brain

- Patients with IBS report more daily and lifetime stressful events as compared to healthy individuals. The effects of stress on gut function is widespread, however those with IBS tend to have greater responsiveness to stress (Hellström, 2019).
- Emotional and physical stress can delay gastric emptying and intestinal transit, disrupting the mucosal barrier causing the transmigration of bacteria leading to GI pain and diarrhea (Drossman, 2016).
- Psychological stress induces the secretion of pro-inflammatory cytokines that activate the hypothalamic-pituitary-adrenal (HPA) axis triggering the release of stress hormones that affect gut homeostasis (Chong et al., 2019).
- Inflammatory cytokines are commonly found in patients with IBS and are highly associated with anxiety and depression, suggesting the gut may have a role in regulating brain function (Chong et al., 2019).
- Two-way communication between the gut and brain occurs via the cingulate cortex and peripheral GI tract. The perception of pain is influenced by this emotional mechanism, allowing mental state to affect IBS symptoms (Lee et al., 2017). The cingulate cortex in IBS patients is dysfunctional, in the presence of psychosocial distress, pain threshold is decreased (Drossman, 2016).
- Higher levels of anxiety and depression are experienced in patients with IBS regardless of subtype (Lee et al., 2017).
- Patterns of brain activation associated with anxiety may be associated with changes in the microbiome of patients with IBS-D (Pimentel & Lembo, 2020).
- While serotonin is usually associated with the brain, it is found mostly in the digestive system and has an important role in GI motility. High levels of serotonin are associated IBS-D and low levels with IBS-C (Chong et al., 2019).

Diet

- The breakdown of food products plays a crucial role in the development of IBS by affecting gut motility, the microbiome and visceral sensation (Chong et al., 2019).
- Many patients report bloating and abdominal pain after ingestion of foods containing fermentable oligosaccharides, disaccharides, monosaccharides and polyols (FODMAPs). Methane production and osmotic effects may stimulate motility and increase intraluminal fluid leading to bloating (Chong et al., 2019).
- Gluten may alter intestinal permeability and activate the autonomous and enteric nervous system leading to bloating and abdominal pain (Chong et al., 2019).
- Research by Fritscher-Ravens et al. (2019) concludes that over 50% of patients with IBS may have atypical food allergies, particularly to wheat. Utilizing confocal laser endomicroscopy, disruption of the intestinal barrier with eosinophilic activation occurred with exposure to food antigens, despite delayed clinical symptoms. Long term follow-up found dramatically improved symptoms when food antigens were removed from the diet.

Visceral Hypersensitivity

- Visceral hypersensitivity in IBS is the perception of pain in the bowel in response to normal GI movement. Abnormalities in central pain processing, impaired mucosal barrier, inflammation and alterations in gut microbiome are possible contributors (Chong et al., 2019).
- Visceral hypersensitivity contributes to IBS symptoms independent of anxiety and depression comorbidity (Simren et al., 2016).

Genetics

- Concordance for IBS is greater among monozygotic twins. Having a parent with IBS tends to be a greater predictor of disease, but social learning may be a factor (Hellström, 2019).
- Polymorphisms in genes responsible for serotonin signaling, immune regulation and epithelial barrier function affecting intestinal motility have been linked to IBS (Chong et al., 2019).
- A mutation of a sodium channel gene SCN5A, associated with abdominal pain, is the first mutation to be linked to IBS. In a large genome-wide association study this mutation was present in 2% of patients (Holtmann et al., 2016).

Significance of Pathophysiology

Recent research has uncovered exciting new evidence and understanding of IBS. While numerous and complex, these perspectives are crucial to the development of effective treatments. Past management has focused on the most prevalent symptoms, rather than on underlying pathophysiology and as a result the long-term course of the disorder is largely unchanged (Holtmann et al., 2016).

- No widely accepted treatment currently exists. Medications are only partially effective and with side effects. A multi-disciplinary approach can provide the best outcomes in this complex disorder (Nelkowska, 2020).
- GI symptoms may be the result of poor coping strategies. Short term psychological therapy is effective in reducing abdominal symptoms with long term improvement (Nelkowska, 2020).
- A low FODMAP diet can decrease abdominal pain, bloating and diarrhea by eliminating foods that produce bacterial fermentation in the gut, however long-term use and follow-up is lacking (Pimentel & Lembo, 2020).
- Many gastroenterologists believe diet to be an important part of IBS treatment, however only a small percentage refer patients to dieticians (Nelkowska, 2020).
- Rifaximin, a non-systemic antibiotic, has been recently approved by the Food and Drug Administration to treat IBS-D. Reducing small intestinal bacteria is the likely mechanism of action (Pimentel & Lembo, 2020).
- Probiotics have a role in reducing gut inflammation and improving barrier function. Effective strains are trial and error. Future therapy will likely be based upon individual microbiota profiling (Chong et al., 2019).
- Fecal transplantation is a current area of interest in improving the microbiome in IBS. It has not yet proven successful given the challenge of finding the correct balance to normalize gut function (Hellström, 2019).

Nursing Implications

A pilot study conducted by Shannon Purdy (2017), utilized a cross-sectional survey to examine the knowledge level of nurse practitioners (NPs) within the primary care setting, concerning IBS pathophysiology, diagnosis, and treatment. Overall, the survey found significant deficits in these areas that did not correlate with experience level. While the study was small, it provides valuable insight into the important role NPs have in understanding the disorder and utilizing evidence-based care for the best outcomes.

NPs in the primary care setting can play a vital role in the collaborative process of improving the lives of patients with IBS in the following ways:

- Utilize the Rome IV diagnostic criteria to make a positive diagnosis and avoid unnecessary tests or procedures.
- Acknowledge that anxiety and depression are common co-morbidities.
- Understand the current pathophysiology and new advances in the treatment of the disorder (Weaver et al., 2017).

The following educational points can be beneficial in establishing a positive relationship with IBS patients in the primary care setting:

- IBS is a real disorder and not "in your head".
- IBS is a chronic condition with symptoms that can vary over time.
- Quality of life can be significantly impacted with this disorder.
- Stress can trigger or worsen symptoms.
- There are many options to help manage symptoms, but no "magic pills" to cure all the symptoms (Lacy, 2019).

Conclusion

IBS is a prevalent, chronic GI condition associated with recurrent abdominal pain and altered bowel habits. Although not life- threatening, quality of life can be significantly affected.

The pathophysiology involves a complex interaction between the brain and gut. Current knowledge has shifted focus from a psychologically driven etiology to an imbalance of the gut microbiome. Future research will likely involve the sequencing of the microbiome in IBS patients, leading to individualized treatment (Chong, et al., 2019).

References