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Crohn's Disease

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Introduction

Crohn's disease is a systemic autoimmune disease that affects many adults and children in the United States. The prevalence of crohn's disease in the United States is 201 per 100,000 adults. Crohn's disease is an abnormal inflammation of gastrointestinal tract that can affect any area in the gastrointestinal tract from the mouth to anus. Crohn's disease is one of the inflammatory bowel diseases (IBD) that most generally involves the distal ileum and the proximal colon. The cause of crohn's disease is not known; however, new studies suggests that abnormal response of the mucosal immune system might be the cause of destructed inflammatory cascades as well as genetic predisposition and environmental exposures (Mazal, 2014). Commonly, crohn's disease causes abdominal pain, diarrhea, weight loss and malnutrition. And also, it can be chronic, intermittent or in remission. (Smith & Harris, 2014). In children, crohn's disease causes delay in growth and physical development (Lopez & Day, 2015). Individuals with crohn's disease experience a period of disease flare-ups and remissions when symptoms are not evident time to time. As a mother of a newly diagnosed child with crohn's disease and as a healthcare professional, it is very crucial for me to understand the pathophysiology of crohn disease, its signs and symptoms and any new findings of studies to provide appropriate and quality care.

Colon with Crohn's disease

Normal colon

Pathophysiological Processes

Crohn's disease is an autoimmune disease that results from inappropriate response of a malfunctioning mucosal immune system to the native flora and other luminal antigens. The mucosal immune system is responsible for balancing any trigger that activates its defense system and induces inflammation while instantaneously reducing the inflammation to avoid damaging the mucosal layers that line the gastrointestinal tract. The gastrointestinal tract has a large section of the body's mucosal lymphoid tissues that is a border between the immune system and the external environment which protects the gut from invasion; therefore, it is important to maintain the integrity of the mucosa (Mazal, 2014, p. 298). The cause of the malfunctioning mucosal immune system in crohn's disease is unknown; however, researchers believe exposure to environmental factors(air pollution, exposure to cigarette smoking, nonsteroidal anti-inflammatory drug use and oral contraceptive drug use), genetic predisposition (mutation in NOD2/CARD15 gene) and intestinal microbiota play roles in crohn's disease(Smith &.Harris, 2014, p. 36). According to Mazal (2014), there are three possible reasons for immune malfunctions which are:

1. Mucosal malfunction relates to the epithelial wall's role as a barrier
   - The wall of the intestinal lumen consists of 5 layers (Serosa, longitudinal muscle, circular muscle, submucosa and mucosa) and in patients with crohn's disease, the epithelial layer often increases in permeability, allowing pathogens to leak through to the mucosal layers
   - As a result of increased access to the mucosal layer and the submucosa's antigen receptors by microbial pathogens, an immune response maybe triggered, and the inflammatory cascade initiated (Mazal, 2014, p. 298).
2. The mucosa's role in antigen recognition
   - There is variation in the delivery of mucosal toll-like pattern recognition receptors (TLRs) that are found throughout the luminal epithelium in different amount and kind
   - Each Toll-like receptor (TLR) recognizes specific commensal microorganisms
   - The cells of a healthy individual will normally express TLR-3 and TLR-5 with consequent suppression of the immune response due to constant receptor activation by recognized and expected commensal bacteria. However, in patients with Crohn disease, there are small number of TLR-3 and TLR-5 receptors that results in hypersensitivity to commensal bacteria exposure, inducing an unsuppressed, aggressive inflammatory response (Mazal, 2014, p. 298).
3. The mucosa's inability to suppress an inappropriately triggered immune response
   - T-cells play a significant role in cell-mediated immunity and if the immune cells are not appropriately controlled and cleared from the body, they continue and remain activated rather than undergoing apoptosis (programmed cell death)
   - The impairment of the normal immune response is linked to the two risk factors of crohn's disease which are genetic predisposition and exposure to various environmental antigens (Mazal, 2014, p. 298).

Signs and Symptoms

- During flare-up, individuals with crohn's disease experience the following common intestinal-related clinical signs and Symptoms:
  - Crampy abdominal pain
  - Persistent Diarrhea
  - The rectal passage of blood, mucous or both
  - Weight lose
  - Anorexia
  - Fever
  - Night sweats
  - Fatigue
  - Loss of normal menstrual cycle

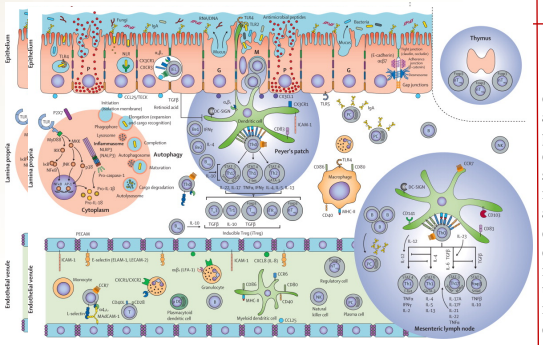
(Smith & Harris, 2014, P. 37)

- In addition to gastrointestinal effect, 25% of individuals with crohn's disease have the following extraintestinal signs and symptoms:
  - Anemia,
  - Primary sclerosing cholangitis
  - Erythema nodosum
  - Inflammatory arthropathies
  - Nephrolithiasis, osteoporosis
  - Uveitis
  - Episcleritis
  - Venous and arterial thromboembolism

(Smith & Harris, 2014, p. 37)

Underlying Pathophysiology

- There are general initial features of the inflammatory process that are common to the development of inflammatory bowel disorders:
  - Upon activation of the body's immune-response system by commensal bacteria, migration of inflammatory cells from the vasculature system flood into the intestinal mucosa at the site of the inflammatory trigger
  - A multitude of aggressive metabolites and mediators accumulate in the mucosal tissue, resulting in tissue damage
  - Such metabolites include nitric oxide, oxygen radicals, prostaglandins, leukotrienes, and histamines, all released at the site of inflammation and subsequently promoting fibroblast growth, collagen secretion, and varying degrees of luminal stricture formation
  - The focal infiltration of inflammatory neutrophilic cells into the intestinal epithelium typically occurs at areas overlying lymphoid aggregates called Peyer patches, usually found in the ileal segment of the small intestine.
  - Neutrophils can infiltrate the intestinal crypts (glands in the intestinal wall responsible for generation of new epithelium) and with chronic irritation lead to cryptitis.
  - If the inflammation is not suppressed, the inflamed crypt cells can progress into ulcers
  - Skip lesions which are the abrupt transition between the unaffected and the ulcerated tissues and characteristic more specific to crohn's disease can develop throughout the diseased segments of bowel, with some segments being affected but not others (Mazal, 2014, p. 300-301).



Significance of Pathophysiology

It is very essential to understand the pathophysiology of crohn's disease in order to provide effective and holistic care. Health care providers need to know the disease process to have optimal treatment plan, to prevent any complications and to promote quality of life for patients with crohn's disease. Patients and their family also need to understand the pathophysiological process of the disease so that they can understanding the effect of their treatment, it's side effects and the long-term goal of the plan of care. Full understanding of the pathophysiological process by the healthcare providers and the patients makes the management of crohn's disease achievable.

Implications for Nursing Care

The goal in Crohn's diseases is managing its signs and symptoms and maintaining clinical remission. Nurses play a great role in managing the signs and symptoms of crohn's disease for their patients by first gaining knowledge about the pathophysiological disease process and the overall effect it has on patients with crohn's disease. Nurses can provide education to their patients on medication adherence and life style changes which includes dietary modification and smoking cessation. It is very important to encourage patient to modify their diet because some foods and beverages can make the signs and symptoms of crohn's disease worse. Nurses should encourage their patients with crohn's disease to restrict dairy products and food high in fat and to avoid foods that causes gas and to increase their fluid intake (Haseky & Gibson, 2017). Nurses should be knowledgeable about complementary and alternative medicines that are proved to be beneficial in treating crohn's disease. According to Maze (2014), probiotics, botanical extracts and acupuncture are used as alternative therapies to treat crohn's disease.

Patients with crohn's disease experience diarrhea, GI bleed, abdominal pain and nursing care involves preventing dehydration, providing proper skin care, controlling their pain, monitoring their weight, nutritional intake, serum electrolytes and hematocrit and hemoglobin, blood cell counts, serum inflammatory markers such as C-reactive protein and sedimentation rates, and vital signs. Nursing care also involves assessing patients' abdomen including bowel sounds and stools and emesis for the presence of gross or occult blood. Nurses are responsible to carry out orders to treat the signs and symptoms of crohn's disease such as replacing fluids and electrolyte, administering pain medications and providing supportive enteral or parenteral nutrition. Since crohn's disease is a chronic, life-changing illness, nurses should assess patients for signs and symptoms of depression and provide emotional support (Smith & Harris, 2014, p. 41).

Conclusion

Crohn's disease is a chronic non-curable, but treatable systemic autoimmune disease that affects any parts of the gastrointestinal tracts. It causes inflammation that leads to ulcers, strictures and abscess formation that may further leads to complications such as stenotic bowel lumen, bowel obstruction and cancer. With unknown etiology, the malfunction of the mucosal immune system is responsible for the uncontrollable or unsuppressed inflammatory response in crohn's disease; however, researchers believe genetic predisposition, environmental exposures and the commensal microorganisms that are critical for proper gastrointestinal function may play role in triggering the inflammatory pathway. Health care professionals, patients with crohn's disease and family membranes need to understand the pathophysiology of crohn's disease in order to manage it effectively (Mazal, 2014).

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