Pathophysiology of Colorectal Cancer

Jessica Okey

Otterbein University, okey1@otterbein.edu

Follow this and additional works at: https://digitalcommons.otterbein.edu/stu_msn

Part of the Nursing Commons

Recommended Citation
Okey, Jessica, "Pathophysiology of Colorectal Cancer" (2019). Nursing Student Class Projects (Formerly MSN). 398.
https://digitalcommons.otterbein.edu/stu_msn/398

This Project is brought to you for free and open access by the Student Research & Creative Work at Digital Commons @ Otterbein. It has been accepted for inclusion in Nursing Student Class Projects (Formerly MSN) by an authorized administrator of Digital Commons @ Otterbein. For more information, please contact digitalcommons07@otterbein.edu.
Colorectal Cancer

Colorectal cancer (CRC) is a slow developing premalignant to malignant disease. Even though CRC is preventable, it remains the third most common cancer in the world and is the second most diagnosed cancer in developed countries (Calabrese, Hammelgarn, Xu, & Choo, 2018). There were estimates that 1,600,000 cases of CRC would be diagnosed in 2018 and 600,000 deaths (Maturi, Karthi, & Landrno, 2019). Many CRCs can be prevented or detected by early detection of gonadal or polyps on the colon before they develop into cancer cells, but up to 60% of patients do not complete recommended screenings (Hassan, Kaminski, & Repici, 2018). To prevent occurrence of CRC it is important to understand the barriers that patients have and the reason why they are not compliant with CRC screening recommendations.

Pathophysiology of Colorectal Cancer

Significance of Pathophysiology

Altered genes and mutations cause cells to proliferate in the colon and polyps in the mucosa develop. The polyps continue to grow and they eventually become malignant. Malignant growths with the potential to metastasize. Usually CRC is a slow developing cancer. Polyps can take years to turn into cancersous cells (with the exception of FAP/LS which has rapid growth). Polyps that are less than 1 cm in size have a 1% chance of being an advanced adenoma and polyps that are bigger than 2 cm have a 10% chance of being malignant (Harrington, Chan, & Weijsdeler, 2019).

The different types of polyps that can develop are:

• Tubular adenoma
• Villous adenoma
• Tubulovillous adenoma

Sporadic

• Presence of instability or suppressor pathway dysfunction
• A genetic alterations in tumor suppressor genes (APC, KRAS, and TP53)

Inflammatory

• When there are mutations in the tumor suppressor genes, tumors are genetically unstable

• Microsatellite instability or mutator pathway dysfunction
• Disruption in the DNA repair mechanisms (MMR genes)
• The MMR system protein specific DNA is not created. When the MMR system identifies an abnormality in the sequence repairs to the DNA are made
• MMR gene dysfunction allows DNA mutations to increase at a rapid pace

• CG island methylated phenotype (CIMP) or serrated pathway dysfunction
• Tumor suppressor genes are mutated

• When tumor suppressor genes are turned off in the CIMP pathway abnormal cells are able to grow and malignant cells develop (Simonsom, 2010).

Screening

• Abnormal dominant
• Defective MMR gene (Snijder & Hampel, 2019)
• This mutation has an increased risk for not only CRC but also ovarian, uterine, colorectal, hepatobiliary, pancreatic, small bowel, gynecological, and skin cancers (Snijder & Hampel, 2019)
• Familial Adenomatous Polyposis (FAP)
• Autosomal dominant
• APC mutation (Snijder & Hampel, 2019)
• Patients that inherit FAP have hundreds of polyps in the colon and 100% of patients with this genetic condition will go CRC by the age of 40 (Simonsom, 2010)
• This patient must undergo early screening and must get a colectomy due to the number of polyps that develop in their colon and their risk of developing cancer.

Colonoscopy screening (CSC)

• Coloscopy is the test to complete every 10 years
• Fecal Immunohistochemical Testing (FIT) is to complete every years
• CT colonoscopy to complete every 5 years
• Flexible sigmoidoscopy to be completed every five to ten years
• FIT-Fecal DNA testing to complete every three years
• Beads test to complete every three years (Lee et al., 2017)

CRC Screening

Treatment of CRC

NRCC can help patients overcome barriers they may face when considering CRC screening. NRCC is working in tandem with the National Society of Colorectal Cancer screening (see Figure 2) for patients who do not have family history of CRC and are considered to be in a low risk group. These screening should be started at age 50 (Rex et al., 2017). Colorectal cancer is recommended for patients that are in the high risk population. Frequency of the screenings depend on each specific case.

Cancer screening- Colonoscopy is direct visualization of the entire colon (from the rectum to the cecum) where polyps or growths can be found. If polyps are noted they can be removed or biopsied and sent for analysis at the time of the colonoscopy.

• Flexible Immunohistochemical Testing (FIT) analyzes stool samples for blood
• CT colonoscopy is an imaging test that can detect growths in the colon

• Flexible sigmoidoscopy is a procedure similar to colonoscopy, but the endoscope only visualizes part of the colon, the transverse and uppermost colon are not visualized during a sigmoidoscopy

• FIT-Fecal DNA testing (Cologuard) is a test that is able to detect abnormal DNA that is found in some polyps and adenomas

• When any of the screening tests come back abnormal or positive a colonoscopy would be recommended. If patients undergo CRC, the frequency of the screenings may increase to every three to five years.

Conclusion

CRC is a preventable disease that continues to be one of the leading causes of cancer. Multiple complex genetic mutations take place to turn normal cells into malignant growths. If the abnormal growths are found in the early stages, they can be removed endoscopically, but once the mass gets too large a surgical resection is necessary. Many patients fail to complete screening for CRC. Many times CRC could be prevented if the screenings were completed. Healthcare providers must ensure their patients understand the importance of screening for CRC and promote the completion of preventative screenings.

References


Case Presentation

A 67 year old caucasian male presents to our inpatient colorectal center has his first colonoscopy. He does not have any symptoms and did not have the screening. He is insured due to being competent. He eventually agreed to have a colonoscopy completed. The colonoscopy was performed and there was a 3 cm poly removed near the cecum. The polyp was removed with a snare and sent to pathology for analysis. The pathology report came back showing colorectal cancer. The patient was referred to a colorectal surgeon and oncologist for further recommendations.