5 Colorectal cancer

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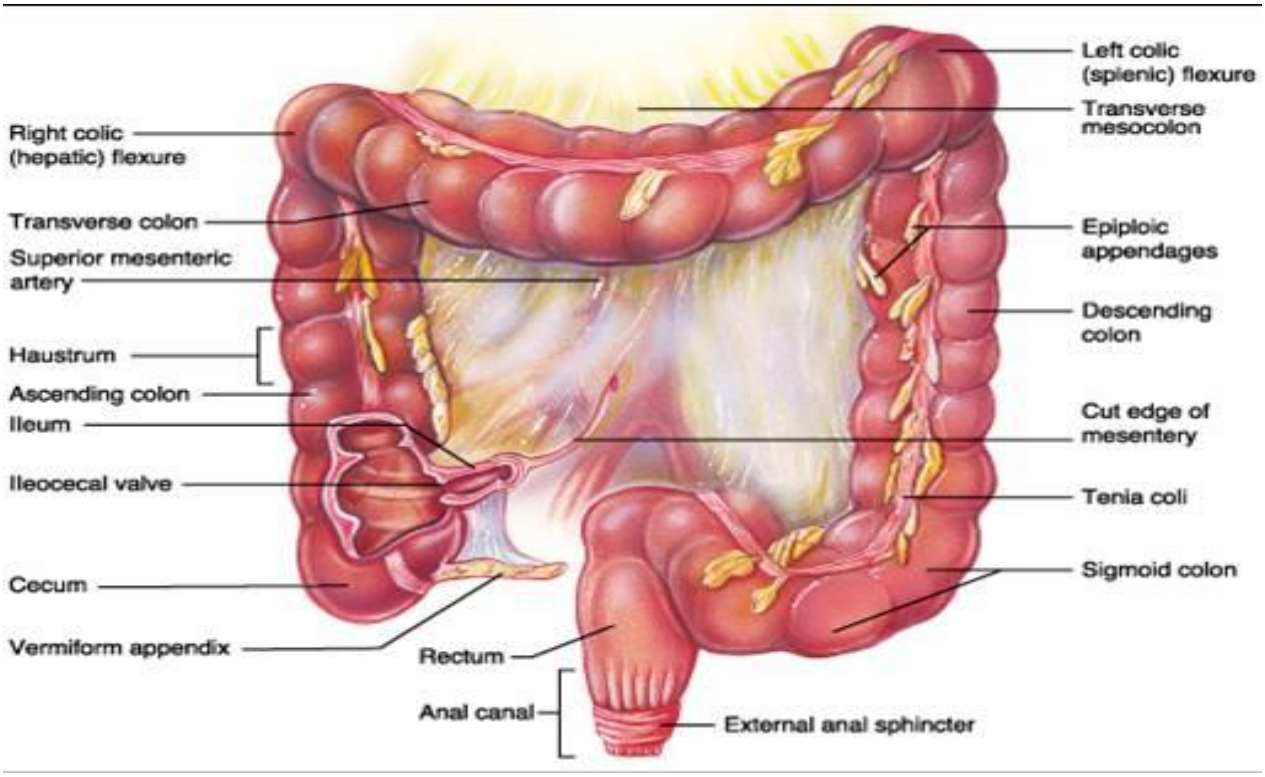
COLOR GUIDE: • Females' Notes • Males' Notes • Important • Additional

Objectives

1. Epidemiology, Risk Factors
2. Molecular Biology & Pathology
3. Diagnosis , Stages, Screening
4. Therapy



1 DEFINITIONS:

- Colon = large bowel = large intestine
- Rectum - terminal portion of the colon
- Polyp: is a descriptive term used to describe any mass of tissue that bulges or projects outwards. Colonic polyps are mostly benign outgrowths.
- Adenoma - type of polyp and has chance to develop cancer but not all.
- Cancer - malignant growth; invasive (invades the basement membrane)
- Stage is an estimate to determine how large has the tumor grown.
- Primary - the original tumor, where it started.
- Metastases - where the tumor has spread to.

2 EPIDEMIOLOGY OF CRC:

- Worldwide
  - 4th most common malignancy. **(After lung, prostate, and breast cancers)**
  - Second to lung cancer as a cause of cancer death
- In Saudi Arabia:
  - Ranked first among Saudi male population and third among Saudi female population.
  - Male to female ratio of 125:100.
  - The median age at diagnosis was 60 years among males 56 years among females.
  - 25% of the patients present with distant metastasis.

3. RISK FACTORS:

1. **Age**

- The incidence of CRC increases tremendously after the age of 50.
- Colonoscopy is advised to be performed at the age of 50 for people with no significant risk factors, and should be performed at a younger age if the person has risk factors.
- Colonoscopy can detect and remove adenomas and thus prevent cancer occurrence.

Note(s):

50 year old or above patient came to your clinic with rectal bleeding you have to exclude CRC by colonoscopy even if you find something else in the examination (E.g.

2. **Medical and Family history:**

o Hereditary colorectal cancer syndromes

o Personal history: previous polyps (relative risk of 3.5 to 6), occurrence of previous CRC (relative risk of 2 in the first two years)

o Family history: a first-degree family member doubles risk. Further detail to follow, so when a member of a family is diagnosed with colorectal cancer, it is recommended to screen other members at 10 years younger from their relative's age of diagnosis.

3. **Inflammatory bowel disease**
   - Mainly for cases of disease that extensively involve the colon and Pancolitis, these conditions hold a relative risk of around 2.6 – 2.8
   - The duration of inflammatory bowel disease is a critical factor in predicting the likelihood of adenocarcinoma, also the degree of involvement. You have to screen IBD patient after 10 years of diagnosis, if you find a dysplastic polyp you take it out before it develops into cancer. B/c the first 10 years the incidence is too low then each year increases the risk with 1%.

4.Diet:

- Increased risk: (Red meat consumption, saturated fat, refined carbohydrate).
- Decreased risk: dietary fibers, vegetables, fruits, antioxidant vitamins, calcium, folate (B Vitamin).

Note(s):

The role of fiber was originally seen simply as the provision of bulk to dilute potential carcinogens and speed their transit through the colon.

Micronutrients such as folate, methionine, vitamin D, and calcium may provide protection against oxidative stress at the cellular level.

5. Alcohol Consumption: Acetaldehyde may contribute to free radical formation and proliferative growth of mucosal polyps.

6. Smoking: 18% higher odds of developing colorectal cancers.

a. Higher for cancers in the rectum compared with those in the colon

b. Risk was significant among persons who smoked more than 30 years and was dose dependent.

7. **Exercise and Obesity,**

a. Reduce inflammation and potentially contribute to reduced free radicals

b. Averaged more than 4 hours per week of moderate exercise demonstrate a 22% and 29% reduction in CRC incidence, respectively.

3.1 Hereditary Colorectal Cancer

Hereditary colorectal cancer syndromes are a group of syndromes, includes:

- **Familial adenomatous polyposis**
  - FAP account for <1% of all colorectal cancers
  - Due to mutation of the adenomatosis polyposis coli (APC) gene. It's autosomal

Familial adenomatous polyposis. There are

dominant, that means 50% of the offspring will be affected.

- Numerous adenomas appear as early as childhood and virtually 100% have colorectal cancer by age 50 if untreated. These patients will have to undergo prophylactic colectomy (remove the colon and the rectum) at the age of 20s.
  - **Hereditary non-polyposis colorectal cancer (HNPCC) / Lynch syndrome**
    - More common than FAP and account for ~1-5% of all colonic adenocarcinomas
    - Due to a mutation in one of the mismatch repair genes
    - Earlier age onset (39-46) of colorectal cancer and predominantly involve the right colon
    - HNPCC also increases the risk of
      - Endometrial, ovarian, breast cancer.
      - Stomach, small bowel, hepatobiliary cancer.
      - Renal pelvis or ureter cancer.
    - If you identify it according to Amesterdam criteria you do TOTAL colectomy.

BOX 164-1 Amsterdam II Criteria

- At least three relatives with an HNPCC-associated cancer (colorectal, endometrium, small bowel, ureter, or renal pelvis). One affected relative should be a first-degree relative of the other two.
- At least two successive generations should be affected.
- At least one relative should have been diagnosed before age 50 years.
- Familial adenomatous polyposis should be excluded.

Tumors should be verified by pathologic examination.
HNPCC, Hereditary nonpolyposis colon cancer.

4.COLON AND RECTUM CANCER SIGNIFICANCE:

- The management and the characteristics of colon and rectal cancers are completely different
- Cancer Development:

o 95% of cancers are acquired (sporadic), but some small percentage of cases arise from inherited diseases (5% genetic).

o Most cancers begin as adenomatous polyps, however only a tiny percentage

of adenomas polyps become cancers (1 – 9% become malignant)

4.1 POLYPS:

I. Non-neoplastic polyps:

o The majority of polyps are non-neoplastic accounting for more than 90% of polyps are benign.

o These arise as a result of inflammation or improper maturation. These include:

- Hyperplastic polyps (most commonly seen)
- Hamartomatous polyps (Juvenile & Peutz-Jeghers polyps)
- Inflammatory polyps(E.g. pseudopolyps in ulcerative colitis)
- Lymphoid polyps

II. Neoplastic polyps:

Account for less than 10% of polyps and these are dysplastic polyps that have malignant potential.

Adenoma (Epithelial growth), **Adenomatous Polyps (adenomas):**

- The incidence of colorectal malignancy is two to five times higher in patients with adenomatous polyps than in those without them.
- Occur mainly in large bowel.
- Sporadic and familial.
- Vary from small pedunculated to large sessile.
- Epithelium proliferation and **dysplysia**.
- Divided into:
  - Tubular adenoma: less than 25% villous architecture
  - Villous adenoma: villous architecture over 50%
  - Tubulovillous adenoma: villous architecture between 25 and 50%.

4.2 CANCER SEQUENCE:

- The transformation from benign polyps to cancer takes from 7 - 10 years
- The transformation risk into cancer is based on:

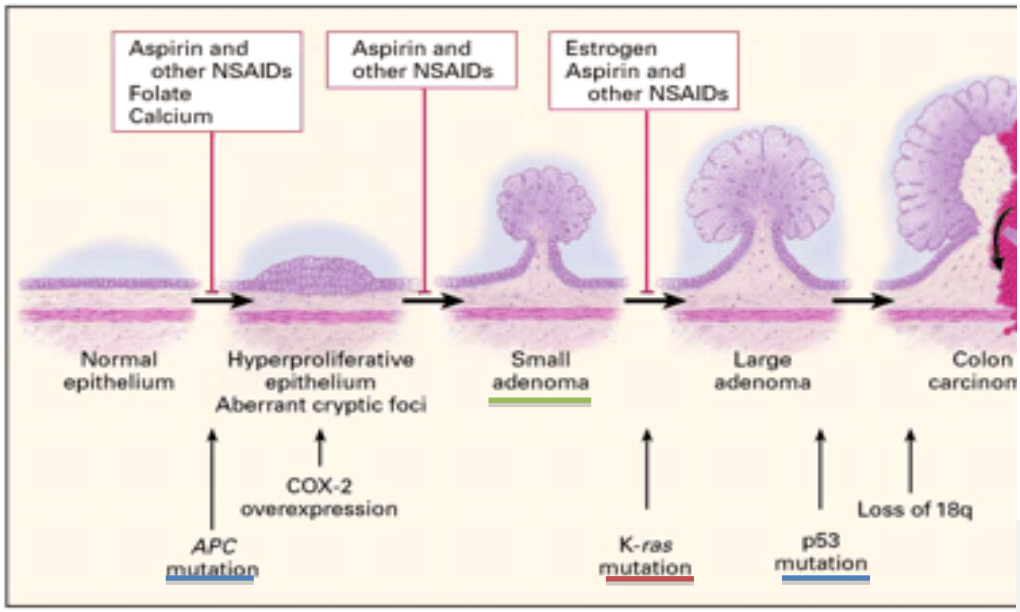
o Size of polyp

o The histologic subtype of the polyp. They are organized in descending order for cancer development risk: Villus, Tubuloviilus, Tubular polyps

o Severity of epithelial dysplasia

o Number of polyps, with multiple polyps holding a greater risk of developing cancer.

-The transformation from normal mucosa to cancer undergoes some important steps as the following:



- In colon cancer, the most important genetic alteration is a mutation of the **K-ras** protooncogene, which is associated with poor prognosis.
- Pathways:
  - The chromosomal instability (CIN) pathway **(Eg. FAP)**
    - characterized by mutations of the APC, p53, and K-ras genes
    - 80% of tumors develop along this pathway.
  - The microsatellite instability (MIN) pathway **(Eg. HNPCC)**
    - These tumors have aberrant DNA mismatch repair
    - is responsible for approximately 20% of carcinomas.
    - Better prognosis

2.2 CLASSIFICATION OF COLORECTAL CARCINOMA:

1. **Adenocarcinoma (>95%)**
2. Carcinoid
3. Lymphoma
4. Sarcoma

Note(s):

1. **Hematochezia** is more often caused by rectal than colon cancer. Iron deficiency anemia is from unrecognized blood loss and is more common with right sided CRCs and is frequently associated with a delayed diagnostic evaluation.

2. Abdominal pains is caused by partial obstruction, peritoneal dissemination, or intestinal perforation leading to generalized peritonitis.

3. Obstruction is more common with left sided lesions, because fecal contents are liquid in the proximal colon and the lumen caliber is larger, and they are therefore less likely to be associated with obstructive symptoms. CRC is the most common cause of bowel obstruction in the elderly.

5. Squamous cell carcinoma

5. CLINCAL PRESENTATION:

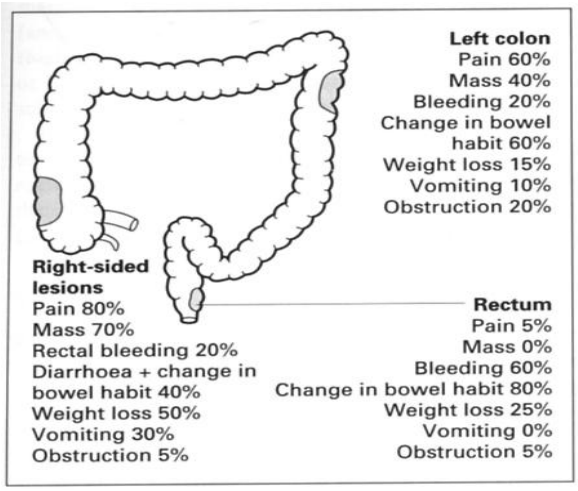
- Asymptomatic.
- Bleeding (melena/hematochezia) - gross, occult, anemia.
- Change in bowel habit – pain, diarrhea, constipation, alternating pattern.
- Abdominal pain.
- Abdominal mass.
- Obstruction
- Change in caliber of the stools
- Weight loss and loss of appetite.
- Fever and night sweats.
- Some symptoms give clues on the location of the tumor:
  - Sigmoid colon: obstruction and change in bowel habits.
  - Rectum: bleeding and tenesmus
  - Cecum: pain and melena
  - Metastasis: weight loss.

If it's in the right side: Symptoms of anemia & pain. While the left side: Pain, tenesmus, change in bowel habit & obstruction.

* Notes on Clinical Presentation:

  - Symptoms of CRC are typically due to growth of the tumor into the lumen or adjacent structures. As a result, symptomatic presentation is often a manifestation of relatively advanced CRC.

  - In a series of Meta analyses: the previous underlined three symptoms were the most common upon presentation.



6. DIAGNOSIS

General: Complete history and physical examination including a DRE (PR)

- Faecal occult blood = Guaiac test = Hemoccult
  - based on pseudoperoxidase activity of haematin
  - 50% sensitivity for colorectal cancers and about 98% specificity.
  - Dietary restrictions – avoid red meat, melons, horse-radish, vitamin C and NSAIDs for 3 days before test
  - Immunochemical test (HemeSelect, Hemolex) – based on antibodies to human haemoglobins
  - Used for screening and NOT diagnosis

- Stool DNA
  - PCR-analysis of sloughed mucosal cells in stool,
  - seeking genetic alterations associated with colorectal cancer
- Double contrast barium enema (Rarely done nowadays)
  - Does not require sedation
  - More limited in detecting small lesions
  - (82.9% sensitivity)
  - All lesions need to be confirmed by colonoscopy and biopsy
  - Performed with sigmoidoscopy
  - Second line in patients who failed / cannot undergo colonoscopy.
  - Rectal lesions may be missed because of interference by the intrarectal occluding balloon.
- Colonoscopy/sigmoidoscopy
  - The gold standard for diagnosis.
  - Can visualize lesions ~ 5mm
  - Colonoscopy is highly sensitive at detecting large (>1 cm) colonic polyps, with a miss rate of only 6%, and is moderately sensitive at detecting (0.6 cm) polyps with a miss rate of about 27%.
  - Performed under sedation
  - The overall complication rate is 0.4%
  - Bleeding, infection, perforation (1 in 3000), missed diagnosis, failed procedure, anaesthetic/medical risks.
  - Bowel prep, abdominal bloating/discomfort afterwards
  - After diagnosis we do CT for → Staging for distant metastasis; Local invasion
- CT colonography (Virtual colonoscopy)
  - CT colonography is not diagnostic; that is, patients with positive findings must undergo a traditional colonoscopy for biopsy or polypectomy.
  - sensitivity and specificity as high as 92% and 94%, respectively, for patients with polyps or lesions greater than 6 mm have been reported.
  - If you do colonoscopy and you find cancer but can't go beyond the cancer to check if there's any other lesion, you do CT colongraphy.
- Endorectal ultrasound
  - Determine: depth, mesorectal lymph node involvements
  - No bowel prep or sedation required
  - Help choose between abdominoperineal resection or ultra-low anterior resection
  - CT and MRI – staging prior to treatment
  - For rectal cancer we use endorectal ultrasound and MRI.
- Blood work
  - FBE, CBC (for anemia), electrolytes, and other function tests

Note(s):

Synchronous lesions: defined as two or more distinct primary tumors separated by normal bowel and not due to direct extension or metastasis. In other words: two or more cancers occurring at the same time. that is why we do CT to rule it out!

Colonoscopy " to rule out other lesions ": it is the most accurate diagnostic test in symptomatic individuals, since it can localize and biopsy lesions throughout the large bowel, detect synchronous neoplasms, and remove polyps.

- CEA (CarcinoEmbryonic Antigen) is a known protein molecule that is produced in high levels by CRC cells. It is not a specific marker, and can be elevated in many benign conditions like smoking! and other malignant cases like pancreatic cancer; therefore, can never be used as a screening test. However, CEA maybe used as a prognostic factor for evaluation of CRC management, it goes down after 3 months of cancer removal.
- Endoscopic: (identify primary, synchronous lesions)

When colorectal cancer is diagnosed, it is almost protocol to perform CT scans of the chest, abdomen, and pelvis to detect or rule out any metastasis.

6.1 Screening:

TABLE 164-2 Screening Guidelines for Average-Risk Individuals

Test	Internal (Beginning at Age 50 Yr)	Comment
FOBT and flexible sigmoidoscopy	FOBT annually and flexible sigmoidoscopy every 5 yr	Flexible sigmoidoscopy together with FOBT is preferred compared with FOBT or flexible sigmoidoscopy alone All positive tests should be followed up with colonoscopy
Flexible sigmoidoscopy	Every 5 yr	All positive tests should be followed up with colonoscopy
FOBTs	Annually	The recommended take-home multiple-sample method should be used All positive tests should be followed up with colonoscopy
Colonoscopy	Every 10 yr	Colonoscopy provides an opportunity to visualize, sample, and/or remove significant lesions
Double-contrast barium enema	Every 5 yr	All positive tests should be followed by colonoscopy

- If the patient has polyp, once the colon is cleared of polyps, repeated colonoscopy at 3 years and, if the results are negative, repeated colonoscopy every 5 years.

❖ Dr. Khayal said don't go through the high risk individual screening.

TABLE 164-3 Screening Guidelines for High-Risk Individuals

Risk Category	Age to Begin	Recommendation	Comment
INCREASED RISK			
Patient with a single small (<1 cm) adenoma	3-6 yr after the initial polypectomy	Colonoscopy	If examination is normal, they can thereafter be screened as per average-risk guidelines
Patient with a large (>1 cm) adenoma, multiple adenomas, or adenomas with high-grade dysplasia or villous change	Within 3 yr after the initial polypectomy	Colonoscopy	If normal, repeat examination in 3 yr; if normal then, the patient can thereafter be screened as per average-risk guidelines
Personal history of curative-intent resection of colorectal cancer	Within 1 yr after cancer resection	Colonoscopy	If normal, repeat examination in 3 yr; if normal then, repeat examination every 5 yr
Either colorectal cancer or adenomatous polyps, in any first-degree relative before age 60 yr, or in ≥2 first-degree relatives at any age (if not a hereditary syndrome)	Age 40 yr, or 10 yr before the youngest case in the immediate family	Colonoscopy	Every 5-10 yr Colorectal cancer in relatives more distant than first-degree does not increase risk substantially above the average-risk group
HIGH RISK			
Family history of familial adenomatous polyposis (FAP)	Puberty	Early surveillance with endoscopy, and counseling to consider genetic testing	If the genetic test is positive, colectomy is indicated These patients are best referred to a center with experience in the management of FAP
Family history of HNPCC	Age 21 yr	Colonoscopy and counseling to consider genetic testing	If the genetic test is positive or if the patient has not had genetic testing, every 1-2 yr until 40 yr of age, then annually These patients are best referred to a center with experience in the management of HNPCC
Inflammatory bowel disease Chronic ulcerative colitis Crohn disease	Cancer risks begin to be significant 8 yr after the onset of pancolitis or 12-15 yr after the onset of left-sided colitis	Colonoscopy with biopsies for dysplasia	Every 1-2 yr These patients are best referred to a center with experience in the surveillance and management of inflammatory bowel disease

❖ Extra notes on Cancer spread :

- CRC can spread by lymphatic and hematogenous dissemination, as well as by contiguous and transperitoneal routes.
- The most common metastatic sites are the regional lymph nodes, liver, lungs, and peritoneum.
- Because the venous drainage of the intestinal tract is via the portal system, the first site of hematogenous dissemination is usually liver, followed by lungs, bone, and many other sites, including brain.
- Tumors arising in the distal rectum may metastasize initially to the lungs because the **inferior rectal vein** drains into the inferior vena cava rather than into the portal venous system.

6.2 STAGING: (VERY IMPORTANT)

- Staging of CRC is now achieved by using the TNM classification and not the modified Duke classification, as studies have shown that the 2010 modification of the TNM classification had better results.

1.How far into the wall has it grown?

o T stage:

- Tis – invasion of mucosa only
- T1 – Invasion of submucosa
- T2 – Invasion of muscularis propria
- T3 – Full thickness/perirectal fat to serosa
- T4 – Invasion into adjacent organs

- Take note that adjacent organs does not mean distant metastasis, as that is a different component in the score. Adjacent organs mean structures like: the urinary bladder, uterus, and even the abdominal wall.
- Malignant polyps invade the muscularis mucosa=basement membrane.

2. Is it growing in other places?

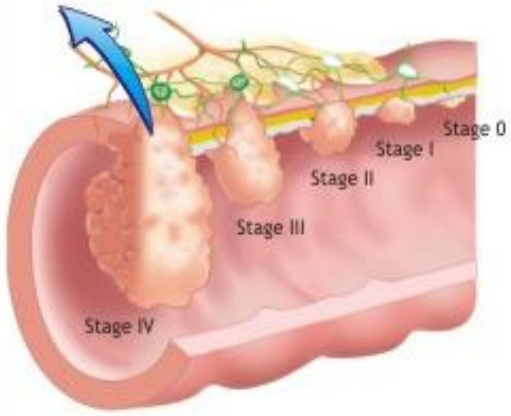
o N stage: lymph node involvement, M stage: presence of metastasis

- N1 – 1-3 lymph nodes
- N2 - >3 lymph nodes
- N3 – distant lymph nodes
- M1 – Distant organ (mostly to the liver, lung)

6.3 TNM STAGING:

0N
0M

- Stage 0 – Tis tumors
  - o Invasion of mucosa
- Stage 1 – T1 and T2 tumors
  - o Invasion of sub mucosa & muscularis propria
- Stage 2 – T3 and T4 tumors
  - o Invasion of full thickness & adjecent organ
- Stage 3 – Any lymph node involvement. imp.
- Stage 4 – Distant metastases anything with M1



AJCC/TNM Staging		Tumor
Stage 0	Tis (carcinoma in-situ)	Superficially involves the mucosa. Has not grown beyond the mucosa
Stage I	T1N0 T2N0	Invades through mucosa Invades through submucosa
Stage II	T3N0 T4N0	Invades through muscle layers Invades nearby tissues or organs
Stage III	Any T, N1-N3	Lymph nodes involved
Stage IV	Any T, Any N, M1	Distant Spread

7. TREATMENT INDICATIONS FOR DIFFERENT STAGES :-

I. Stage I and II: surgery

II. High risk stage II and stage III: surgery + chemo/radiotherapy

III. Stage IV: chemotherapy ± Surgery, depending on whether or not the tumor is resectable and on other factors.

- In colon cancer, adjuvant chemotherapy is administered to reduce the risk of recurrence but radiation and chemotherapy alone cannot cure any stage of colorectal cancer.

7.1 PREOPERATIVE PREPARATION:

Evaluation of medical problems. This is important especially for patients who

have cardiopulmonary disease, as these patients must be evaluated by concerned specialists.

Mechanical bowel preparation (bowel cleansing by laxatives)

o Colyte, Oral fleet

- IV antibiotics
- DVT prevention: Heparin shots, Compression stockings
- Foley catheter
- Epidural catheter

7.2 PRINCIPLES OF SURGERY:

- Examine the entire abdomen
- Remove the appropriate segment of the colon with adequate margins (5cm in each side)
- Remove the corresponding lymph nodes: a minimum of 12 lymph nodes have to be removed in a proper colectomy.
- Open vs laparoscopic approach

7.3 OSTOMY INSERTION:

The intestine is brought out through a hole in the abdominal wall

- Colostomy (colon on the skin)
- Permanent when the rectum is removed
- Temporary when it is unsafe to make a join
- Ileostomy (ileum on the skin)
- Temporary when the join needs time to heal

7.4 RECOVERY:

Surgery 2 to 4 hours

Hospital stay (from 4 to 10 days)

- IV, urine catheter, compression stockings, intravenous pain killers, blood thinner
- Discharge when ambulating, eating, bowel function, good pain control
- Recovery 4 weeks

7.5 FOLLOW UP:

- 80% of Recurrences occur within 3 years of curative resection.
- Office visit every 3 months for two years then every 6 months for 3 years (Any post-treatment plan should include regular follow-up during at least these 3 years).
- Regular blood work (CEA)
- Colonoscopy at year 1 and 4 and every 5 years
- CT scan yearly
- **Some points on CEA:**

o CEA is used to detect the prognosis: higher CEA levels indicate a worse prognosis.

o It is used to detect recurrence: (CEA levels are usually around 2.5 – 5 ng/ml).

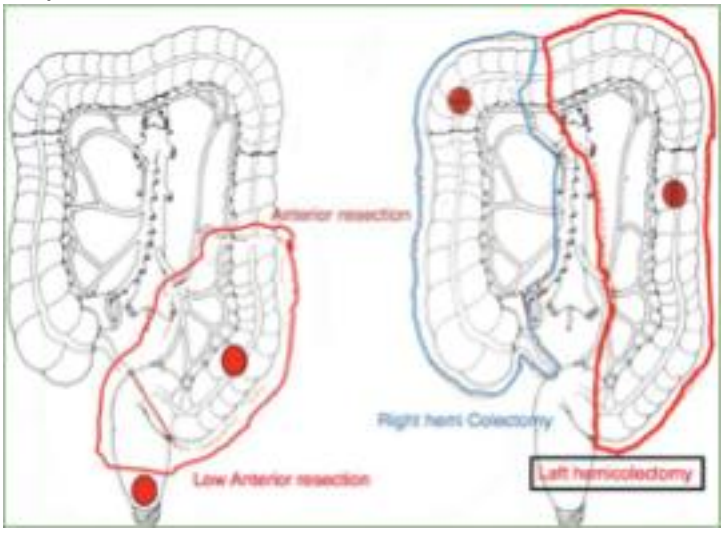
o If CEA was 50, then after surgery it goes back to 5, then after some time it rises to 50 again. Here we suspect recurrence.

o If CEA was 100 and after a surgery it is still 100 it can indicates 2 things A) There is another mass, i.e. metastasis and it hasn't been removed or B) the initial mass was not excised properly.

7.6 Therapy

- ❖ Surgery is the most important variable in the treatment of colorectal cancer.
- ❖ The site of tumor dictates the basic procedure:

- **Caecum or ascending colon**
  - Right hemicolectomy (you'll take the blood vessels that supplies the right side since the lymph nodes runs with the arteries)
  - Vessels divided – ileocaecal and right colic.
  - Anastamosis between terminal ileum and transverse colon



Types of colectomies

- **Transverse colon**
  - Close to hepatic flexure → right hemicolectomy
  -

- Mid-transverse → extended right hemicolectomy (up to descending) + omentum removed en-bloc with tumour
- Splenic flexure → subtotal colectomy (up to sigmoid)

- **Descending colon**
  - Left hemicolectomy
  - Vessels divided – inferior mesenteric, left colic, sigmoid
- **Sigmoid colon**
  - High anterior resection
  - Vessels ligated – inferior mesenteric, left colic and sigmoid
  - Anastomoses of mid-descending colon to upper rectum
- **Obstructing colon carcinoma**
  - Right and transverse colon – resection and primary anastomosis
  - Left sided obstruction
    - Hartmann's procedure – proximal end colostomy (LIF) + oversewing distal bowel + reversal in 4-6 months
    - Primary anastamosis – subtotal colectomy (ileosigmoid or ileorectal anastomosis)
    - Intraoperative bowel prep with primary anastomosis (5% bowel leak)
    - Proximal diverting stoma then resection 2 weeks later
    - Palliative stent

7.7 Rectal Cancer

- **Options**
  - Low anterior resection
  - Transanal local excision
  - Abdomino-perineal resection
  - Palliative procedure
- **Factors influencing choice**
  - Level of lesion – distance from dentate line, <2 cm requires abdomino-perineal resection to obtain adequate margin
    - Note: only 3% of tumours spread beyond 2cm
  - Grade – poorly differentiated → larger margin
  - Patient factors – incotinence
  - Mesorectal node status – resect if LN mets

7.8 WHO GETS ADDITIONAL THERAPY?

- COLON

o All stage 3 patients (positive nodes) - chemotherapy

o High risk stage 2 patients. These patients include: Cancers with the mucinous subtype, patients with bowl obstructions; perforation, and who have undergone resection with less than 12 resected nodes.

- RECTUM

o All stage 2 and stage 3 patients should get radiation and chemotherapy.

o Note**: in the rectum there are no serosa layer** so the stage 2 patients should receive chemotherapy (we give neoadjuvant chemoradiotherapy).

Doctor Notes:

1. Villous adenoma has the ability to become malignant by 40% (most)
2. Not all polyps grow to cancer (but most of the patients who have cancer have polyps)
3. HNPCC, do total colectomy and screen family every year
4. Rectum CC is the worst as it has two layers

*thanks to Hamad Albraidi
for the notes

SUMMARY

- Colorectal cancer is the commonest cancer among Saudi males and the 3rd in Saudi females.
- Risk factors of CRC include: age (you have to exclude CRC in every 50 yr old patient comes with melena), family history (screen the family), IBD, diet, alcohol, smoking.
- Can be prevented through screening and resection of polyps
- Surgery is the primary treatment.
- Hereditary colorectal cencer around 7 syndromes, the most common ones are: Familial adenomatous polyposis (associated with adenomatosis polyposis coli (APC) gene causes chromosomal instability), and Hereditary non-polyposis colorectal cancer /Lynch syndrome (Mutation in one of the mismatch repair genes causes microsatellite instability and can be diagnosed with Amesterdam criteria).
- Only 5% of CRC has genetic association.
- Most of the polyps are non neoplastic, adenoma is form of neoplastic polyps and has to be removed.
- Bleeding per rectum, anemia, change in bowel habit and abdominal pain are the most common symptoms of CRC. (The patient may only present with unexplained anemia)
- Colonoscopy is the gold standard for diagnosing CRC, after diagnosis we have to do CT scan for local invasion and distant metastasis. For rectal cancer we do endorectal ultrasound and MRI
- CEA (CarcinoEmbryonic Antigen) is used for follow up. After surgery by 3 months the level goes down, if not that means either you didn't resect the tumor completely or there's metastasis, if it goes down then after a while gets high again it means there's recurrence.
- Screening for average risk group starting at the age of 50. It is done by colonoscopy every 10 years, if the patient doesn't want or you can't perform colonoscopy either you do focal occult blood test annually + flexible sigmoidoscopy every 5 year OR double contrast barium enema every 5 years.
- TNM classification is used for CRC, T (for wall invasion) N (for lymph nodes involvement) M (for metastasis). Stage 0,1,2 have neither lymph node involvement nor metastasis, stage 3 means there's lymph nodes involved, stage 4 tells us there's distant metastasis.
- For cecum and ascending colon we do Right hemicolectomy, Mid-transverse colon we do extended right hemicolectomy, Descending colon we do left hemicolectomy, Sigmoid colon we do High anterior resection, in case of obstructuion we do Hartmann's procedure, Rectal Cancer we do low anterior resection.

Questions

1) Which of the following patients has the highest risk of developing colorectal cancer?

A. A 45-year-old man whose younger brother has a history of colon cancer
B. A 30-year-old woman with a BRCA1 mutation
C. A 55-year-old man with a 15-year history of ulcerative colitis
D. A 50-year-old man with a history of resected adenomatous colonic polyps
E. A 44-year-old man with FAP syndrome (polyposis coli)

2) Which of the following is the most appropriate treatment for a 40-year-old man with a T3 N1 carcinoma of the cecum?

A. Preoperative chemoradiation therapy followed by right hemicolectomy

B. Right hemicolectomy and postoperative chemotherapy with 5-FU, leu- covorin, and oxaliplatin

C. Endoscopic removal of the tumor followed by chemoradiation therapy

D. Right hemicolectomy and postoperative tamoxifen therapy

E. Definitive treatment with six cycles of FOLFOX and remove the colon only if the patients develops symptoms

3) A 57-year-old woman presents with adenocarcinoma of the right colon. Laboratory evaluation demonstrates an elevation of carcinoembryonic antigen (CEA) to 123 ng/mL. Which of the following is the most appropriate use of CEA testing in patients with colorectal cancer?

A. As a screening test for colorectal cancer
B. To determine which patients should receive adjuvant therapy
C. To determine which patients should receive neoadjuvant therapy
D. To monitor for postoperative recurrence
E. To monitor for preoperative metastatic disease

4) The minimum number of lymph nodes required for the evaluation of lymph node staging in patient with colorectal cancer is?

A. 12
B. 6
C. 3
D. 24

Answers

1) **E.** BRCA1 does not confer an increased risk of colon cancer, whereas BRCA2 does. The other conditions are associated with increased risks of developing colorectal cancer, but a patient with FAP syndrome (the colon is filled with thousands of polyps) has nearly a 100% risk of developing colon cancer.

2) **B.** Right hemicolectomy with postoperative adjuvant chemotherapy using FOLFOX4 (5-FU, leucovorin, and oxaliplatin) is indicated for this patient with stage III colon cancer. Radiation therapy is generally indicated for patients with rectal carcinoma. Tamoxifen therapy is not useful for colorectal carcinoma. Definitive systemic treatment for colorectal cancer without surgery is indicated only in patients with relative asymptomatic stage IV disease.

3) **D.** CEA level is most useful as a marker for postoperative recurrence in colorectal cancer. A level is obtained every 3months during the first 2 years after surgery to detect early recurrence that is amenable to treatment. CEA is a nonspecific tumor marker that is elevated in only about one-half of patients with colorectal tumors and is often elevated in patients with lung, pancreatic, gastric, or gynecologic malignancies. Use of CEA level as a screening test for colorectal cancer is not recommended. Although preoperative elevation of CEA level is an indicator of poor prognosis, CEA levels are not used to determine whether to give a patient adjuvant (or neoadjuvant) therapy. CEA levels are not routinely used in the preoperative setting to evaluate for metastasis in colorectal cancer. Most surgeons obtain a CT scan of the abdomen and pelvis to evaluate for metastases.

4) **A**

Answers:

1st Question: E

2nd Question: B

3rd Question: D

4th Question: A