CARCINOMA OF THE RECTUM

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ANATOMY

• Rectum is a muscular tube connecting the sigmoid colon with the anal canal. It is lined by mucosa and contained within fascia called mesorectum. ‘Surgical rectum’ extends between the sacral promontory and the coccyx and is about 18 cms. long, whereas the ‘anatomical rectum’ extends between the 3rd. sacral vertebra and the coccyx and is only about 12 cms in length.
ANATOMY

- Pubo rectalis sling encircles the anorectal junction, creating the anorectal angle, which is responsible for maintenance of continence.
• The rectum has three lateral curves, two convex to right and one convex to left. On the mucosal side, these curves are marked by three mucosal folds called Houston’s valves. Upper third of the rectum is covered by peritoneum in front and sides. Middle third has peritoneal coat on the anterior aspect only. Lower third has no peritoneal covering. It is separated anteriorly from the prostate by the Denonvillier’s fascia. Posteriorly, it is separated from the coccyx and lower two sacral vertebrae by Waldeyer’s fascia.
ANATOMY

• **BLOOD SUPPLY**
• Main supply is by the superior rectal artery, which is a direct continuation of the inferior mesenteric artery.
• The middle rectal arteries are branches of the internal iliac artery.
• The inferior rectal artery arises on each side from the internal pudendal artery as it enters the Alcock’s canal.
ANATOMY

- **VENOUS DRAINAGE**

- The superior haemorrhoidal veins which drain the anal canal above the dentate line pass upwards to continue as the rectal veins. These unite to form the superior rectal vein, which later becomes the inferior mesenteric vein. Middle rectal veins are small and pass through the lateral ligaments.
ANATOMY

• **LYMPHATIC DRAINAGE**

  Drainage is mainly upwards and only to a small extent downwards and laterally. If the proximal nodes are blocked by malignancy, flow can be directed distally, resulting in involvement of side walls of pelvis (along the middle rectal vessels), and the inguinal nodes via the inferior rectal vessels.

• Superior rectal nodes of Gerota are situated behind the middle third of the rectum, above the levator ani.

• Middle rectal nodes are close to the middle rectal vessels.
EXAMINATION OF THE RECTUM

- Up to middle third can be examined digitally; tumours in the upper third can just be touched.

- Proctoscopy is used to inspect the anus, anorectal junction and lower rectum up to 10cms. Biopsy can be taken from suspicious areas.

- Flexible sigmoidoscope is now commonly used to inspect the rectum and sigmoid colon and take biopsy.
EXAMINATION OF THE RECTUM

• Endoluminal ultrasound is useful to assess local spread. Computerised tomography, magnetic resonance imaging and ultrasound are useful to assess local spread as well as metastasis of the liver. Chest X-ray and CT of chest are useful to detect metastasis in the lungs.
BENIGN TUMOURS

- Rectum and sigmoid colon are the most frequent sites of polyps. All neoplastic polyps have a tendency to become malignant. This tendency is more in sessile and large polyps. Hence, polyps must be removed totally to exclude carcinoma in situ and to prevent recurrence. A proximal carcinoma should always be ruled out prior to removal of a polyp, as local implantation of cancer cells may occur in the distally situated rectal wound.
BENIGN TUMOURS

• **JUVENILE POLYP**
  Bright red glistening pedunculated spherical lesions found in infants and children. They have no tendency to turn malignant. If symptomatic, they can be removed by an endoscopic snare.
BENIGN TUMOURS

- **METAPLASTIC POLYPS**
  Small pinkish, sessile polyps and frequently multiple. Harmless.

- **INFLAMMATORY POLYPS OR PSEUDOPOLYPS**
  They are oedematous thickening of mucous membrane associated with colitis.
BENIGN TUMOURS

• **VILLOUS ADENOMAS**
  Sometimes very large, they have a characteristic frond-like appearance. They have a tendency to become malignant. Profuse mucous discharge from these tumours, which is rich in potassium, can cause electrolyte and fluid loss.

• They can be removed through the anus or from above. When malignant change is suspected, the rectum has to be excised totally.
BENIGN TUMOURS

• **FAMILIAL ADENOMATOUS POLYPOSIS**
  Multiple rectal and colonic polyps develop around puberty. Genetically transmitted. This condition is premalignant and requires total colectomy and replacement of the rectum with a 'pouch' of folded ileum.

• **BILHARZIAL PAPILLOMA**
  Common in Egypt. Can resemble carcinoma.

• **BENIGN LYMPHOMA**
  Circumscribed movable nodules, firm in consistency, greenish white to pink in colour. Complete local excision is the management.
BENIGN TUMOURS

• **ENDOMETRIOMA**
  Constricting lesions at recto sigmoid junction or tumours invading the rectum from the rectovaginal septum. Dysmenorrhea and rectal bleeding are common symptoms. Can be controlled with oral contraceptives or cured by bilateral oophorectomy.

• **HAEMANGIOMA**
  Uncommon. Can cause serious or even fatal haemorrhage. They have to be treated by excision of the portion of the anorectum bearing the lesion.
CARCINOMA

• Second most common variety of malignant tumour in men and fourth common malignant tumour in women.

• **Origin**

  Adenomas and papillomas are precarcinomatous conditions. Most rectal carcinomas start as adenomas.
• **Pathological Histology**
  Three types are recognized.
  • Well differentiated adenocarcinoma
  • Moderately differentiated adenocarcinoma
  • Anaplastic, highly undifferentiated adenocarcinoma

More malignant varieties contain large numbers of mucin producing cells.
Ulcerative types are the usual ones, but papilliferous and infiltrating types are common.
• **Spread**
• **Local spread**
  - Local spread occurs circumferentially rather then in a longitudinal direction. A period of 18-24 months is required for complete encirclement. Annular variety is common at the rectosigmoid junction. Anteriorly, spread occurs in male to the prostate, seminal vesicles, or the bladder. In the female, the vagina or the uterus is involved. Posteriorly, sacrum and sacral plexus are involved. Lateral spread involves the ureters.
• **Lymphatic spread**
Lymphatic spread occurs in an upward direction in cases of carcinoma occurring above the peritoneal reflection. Below the peritoneal reflection to within 1-2 cm of the anal orifice, the lymphatic spread is still upwards, but the first halting place is in the pararectal nodes of Gerota. Primary lateral spread can occur if the growth occurs in the field of the middle rectal artery. Atypical and widespread lymphatic permeation can occur in anaplastic growths.

• **Venous spread**
Venous spread is late. Liver, lungs and adrenals are the most common sites.

• Peritoneal dissemination may follow penetration of the peritoneal coat in a high placed rectal carcinoma.
**STAGING**

**DUKES’ staging**

A. The growth is limited to the rectal wall. (15%). Prognosis is excellent.

B. The growth has extended to the extrarectal tissues, but no metastasis to the regional nodes. (35%). Prognosis reasonable.

C. There are secondary deposits in the regional lymph nodes. (50%) C1 – Local pararectal nodes alone are involved. C2 – Nodes near the main supplying vessels are involved. Prognosis is poor.

D. Presence of widespread metastasis, usually hepatic.
• **TNM staging**
  • Useful for international staging.
  • T1- Tumour invades the submucosa
  • T2- Tumour invades the muscularis
  • T3- Tumour invades the subserosa or non peritonealised perirectal tissues
  • T4- Tumour penetrates the visceral peritoneum or directly invades other organs or tissues

• N0- No nodes
  • N1- Metastasis in 1-3 perirectal lymph nodes
  • N2- Metastasis in 4 or more perirectal nodes
  • N3- Metastasis in nodes along the named vascular tree

• M0- No distant metastasis
  • M1- Distant metastasis present
• **CLINICAL FEATURES**

Carcinoma rectum can occur in early life, though the common age is above 55 years. Early cases are free from symptoms, so patients do not come for advice for more than six months.

- **1. Bleeding**
  Bleeding is often slight and occurs at end of defaecation, resembling haemorrhoids. Haemorrhoids can coexist with carcinoma.

- **2. Sense of incomplete defaecation**
  The bowels open, but there is a sensation that there is more faeces to be passed. Patient tries to empty the bowel several times a day, often with passage of flatus and a little blood stained mucus (‘bloody slime’).
3. Alteration of bowel habits
Annular carcinoma leads to constipation. Growths in the middle and lower parts give rise to early morning diarrhoea mixed with blood.

4. Pain
Pain is a late feature. Colicky pain is associated with advanced growths of rectosigmoid region due to some degree of intestinal obstruction. When a deep seated carcinoma of the rectum erodes the prostate or bladder, severe pain occurs. Pain in the back or sciatica occurs when the growth invades the sacral plexus.

Weight loss is suggestive of hepatic metastasis.
• **INVESTIGATIONS**

• Abdominal examination is negative in early cases.

Annular growth of rectosigmoid junction may present as intestinal obstruction. Metastases in the liver may be palpable. When the peritoneum is studded with secondary deposits, ascites may be found.
2. Rectal examination

- In 90% of patients, the neoplasm can be felt digitally as an indurated nodule. If central ulceration occurs, a shallow depression will be found, the edges of which are raised and everted. On bimanual examination, it may be possible to feel the lower end of a carcinoma situated in the rectosigmoid junction. After the finger has been withdrawn, if it has been in contact with a carcinoma, it is smeared with blood or mucopurulent material tinged with blood. Sometimes, lymph nodes can be felt as one or more hard, oval swellings in the extrarectal tissues posteriorly or posterolaterally.

- In females, a vaginal examination is done. When the tumour is situated in the anterior wall of the rectum, it can be palpated accurately with one finger in the vagina and another in the rectum.
3. Procto-sigmoidoscopy will show a carcinoma if the rectum is emptied of faeces.

Biopsy is taken from the edge of the tumour. It will confirm the diagnosis and to some extent permit grading.

4. Colonoscopy is done to exclude a synchronous tumour, whether an adenoma or carcinoma. If an adenoma is found, it can be snared and removed via the colonoscope. If a full colonoscopy is not possible, a barium enema should be done.

5. Carcinoembryonic antigen
• MRI to show liver metastasis
CARCINOMA WITH HAEMORRHOIDS
Differential diagnosis

1. Inflammatory strictures
2. Amoebic granuloma
3. Adenoma
4. Endometrioma
5. Carcinoid tumour
• **Treatment**

• Some form of excision is essential if at all possible, because of the extreme suffering if the neoplasm remains.

• Prior to surgery, it is necessary to assess the fitness of the patient for operation and the extent of spread of the tumour.

A) Ultrasound, CT, Xray of the chest and CT of the chest are done to exclude distant metastasis.

B) Transluminal ultrasound, where a probe is placed in the rectal lumen can be used to assess the local spread of the tumour. CT and MRI are also useful to assess local spread.
• **Principles of surgical treatment**

  • Radical excision of the rectum together with the mesorectum and associated lymph nodes should be the aim. Even in the presence of metastases, a rectal excision should be considered, as this is often the best means of palliation.

  • Solitary metastatic deposits in liver have been resected with good long term survival.

  • When a tumour is locally advanced, a course of preoperative radiotherapy may be given to reduce its size and make it more amenable for radical excision.

  • For patients who are unfit for radical excision or who have widespread metastases, a lesser local procedure such as transanal excision, laser destruction or interstitial radiation should be considered.
• When a rectal excision is possible, the aim should be to restore the continuity of the bowel and preserve the anal sphincter.
• A sphincter saving procedure (Anterior Resection) is usually possible for tumours of the upper two-thirds of the rectum.
• Removal of the rectum with a permanent colostomy (Abdomino Perineal Excision) is required for tumours of the lower one-third.
• Anterior resection is now applied to at least two-thirds of patients presenting with carcinoma of the rectum. Here, the neoplasm is excised radically with at least 2 cm. margin of normal bowel below the lower edge of the tumour, removal of all the mesorectum and high ligation of the inferior mesenteric lymphovascular pedicle.
• Once the rectum has been mobilized, it is removed and the remaining bowel ends are washed well. Continuity is restored by direct end to end anastomosis, either manually or with stapler.
• **Preoperative preparation**

• Bowel is prepared by diet and use of purgatives.

• Prophylactic systemic antibiotics are given (usually Cefuroxime 750mg. and Metronidazole 500mg IV) an hour prior to surgery.

• All patients are seen preoperatively by a stoma care nurse and counseled regarding the colostomy and possible complications of operation like pelvic autonomic nerve damage resulting in bladder and sexual dysfunction.

• Anaemia and electrolyte deficiencies are corrected.

• An indwelling bladder catheter is passed prior to surgery.
• **Abdominoperineal resection**
• AP resection is done as a synchronous transabdominal and perineal procedure with two operative teams.
• Position: Modified lithotomy
• **Technical points:**
• The locoregional and distant spreads are evaluated and mobility of the lesion is assessed.
• The lateral peritoneum is incised and the sigmoid mobilized, identifying the left ureter.
• The inferior mesenteric artery is ligated below the left colic branch.
• Posterior mobilization is done carefully preserving the presacral nerves and without breaching the presacral fascia. Damage to the presacral fascia can lead to severe haemorrhage from the presacral veins.
• The anterior plane is just behind the seminal vesicles.
• The permanent end colostomy is through the rectus sheath to minimize subsequent hernia.
Abdomino perineal resection - Pelvic dissection
AP resection - Colostomy
• **Anterior resection**
  
  • The rectum is mobilized to the level of the levators through the abdomen. The colon is anastomosed to the anus with an intraluminal circular stapler or by hand suture.
  
  • The same procedure can be done through a laparoscope.
• **Hartmann's operation**
  Ideal procedure for an old and feeble patient who will not tolerate a lengthy anterior resection or an abdominoperineal resection
  The rectum is excised through the abdomen, anorectal stump is transected and closed. A terminal colostomy is done.
• **Palliative colostomy**

• It is done for patients presenting in an advanced stage with intestinal obstruction.
• **Pelvic exenteration**  
  (Bruns chwig’s operation)

Here, the aim is to remove all the pelvic organs, together with the internal iliac and obturator group of lymph nodes. Urine has to be diverted through an ileal conduit.
• **Radiotherapy**

Some adenocarcinomas respond to megavoltage cobalt therapy or neutron beam irradiation. RT can be used as an adjuvant alone or with chemotherapy. RT can be given for inoperable primaries and local recurrences. Intracavity radiation can be applied through the anal route.
• **Immunotherapy**

Monoclonal antibodies to CEA combined with cancericidal agents are used for management of disseminated disease.
• **Prognosis**

Survival rates are influenced by Dukes’ stage, with stage C patients doing worse than those with stage A and B. Fixed lesions and poorly differentiated tumours have poor prognosis. Overall, 5-year survival rate is about 50% in advanced centers.
• **Local recurrence**
Local recurrence is mostly due to inadequate removal. It is managed by RT.

Neodymium: yttrium-aluminium-garnet (Nd: YAG) laser can be used for an obstructing or bleeding lesion. Intraluminal stent can be inserted endoscopically in high stenosing rectal cancers to palliate a tumour that is causing obstruction.
Flexible Sigmoidoscope