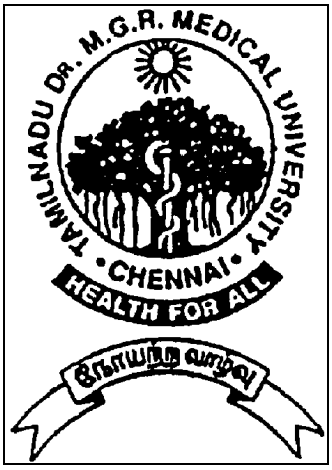
AN OVERVIEW OF CARCINOMA OF THE RECTUM

Dissertation
Submitted in partial fulfillment of the Regulation of

M.S., Degree Examination
Branch I General Surgery

Department of General Surgery
STANLEY MEDICAL COLLEGE & HOSPITAL
Chennai – 600 001



THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY
CHENNAI

SEPTEMBER – 2006

CERTIFICATE

This is to certify that the Dissertation titled **"AN OVERVIEW OF CARCINOMA OF THE RECTUM"** of **Dr. P. RAMADOSS** is done in partial fulfillment of the requirements of M.S. Branch I General Surgery Degree Examination of The TamilNadu Dr. M.G.R. Medical University to be held in September 2006. The period of study is from January 2004 to December 2005.

UNIT CHIEF HEAD OF THE DEPARTMENT

DEAN

DECLARATION

I **Dr. P. RAMADOSS** solemnly declare that this dissertation titled **"AN OVERVIEW OF CARCINOMA OF THE RECTUM"** is a bonafide work done by me at **Stanley Medical College And Government Hospital** from January 2004 to December 2005 under the guidance and supervision of my Unit Chief

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ACKNOWLEDGEMENT

I wholeheartedly thank our beloved **Dean Dr. M. Vasantha M.D.,** Government Stanley hospital, Stanley Medical College for having permitted me to carry out the study and to utilize the clinical materials and the facilities in Stanley medical college, Chennai during the period of study from January 2004 to February 2006.

I am greatly indebted to my **Professor DR. D. R. GUNASEKARAN, M.S., F.I.C.S**., Chief and the Head of the department of General Surgery, Stanley Medical College for having guided through the period of my study and having extended his full support and valuable ideas.

I thank my Assistant Professors DR. K. RAMASUBRAMANIYAM, DR. R.KANNAN, DR. R. VASUKI and DR. M. ANTO for the valuable advice and encouragement and help rendered during the period of the study.

I thank surgical registrar Dr.N.Gunaseelan, M.S., for his advice and help during the period of study.

I sincerely thank my family, my colleagues and my fellow postgraduates for their help and support.

Last but not the least, I thank all my patients for their kind cooperation in carrying out the study successfully.

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INTRODUCTION

Carcinoma of the Rectum represents one of the prime challenges to the medical profession because they arise in polyps and produce symptoms relatively early and at a stage generally curable by resection.

Carcinoma of the Rectum is a major cause of morbidity and mortality. Incidence of carcinoma of the rectum has been on the rise over the past 10 years. This may be attributed to changing trends in lifestyle, such as adoption of western diet.

Almost all rectal cancers are primary adenocarcinomas (98%). Carcinoid (0.1%), Lymphoma (1.3%), and sarcoma (0.3%) are rare varieties of carcinoma of the rectum.

The 5-year survival rate is approximately 50%. Early diagnosis and appropriate therapeutic intervention will improve the survival rate.

AIMS OF THE STUDY

The aims of the study are

(1) to know the incidence of the carcinoma of the rectum with regard to age and sex

(2) to understand the clinical pattern and presentation

(3) to understand the pathology

(4) to know the site of the malignancy from the anal verge

(5) to know the role of various investigations

(6) to evaluate appropriate investigations

(7) to know the morbidity and mortality

ANATOMY

The rectum lies anterior to the sacrum and coccyx and is approximately 15 cm long. The rectosigmoid junction is located at the end of the sigmoid mesocolon. Its upper third is covered almost completely by peritoneum. Below this level, the peritoneum is reflected anteriorly onto the posterior surface of the uterus and vagina in females and onto the posterior surface of the bladder in males. The peritoneal recesses, the pouch of Douglas (rectouterine), and the rectovesical pouch lie between these organs.

The lower half of the rectum is entirely extraperitoneal. The rectum ends just below the level of the coccyx. It turns posteriorly through the puborectal sling of the levator ani muscles to become the anal canal. The rectum is supplied by the superior rectal branch of the inferior mesenteric artery and from branches of the internal iliac arteries. The rectal lymphatics drain superiorly into the superior rectal, then the inferior mesenteric nodes, and laterally into the internal iliac nodes.

The rectal wall comprises 5 layers, including the (1) mucosa (lined with columnar epithelium), (2) muscularis mucosa, (3) submucosa, (4) muscularis propria (an inner circular layer and an outer longitudinal layer, comprising 3 narrow bands), and (5) serosa.

EPIDEMIOLOGY

Frequency:

Colorectal cancers are the second most common cause of cancer death in the developed countries and the most common GI cancer. The incidence of the rectal cancer is the highest in the westernized countries of North America, Northern Europe, Australia and New Zealand. Intermediate rates are found in Southern Europe and low rates in Africa, Asia and South America .Rectal cancers shows less international variations than colon cancer. High colon – to-rectal cancer ratios prevail in the westernized countries .Ratios equalizing less than one are typical in Asia and Africa.

Race:

Western nations tend to have a higher incidence than Asian and African countries; however, within the United States, little difference in incidence exists among whites, African Americans, and Asian Americans. Among religious denominations, colorectal cancer occurs more frequently in the Jewish population.

Sex:

The incidence of colorectal malignancy is slightly higher in males than in Females.

Age:

Incidence peaks in the seventh decade; however, cases have been reported in young children

ETIOPATHOGENESIS

The etiology of colorectal cancer is unknown but appears to be multi-factorial in origin and includes environmental factors and a genetic component. Diet may have an etiologic role, especially diet with high fat content. Approximately 75% of colorectal cancers are sporadic and develop in people with no specific risk factors. The remaining 25% of cases occur in people with significant risk factors. Most (15-20%) colorectal cancers develop in people with either a positive family history or a personal history of colorectal cancer or polyps. The remaining cases occur in people with certain genetic predispositions, such as hereditary nonpolyposis colorectal cancer (HNPCC, 4-7%) or familial adenomatous polyposis (FAP, 1%) or in people with inflammatory bowel disease (IBD, 1%).

Environmental factors

Diet

A high-fat, low-fiber diet is implicated in the development of colorectal cancer. Specifically, people who ingest a diet high in unsaturated animal fats and highly saturated vegetable oils (E.g. corn, safflower) have a higher incidence of colorectal cancer. Saturated fats from dairy products do not have the same effect, nor do oils containing oleic acid (e.g. olive, coconut, fish oils). Omega-3 monounsaturated fatty

acids and omega-6 monounsaturated fatty acids also appeared to be less carcinogenic than unsaturated or polyunsaturated fats.

The mechanism by which these substances are related to the development of colorectal cancer is unknown. The ingestion of a high-fiber diet appears to be protective against colorectal cancer. Fiber causes the formation of a soft, bulky stool that dilutes out carcinogens; it also decreases colonic transit time, allowing less time for harmful substances to contact the mucosa. The decreased incidence of colorectal cancer in Africans is attributed to their high-fiber, low–animal-fat diet. This favorable statistic is reversed when Africans adopt a western diet.

Increased dietary intake of calcium appears to have a protective effect on colorectal mucosa by binding with bile acids and fatty acids. The resulting calcium salts may have anti-proliferative effects, decreasing crypt cell production in the mucosa. Other dietary components, such as selenium, carotenoids, and vitamins A, C, and E, may have protective effects by scavenging free-oxygen radicals in the colon.

Alcohol

Daily alcohol drinkers experience a 2-fold increased risk of developing colorectal

carcinoma. Specifically, beer consumption in excess of 15 liters per month increases the risk of rectal cancer in men.

Hereditary factors

Family history

The relative risk of developing colorectal cancer is increased in the first-degree relatives of affected patients. The relative risk of developing this malignancy if 1 first-degree family member is affected with colorectal cancer is 1.72; with 2 first-degree family members affected, the relative risk increases to 2.75. If the first-degree family member is younger than 45 years at the time of diagnosis, the risk increases to 5.37.Personal history of colorectal cancer or polyps: Of patients with colorectal cancer, 30% have synchronous lesions, usually adenomatous polyps. Approximately 40-50% of patients have polyps on follow-up colonoscopy. Of patients who have adenomatous polyps on colonoscopy, 29% have additional polyps on repeat colonoscopy 1 year later. Malignancy develops in 2-5% of patients. The risk of cancer in people who have had polyps removed is 2.7-7.7 times that of the general population.

Genetic disorders

Familial adenomatous polyposis

FAP is an autosomal dominant inherited syndrome that results in the development of more than 100 adenomatous polyps and a variety of extraintestinal manifestations. The defect is in the *APC* gene, which is located on chromosome 5 at locus q21. The disease process causes the formation of hundreds of intestinal polyps, osteomas of the bone, desmoid tumors, and, occasionally, brain tumors. Individually, the polyps do not have a risk of malignant transformation greater than polyps in the general population. The increased number of polyps, however, predisposes patients to a greater risk of cancer. If left untreated, colorectal cancer develops in nearly 100% of these patients by age 40 years. While the hereditary link is documented, approximately 20% of FAP cases are caused by spontaneous mutation.

Hereditary nonpolyposis colorectal cancer

HNPCC is an autosomal dominant inherited syndrome that occurs because of defective mismatch repair genes located on chromosomes 2, 3, and 7. Patients have the same number of polyps as the general population, but their polyps are more likely to

become malignant. These patients also have a higher incidence of endometrial, gastric, thyroid, and brain cancers.

Inflammatory bowel disease

Ulcerative colitis

The incidence of malignancy increases with duration. After 10 years, the incidence of colorectal cancer in ulcerative colitis (UC) is approximately 1% per year. Evaluate patients for dysplastic changes with annual colonoscopy. Dysplasia is a precursor of cancer and, when present, the risk of cancer is 30%.

Crohn disease

The incidence of colorectal cancer in patients with Crohn disease is 4-20 times greater than that of the general population. Cancer occurs in patients with disease of at least 10 years' duration. The average age at diagnosis (i.e. 46-55 y) is younger than that of the general population. Cancers often develop in areas of strictures and in de-functionalized segments of intestine.

Pathophysiology

Carcinomas are found in as many as 4% of neoplastic polyps. Cells must accumulate 4-5 molecular defects, including activation of oncogenes and inactivation of tumor suppressor genes, to undergo malignant transformation. In normal mucosa, the surface epithelium regenerates approximately every 6 days. Crypt cells migrate from the base of the crypt to the surface, where they undergo differentiation, maturation, and, ultimately, lose the ability to replicate. In adenomas, several genetic mutations alter this process, starting with inactivation of the adenomatous polyposis coli (*APC*) gene, allowing unchecked cellular replication at the crypt surface. With the increase in cell division, further mutations occur, resulting in activation of the K-*ras* oncogene in the early stages and *p53* mutations in later stages. These cumulative losses in tumor suppressor gene function prevent apoptosis and give the cell eternal life.

Macroscopic appearance

(1) Ulcerative - presents as a malignant lesion with raised and irregular everted edges and sloughed floor

(2) Proliferative - Has an irregular nodular surface and is friable and bleeds early

(3)Annular - It tends to involve the wall of the rectum but does not project into the rectum. Usually causes obstruction

(4) Infiltrating - Causes diffuse thickening of the wall.

Histological grading

In the great majority of cases, carcinoma of the rectum is a columnar-celled adenocarcinoma. The more nearly the tumor cells approach normal shape and arrangement, the less malignant is the tumor. Conversely, the greater the percentage of cells of an embryonic or undifferentiated type, the more malignant is the tumor.

Low grade	Well-differentiated	Prognosis good
Average grade	Averagely-differentiated	Prognosis fair
High grade	Anaplastic	Prognosis poor

Staging:

Dukes classification

In 1932, Cuthbert E. Dukes, a pathologist at St. Mark Hospital in England, introduced a staging system for rectal cancer.

His system divided tumor classification into 3 stages, as follows:

Dukes A	Growth limited to the rectal wall

Dukes B Growth extending through the rectal wall in to extra rectal tissue.

Dukes C Metastasis to regional lymphnodes

C1 Involvement of local pararectal lymphnodes

C2 Nodes accompanying the supplying blood vessels are implicated up to the point of division

A stage D is often included which was not described by Dukes. This stage signifies the presence of wide spread metastasis

ASTLER – COLLER CLASSIFICATION

A Limited to the mucosa

B1 Extending in to the musularis propria but not penetrating through it; uninvolved nodes

B2 Penetrating through musularis propria ; uninvolved nodes

C1 Extending in to the musularis propria but not penetrating through it; involved nodes

C2 Penetrating through musularis propria ; involved nodes

D Distant metastasis

Tumor, node, metastasis (TNM) system:

This system was introduced in 1954 by the American Joint Committee on Cancer (AJCC) and the International Union Against Cancer (IUAC). The TNM system is a universal staging system for all solid cancers that is based on clinical and pathologic information. Each category is independent.

Neither the Dukes nor the TNM system includes prognostic information such as histologic grade, vascular or perineural invasion, or tumor DNA ploidy.

TNM classification for cancer of the colon and rectum (AJCC)

Primary tumor (T)

TX - Primary tumor cannot be assessed or depth of penetration not specified

T0 - No evidence of primary tumor

Tis - Carcinoma in situ (mucosal); intraepithelial or invasion of the lamina propria

T1 - Tumor invades submucosa

T2 - Tumor invades muscularis propria

T3 - Tumor invades through the muscularis propria into the subserosa or into nonperitonealized pericolic or perirectal tissue

T4 - Tumor perforates the visceral peritoneum or directly invades other organs or structures

Regional lymph nodes (N)

NX - Regional lymph nodes cannot be assessed

N0 - No regional lymph node metastasis

N1 - Metastasis in 1-3 pericolic or perirectal lymph nodes

N2 - Metastasis in 4 or more pericolic or perirectal lymph nodes

N3 - Metastasis in any lymph node along the course of a named vascular trunk

Distant metastasis (M)

MX - Presence of metastasis cannot be assessed

M0 - No distant metastasis

M1 - Distant metastasis

TNM Stage Grouping for Cancer of the Colon and Rectum

Stage	T	N	M	Dukes Stage
I	Tis	N0	M0	A
	T1	N0	M0	
	T2	N0	M0	
II	T3	N0	M0	B
	T4	N0	M0	
III	Any T	N1	M0	C
	Any T	N2, N3	M0	
IV	Any T	Any N	M1	

CLINICAL FEATURES

All patients should undergo a complete history, including a family history and assessment of risk factors for the development of rectal cancer. Many rectal cancers produce no symptoms and are discovered during digital or proctoscopic screening examinations.

Bleeding

This is the most common symptom of rectal cancer and occurs in 60% of patients. Bleeding often is attributed to other causes (e.g. hemorrhoids), especially if the patient has a history. Profuse bleeding and anemia are rare. Bleeding may be accompanied by the passage of mucus and warrants further investigation.

Change in bowel habits

Present in 43% of patients, this symptom has several different presentations. Often, it occurs in the form of diarrhea, particularly if the tumor has a large villous component. These patients may have hypokalemia on laboratory studies. The capacity of the rectal reservoir may mask the presence of a small lesion. Some patients experience a change in caliber of the stool. Large tumors can cause obstructive symptoms. Tumors located low in the rectum can cause a feeling of incomplete evacuation and tenesmus.

Occult bleeding:

This is detected on screening fecal occult blood test (FOBT) in 26% of cases.

Abdominal pain

Partial large-bowel obstruction may cause colicky abdominal pain and bloating and is present in 20% of cases. Back pain usually is a late sign caused by a tumor invading or compressing nerve trunks. Urinary symptoms may occur if the tumor is invading or compressing the bladder or prostate.

Malaise

This nonspecific entity is the presenting symptom in 9% of cases.

Bowel obstruction:

Complete obstruction of the large bowel is rare and is the presenting symptom in 9% of cases.

Pelvic pain:

This late symptom usually indicates nerve trunk involvement and is present in 5% of cases.

Other presentations include emergencies such as peritonitis from perforation (3%)

or jaundice, which may occur with liver metastases (<1%).

Physical Examination

Physical examination is performed with specific attention to possible metastatic lesions, including enlarged lymph nodes or hepatomegaly. The remainder of the colon also is examined.

Digital rectal examination

The easy accessibility of the rectum provides an opportunity to readily detect abnormal lesions via digital rectal examination (DRE). The average finger can reach approximately 8 cm above the dentate line. Tumors can be assessed for size, ulceration, and presence of any pararectal lymph nodes. Fixation of the tumor to surrounding structures (e.g. sphincters, prostate, vagina) also can be assessed. DRE also permits a cursory evaluation of the patient's sphincter function. This information is necessary when determining whether a patient is a candidate for a sphincter-sparing procedure.

INVESTIGATIONS

Lab Studies:

Routine laboratory studies should include a complete blood count; serum chemistries, including liver and kidney function tests; and a carcinoembryonic antigen (CEA) test.

Metastatic workup

Liver function tests usually are part of the preoperative workup; these test results often are normal even with metastases to the liver.

Carcinoembryonic antigen test:

Perform a CEA test in all patients with rectal cancer. A baseline level is obtained before surgery and a follow-up level is obtained after surgery. This may alert to a possible recurrence if a previously normalized CEA begins to rise in the postoperative period. A CEA higher than 100ng/mL usually indicates metastatic disease and warrants a thorough investigation.

Imaging Studies

Proctoscopy

The proctoscope enables visual examinations to be made of the lower part of the rectum and the anal canal. The mucous membrane of the rectum is examined and any abnormalities such as inflammation, ulceration, or tumor are noted.

Sigmoidoscopy

The 60-cm flexible sigmidoscope has a increased range over the rigid sigmoidoscope which at best reaches only to the rectosigmoid (30-cm).It can be performed without an anaesthestic, allows direct visualization of the rectum and provides an estimation of the size of the lesion and the degree of obstruction. This procedure is used to obtain biopsies of the lesion, assess ulceration, and determine the degree of fixation. In addition, it gives an accurate measurement of the distance of the lesion from the dentate line; the latter is critical in deciding which operation is appropriate.

Endorectal ultrasound

Endorectal ultrasound (ERUS) is an invaluable tool in assessing depth of invasion of rectal cancers; it is 72-94% accurate.

The accuracy of detection of lymph node involvement ranges from 73-86%. Most of these nodes are larger than 1 cm. Smaller nodes can be detected, but the accuracy of determining tumor involvement is less than the accuracy for larger nodes.

Overestimation of staging and nodal involvement occurs more often than under staging. This probably is due to the inflammatory process caused by the tumor.

ERUS visualizes the rectal wall as alternating hyperechoic and hypoechoic layers of tissue. The first layer is the hyperechoic water-filled balloon or mucosal interface, which is bounded by the hypoechoic mucosa and muscularis mucosa, the hyperechoic submucosa, the hypoechoic muscularis propria, and, finally, the hyperechoic muscularis mucosa or perirectal fat interface. Depth of penetration is determined by identifying which of these layers is disrupted by the tumor.

ERUS also is useful in determining invasion of surrounding structures and the presence of local recurrence when used after surgery.

Endorectal surface-coil MRI: An alternative to ERUS, this technique is touted as equally or more accurate than ERUS in lymph node staging.

Metastatic workup

Chest radiograph:

Obtain a chest radiograph to rule out pulmonary metastases and to determine whether the patient has any gross underlying pulmonary disease, including emphysema.

CT scan:

This study generally is used to determine the presence or absence of metastases.

CT scans can identify lesions in the liver, adrenals, ovaries, lymph nodes, and other organs. In 10% of patients, the CT scan misses small liver lesions. When combined with an angiogram, a CT scan is 95% accurate in identifying liver metastases.

Some information can be gleaned from a CT scan regarding depth of penetration of the primary rectal tumor. When performed with rectal contrast given as an enema, CT scans can determine the depth of penetration accurately in 84% of cases.

CT scan detects lymph nodes larger than 1 cm in 75% of cases.

CT scans are helpful in determining whether patients require preoperative chemoradiation therapy.

MRI actually is the most sensitive test for determining the presence of liver metastases and often is used if liver resection is considered.

Positron emission tomography:

The major advantage of a positron emission tomography (PET) scan is to differentiate between recurrent tumor and scar tissue by measuring tissue metabolism of an injected glucose-based substance. Scar tissue is inactive, whereas tumor generally is hypermetabolic. This test generally is not used in a routine preoperative metastatic workup.

CEA scan:

If routine imaging studies cannot detect the area of metastatic disease, a CEA scan can be performed. Radioimmunoscintigraphy uses radiolabeled antibodies to CEA and total-body scanning to determine the location of CEA-producing metastases. This test is not used routinely in the preoperative evaluation, and its value is controversial.

TREATMENT

Preoperative radiation therapy

The potential advantages of this treatment include tumor down-staging; an increase in resectability, possibly with a sphincter-sparing procedure; and a decrease in tumor viability, which may decrease the risk of local recurrence.

The disadvantages include delaying surgery, possible loss of accurate surgical staging, and increased postoperative morbidity and mortality rates.

Preoperative radiation therapy (RT) decreases the risk of tumor recurrence in patients with stage II or III disease; however, this does not translate into a decrease in distant metastases or an increase in survival rate. Some recent reports cite an increase in survival; however, this is still the minority opinion. In patients with stage I disease, the morbidity and mortality rates are higher, and preoperative RT has no proven benefit.

Postoperative radiation therapy

The advantages of postoperative RT include immediate surgery and complete pathologic information before beginning RT.

The disadvantages include possible delay in RT if postoperative complications ensue, no effect on tumor cell spread at the time of surgery, and decreased effect of RT in surgically induced tissue hypoxia.

Postoperative RT decreases the rate of local recurrence when compared to surgery alone but has not been shown to increase survival.

Chemotherapy/combined modality therapy

This has been studied extensively. Initial studies using fluorouracil and methyl-cyclohexylchloroethlynitrosurea (methyl-CCNU) did not demonstrate any decrease in local control or distant spread or any increase in survival.

Other studies using fluorouracil and vincristine showed some marginal improvement in survival when compared to surgery alone.

Combined modality therapy

The combination of preoperative RT and chemotherapy with fluorouracil and methyl-CCNU improves local control, distant spread, and survival. The basis of this improvement is believed to be the activity of fluorouracil as a radiosensitizer.

Chemoradiation therapy involves using preoperative RT and fluorouracil with a variety of other drugs such as leucovorin and irinotecan. In some cases, surgical specimens inspected after this combination therapy have shown a complete response with no evidence of residual tumor. While these results are encouraging, further studies

are still necessary to determine long-term results. The dosages and administration schedules of these chemotherapeutic regimens are left to the discretion of the consulting oncologist or may be dictated by experimental protocols. This is beyond the scope of this review and is not discussed further.

Surgical Care:

Transanal excision

The transanal excision method of local excision of rectal cancer is reserved for only the most superficial lesions. Patients with stage 0 or stage I cancer with a T1 lesion are candidates for this procedure.

Tis and T1 lesions are confined to the submucosa of the rectal wall. Lesions in the lower one third of the rectum are the most easily accessible and are suited best for transanal excision. Preferably, they also should be polypoid, involve less than one third of the circumference of the rectal wall, be mildly to moderately well differentiated, and not involve the sphincters. The likelihood of lymph node involvement in this type of lesion ranges from 0-12%.

Perform preoperative ERUS. If nodes are identified as suggestive of cancer, do not perform transanal excision.

The lesion is excised with full thickness of the rectal wall, leaving a 1-cm margin of normal tissue. The defect usually is closed, although some surgeons leave it open.

Positive resection margins or involved lymph nodes mandate definitive resection. Usually, an abdominal perineal proctosigmoidectomy is performed, although some facilities attempt sphincter-sparing resections.

The 5-year survival rate after transanal excision ranges from 65-100% (including some T2 lesions). The local recurrence rate ranges from 0-40%.

Lesions that display unfavorable histologic features but are excised completely may be treated with adjuvant radiation therapy.

Transanal endoscopic microsurgery

Transanal endoscopic microsurgery is another form of local excision that uses a special operating proctoscope that distends the rectum with insufflated carbon dioxide and allows the passage of dissecting instruments.

This method can be used on lesions located higher in the rectum and even the distal sigmoid colon.

Transanal endoscopic microsurgery has not come into wide use yet because of a significant learning curve and a lack of availability.

Sphincter-sparing procedures: Procedures are described using the traditional open technique. All of these procedures, except the perineal portions, can and have been performed using laparoscopic techniques with excellent results.

Low anterior resection

Low anterior resection (LAR) generally is performed for lesions in the middle and upper third of the rectum and, occasionally, for lesions in the lower third.

Because this is a major operation, patients who undergo LAR should be in good health. They should not have any preexisting sphincter problems or evidence of extensive local disease in the pelvis.

Patients will not have a permanent colostomy but should be informed that a temporary colostomy or ileostomy may be necessary. They also must be willing to accept the possibility of slightly less-than-perfect continence after surgery, although this

is not usually a major problem.

Other possible disturbances in function include transient urinary dysfunction secondary to weakening of the detrusor muscle. This occurs in 3-15% of patients. Sexual dysfunction is more prominent and includes retrograde ejaculation and impotence. In the past, this has occurred in 5-70% of men, but recent reports indicate that the current incidence is lower.

The operation entails full mobilization of the rectum, sigmoid colon, and, usually, the splenic flexure. Mobilization of the rectum requires a technique called total mesorectal excision (TME).

TME involves sharp dissection in the avascular plane that is created by the envelope that separates the mesorectum from the surrounding structures. This includes the anterior peritoneal reflection and Denonvilliers fascia anteriorly and preserves the inferior hypogastric plexus posteriorly and laterally.

TME is performed under direct visualization.

TME yields a lower local recurrence rate (4%) than transanal excision (20%), but it is associated with a higher rate of anastomotic leak (11%). For this reason, TME may not be necessary for lesions in the upper third of the rectum.

The distal resection margin varies depending on the site of the lesion. A 2-cm margin distal to the lesion must be achieved. The procedure is performed with the patient in the modified lithotomy position with the buttocks slightly over the edge of the operating table to allow easy access to the rectum.

A circular stapling device is used to create the anastomosis. A double-stapled technique is performed. This entails transection of the rectum distal to the tumor from within the abdomen using a linear stapling device. The proximal resection margin is divided with a purse-string device. After sizing the lumen, the detached anvil of the circular stapler is inserted into the proximal margin and secured with the purse-string suture. The circular stapler is inserted carefully into the rectum, and the central shaft is projected through or near the linear staple line. Then, the anvil is engaged with the central shaft, and, after completely closing the circular stapler, the device is fired. Two rings of staples create the anastomosis, and a circular rim or donut of tissue from the proximal and distal margins is removed with the stapling device.

The anastomotic leak rate with this technique ranges from 3-11% for middle-third and upper-third anastomoses and to 20% for lower-third anastomoses. For this reason, some surgeons choose to protect the lower-third anastomosis by creating a temporary diverting stoma. This is especially important when patients have received preoperative RT. The rate of stenosis is approximately 5-20%. A hand-sewn anastomosis may be

performed; if preferred, the anastomosis is performed as a single-layer technique. The leak and stenosis rates are the same.

Coloanal anastomosis

Very distal rectal cancers that are located just above the sphincters occasionally can be resected without the need for a permanent colostomy. The procedure is as already described; however, the pelvic dissection is carried down to below the level of the levator ani muscles from within the abdomen. A straight-tube coloanal anastomosis (CAA) can be performed using the doubled-stapled technique, or a hand-sewn anastomosis can be performed transanally.

The functional results of this procedure have been poor in some patients, who experience increased frequency and urgency of bowel movements, as well as some incontinence to flatus and stool.

An alternative to the straight-tube CAA is creation of a colonic J pouch. The pouch is created by folding a loop of colon on itself in the shape of a J. A linear stapling or cutting device is inserted into the apex of the J, and the stapler creates an outer staple line while dividing the inner septum. The J-pouch anal anastomosis can be stapled or hand sewn.

An alternative to doing the entire dissection from within the abdomen is to begin the operation with the patient in the prone jackknife position. The perineal portion of this procedure involves an intersphincteric dissection via the anus up to the level of the levator ani muscles. After the perineal portion is complete, the patient is turned to the modified lithotomy position and the abdominal portion is performed. Either a straight-tube or colonic J-pouch anal anastomosis can be created; however, both must be hand sewn.

The advantages of the J pouch include decreased frequency and urgency of bowel movements because of the increased capacity of the pouch.

A temporary diverting stoma is performed routinely with any coloanal anastomosis.

Abdominal perineal resection

Abdominal perineal resection (APR) is performed in patients with lower-third rectal cancers who cannot undergo a sphincter-sparing procedure. This includes patients with complex involvement of the sphincters, preexisting significant sphincter dysfunction, or pelvic fixation, and sometimes is a matter of patient preference.

A 2-team approach often is used, with the patient in modified lithotomy position.

One team mobilizes the colon and rectum, transects the colon proximally, and creates an end-sigmoid colostomy.

The perineal team begins by closing the anus with a purse-string suture and making a generous elliptical incision. The incision is carried through the fat using electrocautery. The inferior rectal vessels are ligated and the anococcygeal ligament is divided. The dissection plane continues posteriorly, anterior to the coccyx to the level of the levator ani muscles. Then, the surgeon breaks through the muscles and retrieves the specimen that has been placed in the pelvis. The specimen is brought out through the posterior opening, and the anterior dissection is continued carefully. Care must be taken to avoid the prostatic capsule in the male and the vagina in the female (unless posterior vaginectomy was planned). The specimen is removed through the perineum, and the wound is irrigated copiously. A closed-suction drain is left in place, and the perineal wound is closed in layers by using absorbable sutures.

During this time, the abdominal team closes the pelvic peritoneum (this is not mandatory), closes the abdomen, and matures the colostomy.

Prognosis:

Overall 5-year survival rates for rectal cancer are as follows:

Stage I - 72%

Stage II - 54%

Stage III - 39%

Stage IV - 7%

Fifty percent of patients develop recurrence, which may be local, distant, or both.

Local recurrence is more common in rectal cancer than in colon cancer.

Disease recurs in 5-30% of patients, usually in the first 2 years after surgery.

Factors that influence the development of recurrence include surgeon variability, grade and stage of the primary tumor, location of the primary tumor, and ability to obtain negative margins.

Surgical therapy may be attempted for recurrence and includes pelvic exenteration or APR in patients who had a sphincter-sparing procedure.RT generally is used as palliative treatment in patients who have locally unresectable disease.

MATERIALS AND METHODS

Patients attending surgical units of Government Stanley Hospital between January 2004 to February 2006 were included for study.

Patients with history of blood or mucus in the stools and presence of identified growth in the rectum detected by DRE or Proctosigmoidoscopy were included for the study.

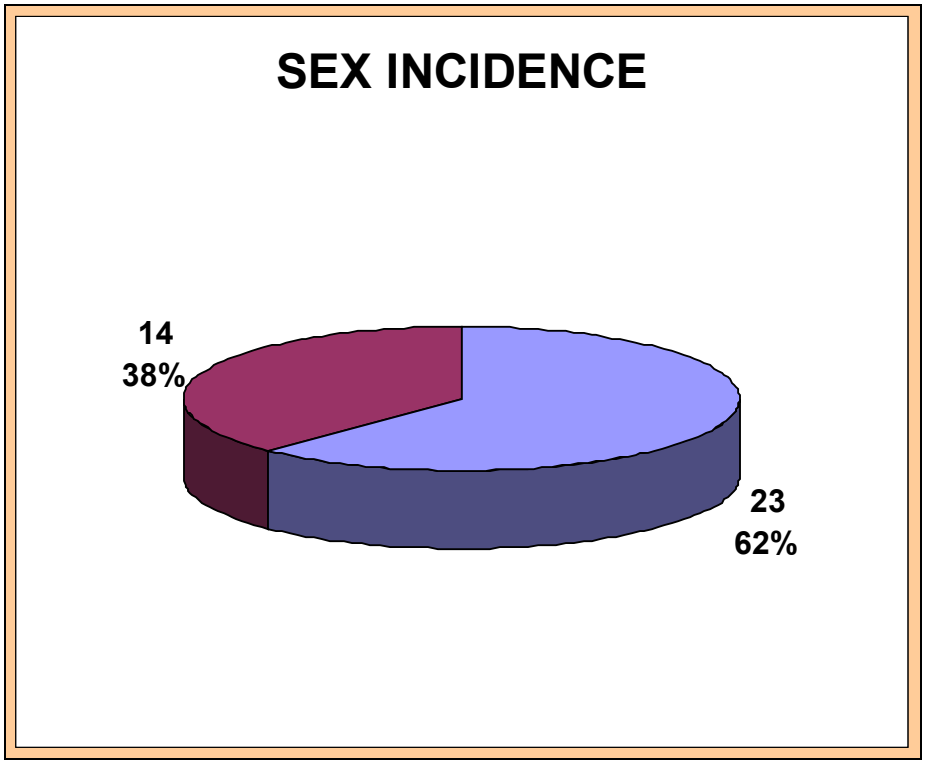
Patients had a detailed history and clinical evaluation. A DRE and proctoscopy was done, if a lesion was identified, sigmoidoscopy was performed.

All the patients included for study had baseline investigations done which included Hb%, TC, DC, and Renal function tests. Liver function tests was done to evaluate the liver function. USG abdomen and pelvis was done. CT abdomen and pelvis was done mandatory in all patients except for cases with acute presentation. Double contrast enema was done whenever necessary. The patients were also counseled with regards to colostomy. Pre-operative bowel preparation was done with polyethylene glycol given orally the day before the surgery and on the morning of surgery. Intravenous antibiotics was also given one hour prior to surgery.

All the patients were subjected to surgery if the general condition was good enough to permit the same. Preference for a particular surgery depended on the site, stage and operability of the tumor. Surgeries were either curative or palliative. Postoperatively patients were followed up with either chemotherapy in the form of 5-FU or Radiotherapy. All the data were recorded in the proforma for study purpose.

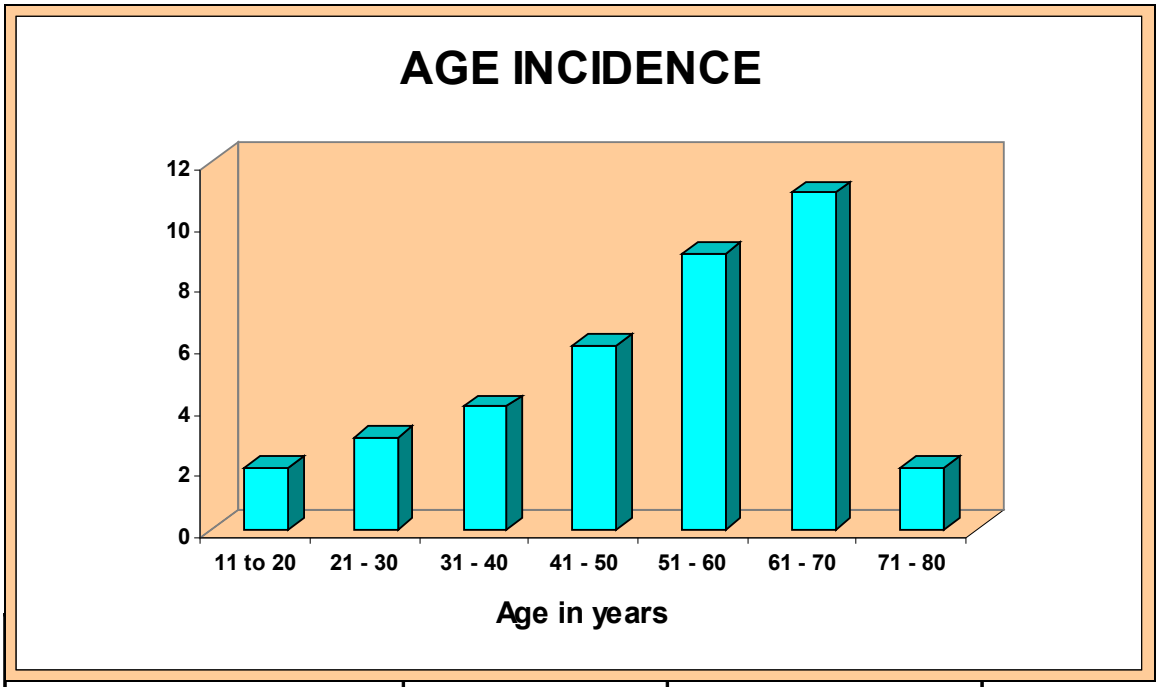
SEX INCIDENCE

SEX	No. of cases
Male	23
Female	14



Age in years	No. of cases
11 to 20	2
21 – 30	3
31 – 40	4
41 – 50	6
51 – 60	9
61 – 70	11
71 – 80	2

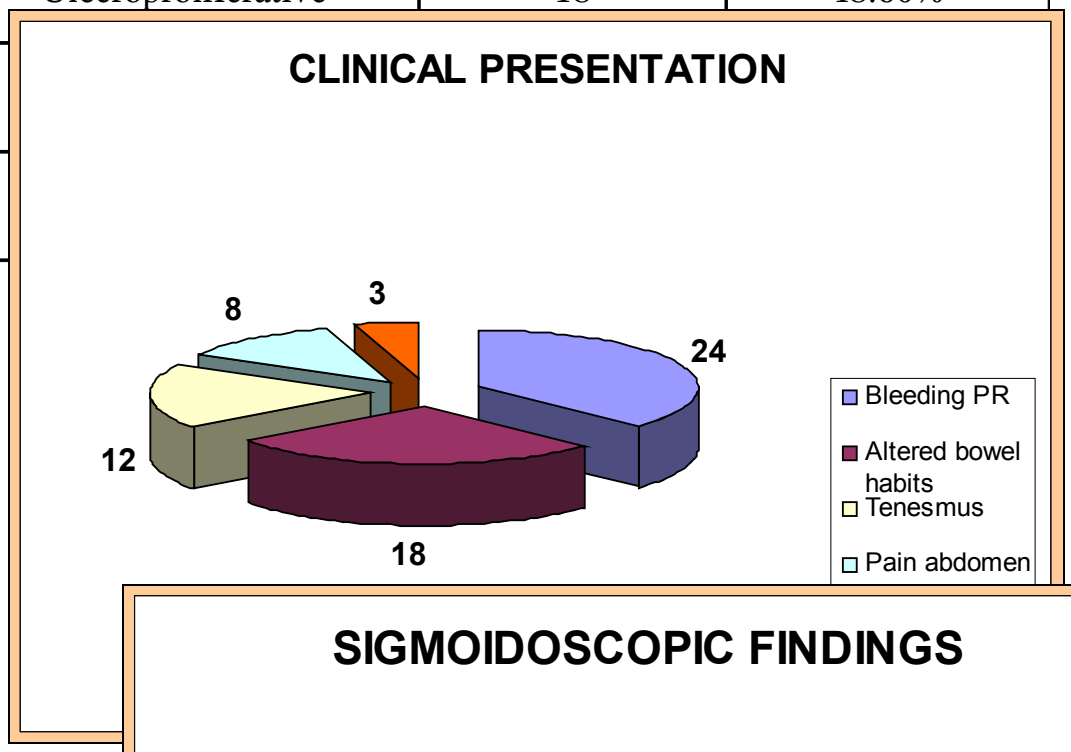
AGE INCIDENCE

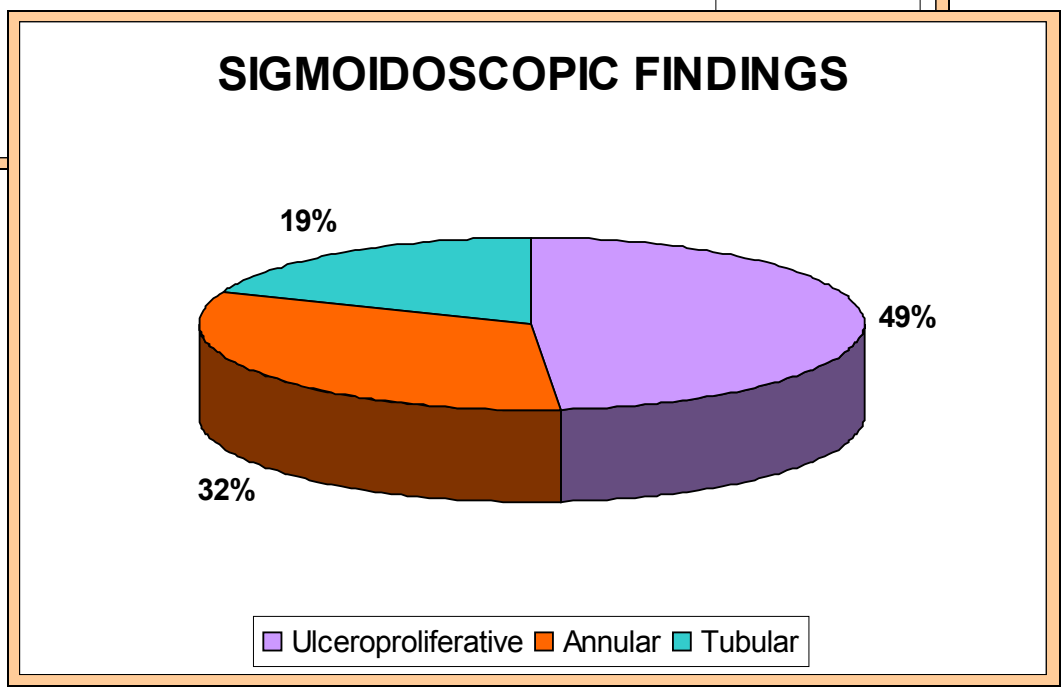


Bleeding PR	24	64.90%

Altered bowel habits	18	48.60%
Tenesmus	12	32.40%
Pain abdomen	8	21.60%
Obstruction	3	8.10%

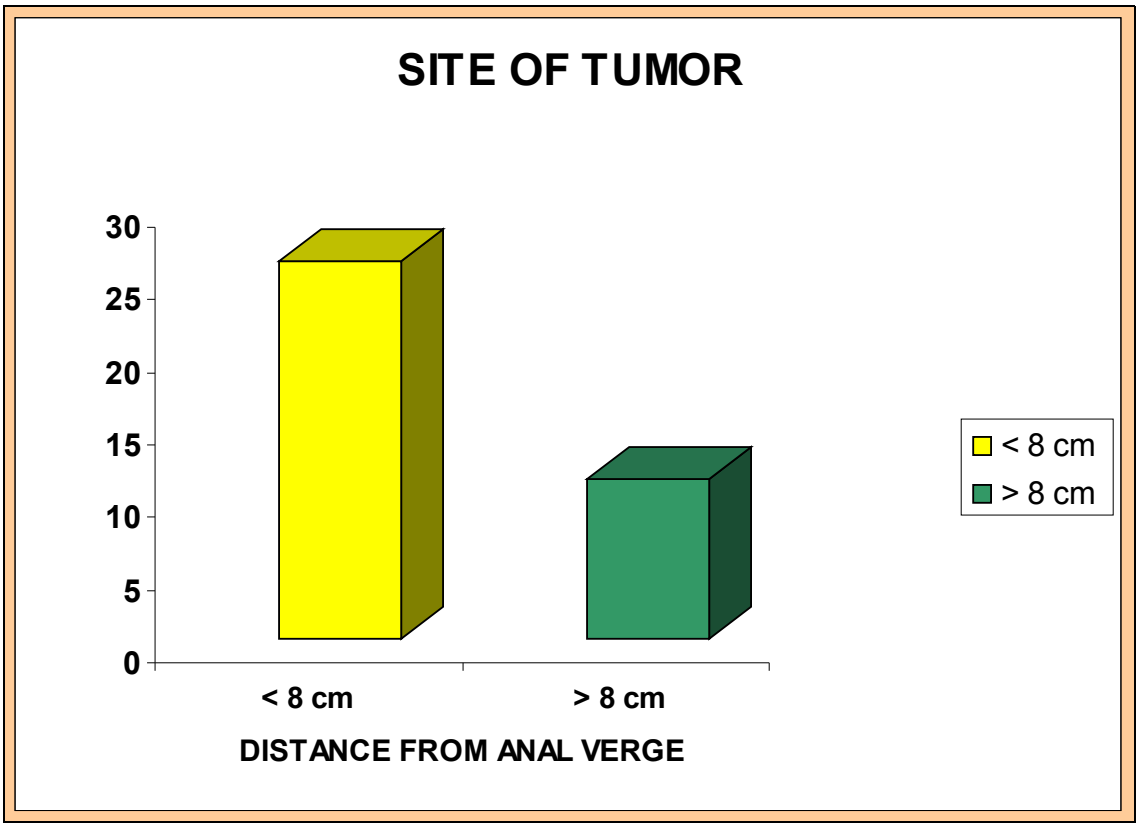
Macroscopic Appearance	No. of cases	Percentage
Ulceroproliferative	18	48.60%





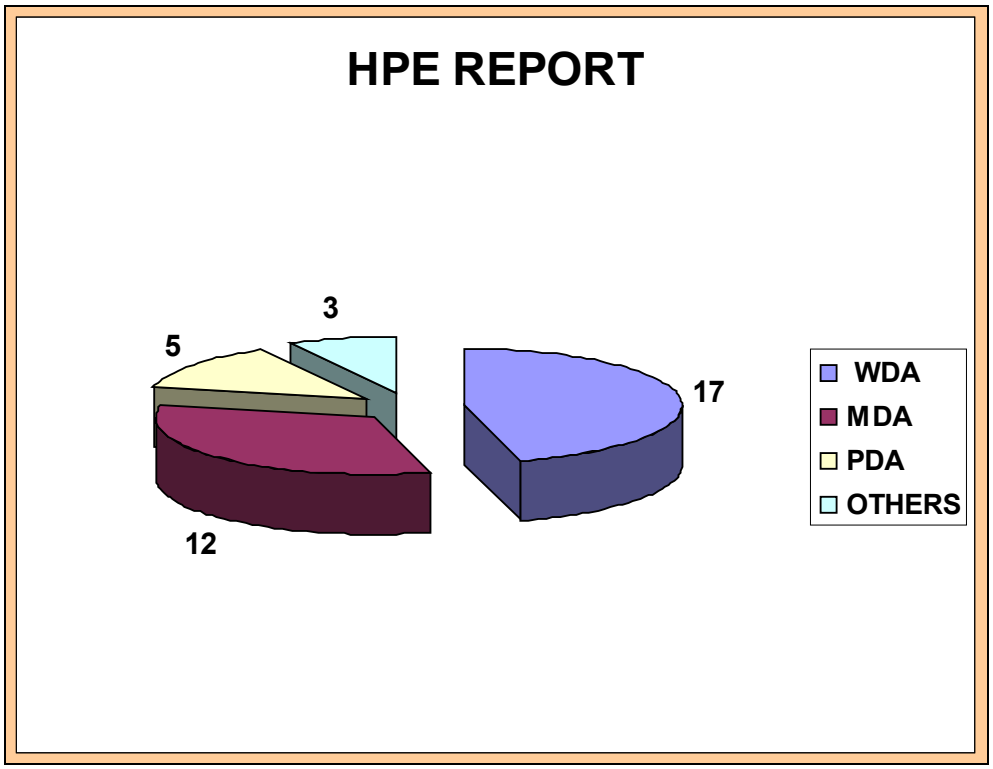
Site of Tumor	No. of cases	Percentage
< 8 cm	26	70.30%
> 8 cm	11	29.70%

DISTANCE OF TUMOR FROM ANAL VERGE



Histopathology	No. of cases	Percentage
WDA	17	45.90%
MDA	12	32.40%
PDA	5	13.50%
OTHERS	3	8.20%

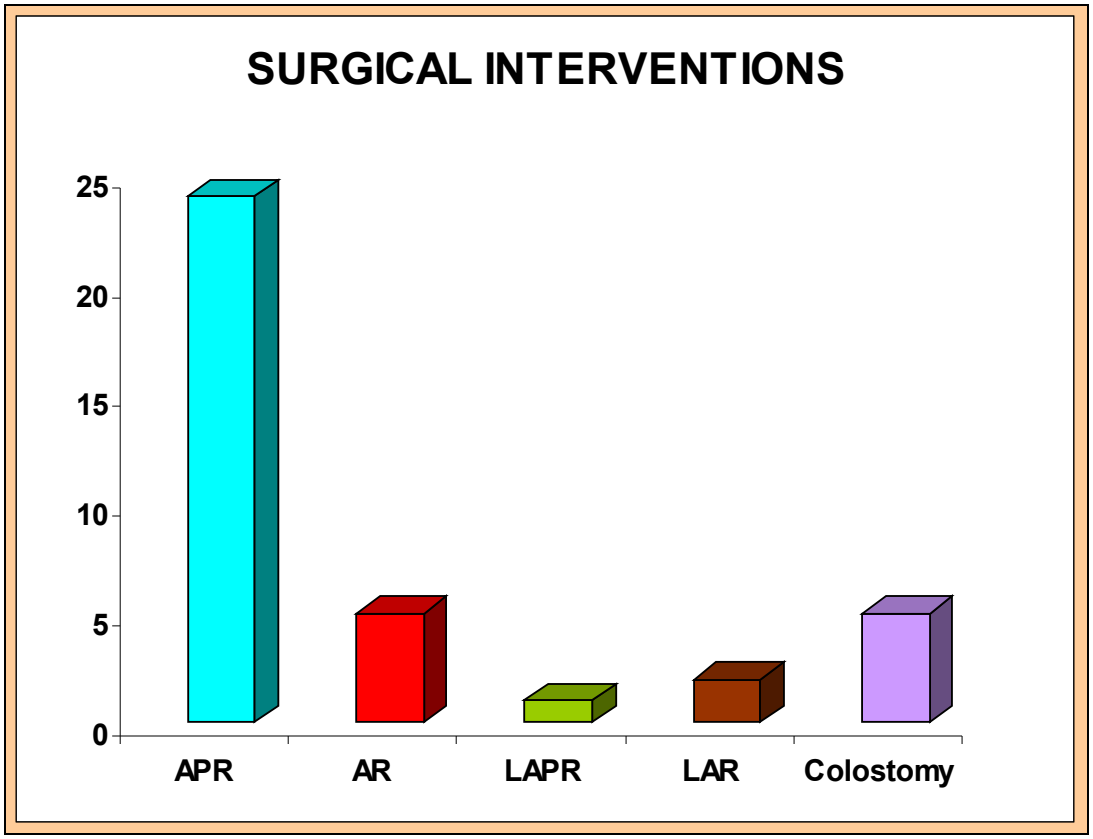
WDA - Well Differentiated Adenocarcinoma.
MDA - Moderately Differentiated Adenocarcinoma.
PDA - Poorly Differentiated Adenocarcinoma.
OTHERS - Malignant melanoma, Burkitt's lymphoma, Neuroendocrine tumor.



SURGICAL INTERVENTIONS

Surgery	No. of cases	Percentage
APR	24	64.90%
AR	5	13.50%
LAPR	1	2.70%
LAR	2	5.40%
Colostomy	5	13.50%

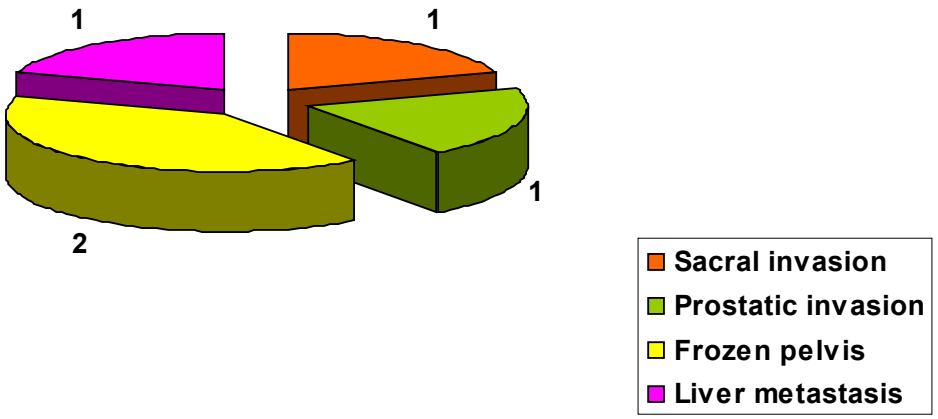
Causes	No. of cases	Percentage
Sacral invasion	1	20.00%
Prostatic invasion	1	20.00%
Frozen pelvis	2	40.00%
Liver metastasis	1	20.00%



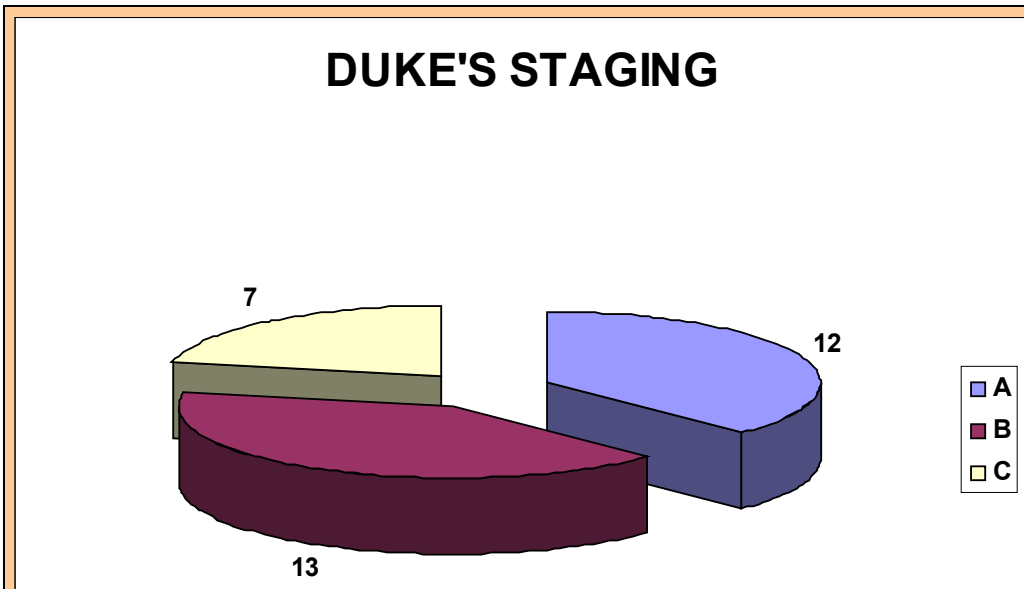
DUKE'S STAGING

Duke's Staging	No. of cases	Percentage
A	12	37.50%
B	13	40.60%
C	7	21.90%

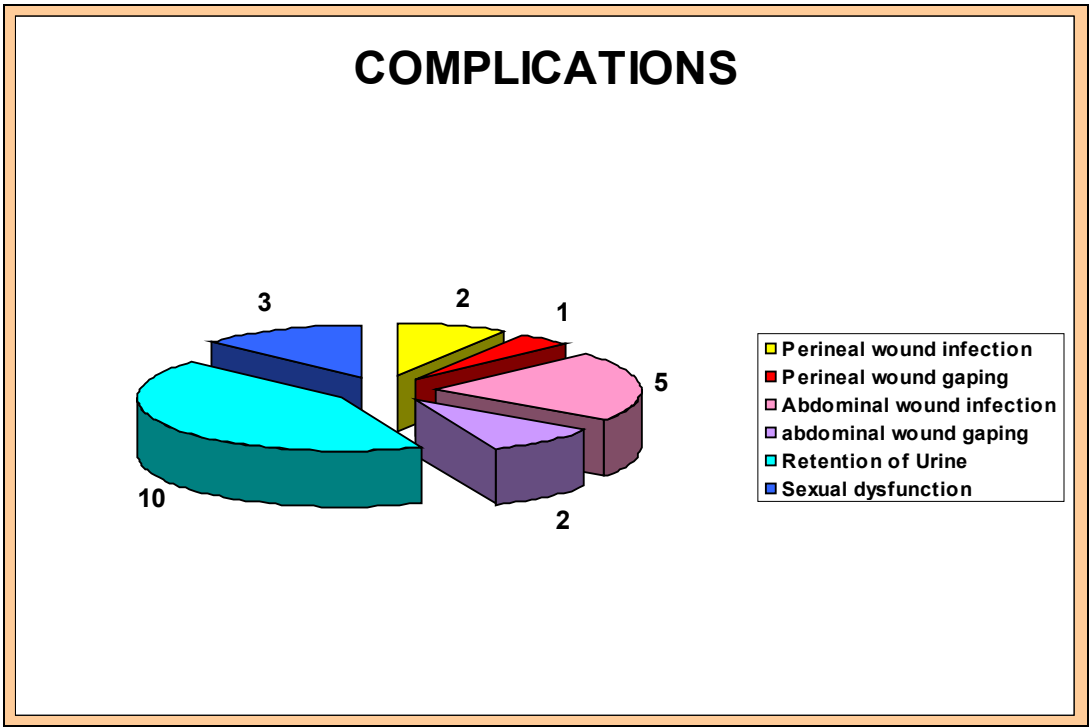
CAUSES OF INOPERABILITY



DUKE'S STAGING



Complications	No. of cases
Perineal wound infection	2
Perineal wound gaping	1
Abdominal wound infection	5
Abdominal wound gaping	2
Retention of Urine	10
Sexual dysfunction	3



DISCUSSION

37 patients were managed during the study period from January 2004 to February 2006. There were 23 males (62%) and 14 females (38%). **Gilliland** *et al* reported the incidence of males in 54% of patients and females in 46% of patients. Studies conducted at adyar cancer institute showed the sex ratio of 1.2:1. Other studies showed variation from 1.1:1 to 1.8:1. our study shows the sex ratio of 1.6:1.

The range of age is from 18 to 72 years. The peak incidence is in the seventh decade. However, more cases are found above the age of fourty years. Issac hussain et al in his study quoted increased incidence of cases between 61 to 70 years.

Elizabeth cirincione *et al* in her study reported bleeding per rectum in 56% of the cases as the main complaint with alteration of bowel habits in 28% of the cases. This study also shows that bleeding per rectum is the most common clinical presentation in about 24 cases (64.9%) and alteration of bowel habits in 15 patients (48.6%). However, pain abdomen and features of obstruction are also reported in 8 cases (21.6%) and 3 cases (6.1%) respectively.

Ulceroproliferative growth of the rectum was the most common appearance in sigmoidoscopy was present in 18 cases (48.6%), whereas annular variety was present in 12 cases (32.4%), tubular variety was present in 7 cases (19%).

Goligher *et al* in his study says that lower third of rectum is the most commom site of cancer in about 62% of cases,whereas Jarvinen et al found it to be the frequent site in 46% of the cases.In our study, the most commom site of tumor is the lower third of the rectum in about 26 cases (70.3%).

Issac Hassan *et al* reports adenocarcinoma as the most common histopathologic type in about 90% of the cases, whereas our study adenocarcinoma was the most common type in 34 cases (91.8%). However, we also had the rare varieties of histopathologic presentations like malignant melanoma, neuro-endocrine tumors and Burkitt's lymphoma. The last mentioned variety is was seen in an Immunocompromised patient(HIV-AIDS).

Curative surgery was possible in 32 cases (86.5%). Abdomino-perineal resection was done in 25cases (67.6%) where the tumor is situated in the lower third of the rectum, of which one case was done with minimal access method (LAPR). Anterior resection was done for the cases when the tumor is situated in the upper and middle third of the rectum in 7 cases (18.9%) of which 2 cases (5.4%) were done by laparoscopic method (LAR). **Turuman MJ** *et al* says that curative surgey was possible in 65.6% of the cases. Colostomy alone was done in 5 cases (13.5%). The main causes of inoperabilty were frozen pelvis, sacral invasion and prostatic invasion.

Duke's staging was done in 32 cases of which 12 cases were in stage A (37.5%), 13 cases (40.6%) were in Stage B, 7 cases (21.9%) were in stage C**. Boland CR** *et al* in his study series reported 10% of the cases in stage A, 50% in stage B and 30% in stage C.

Wound infection either in the perineum or abdomen was the most common cause of morbidity. It was present in ten cases. 2 patients required secondary suturing whereas others healed with daily dressings. Retention of urine was also a common complication. Sexual dysfunction was also present in some cases.

Corman *et al* reported the incidence of mortality of 6.7% in his study series. 2 patients died in our study period (5.4%). One patient underwent laparoscopic APR afterwhich the patient never recovered from anaesthesia and was in Intensive care unit under artificial ventilation. Patient died on the sixth post operative day. Another patient underwent APR,who was also immunocompromised, died due to septicemia.

CONCLUSION

Carcinoma of the rectum is more common in males when compared to females. The peak age of incidence is in the seventh decade with more patients also seen between the ages of 40-50 years. Bleeding per rectum is the most common type of clinical presentation followed by alteration of bowel habits. Ulcero-proliferative growth was the most common macroscopic appearance of the tumor on sigmoidoscopy followed by annular variety. Adenocarcinoma was the most common histological type with rare varieties like Malignant melanoma, Burkitt's lymphoma and Neuro-endocrine tumor should also be borne in mind. Curative surgery either in the form of abdomino-perineal resection (APR) or anterior resection (AR) was done in most cases and the patients were followed with radio-therapy or chemotherapy in the form of 5-Flurouracil in the post operative period.

The main cause of inoperability is frozen pelvis, where the growth is adherent with the adjacent structures and involvement of multiple nodes. Wound infection, either in the abdomen or in the perineum was the most common complication and should be given highest antibiotics to prevent it.

There is need to increase awareness through public education about the

malignancy and the management. Any adult with complaints of blood or mucus in the stools or alteration of bowel habits, especially over the age of 40 years, which may herald the onset of carcinoma of the rectum, should be adequately investigated with digital rectal examination and proctosigmoidoscopy as this is the only hope of making an early diagnosis.

With modern diagnostic techniques and improved therapeutic interventions, carcinoma of the rectum can be cured without morbidity and mortality.

PROFORMA

Name Age Sex I.P.No

Address

Complaints

Bleeding PR

Altered bowel habits

Mucus stools

Constipation

Spurious diarrhea

Loss of weight

Loss of weight

Abdominal pain

Fatigue

Obstipation

Personal history

Smoking

Alcoholism

Nonvegetarian

Past history

Family history

Investigations

- Hb%
- RFT
- LFT
- AXR-Erect
- CXR-PA
- ECG
- USG Abdomen and pelvis
- CT Abdomen and pelvis
- Sigmoidoscopy

Preoperative preparation

- Bowel preparation
- Antibiotics

Surgical procedure and findings

Postoperative complications

Follow up

MASTER CHART

MASTER CHART

S. No.	NAME	AGE	SEX	IP No.	SYMPTOMS					COLONOSCOPY	SITE	SURGERY	DUKE'S STAGING	HPE
					Bld PR	Alt. bowel habit	Tene	Obs	Pain abd					
1	Rahim	64	M	40289	+	+	+	-	+	Ulceroproliferative	< 8 cm	APR	A	WDA
2	Narayanan	54	M	865	-	+	+	-	-	Ulceroproliferative	< 8 cm	APR	A	WDA
3	Appasamy	65	M	10900	+	+	-	-	-	Ulceroproliferative	< 8 cm	APR	B	WDA
4	Jadiajan	65	M	10600	+	-	-	-	-	Annular	> 8 cm	AR	C	PDA
5	Kuppammal	50	F	27219	+	-	+	-	+	Tubular	< 8 cm	APR	B	MDA
6	Meera	63	F	25732	-	+	-	-	-	Ulceroproliferative	< 8 cm	APR	A	WDA
7	Lakshmi	45	F	36789	+	-	-	-	-	Tubular	< 8 cm	APR	C	MDA
8	Elumalai	60	M	34303	+	+	+	-	-	Annular	> 8 cm	AR	A	WDA
9	Manjula	25	F	36117	-	+	+	-	-	Ulceroproliferative	< 8 cm	APR	B	WDA
10	Raja	36	M	13171	+	-	-	-	+	Ulceroproliferative	< 8 cm	APR	C	MDA
11	Rathinavel	55	M	14902	+	-	-	-	-	Annular	< 8 cm	Colostomy		PDA
12	Neela	39	F	16540	+	-	-	-	-	Annular	< 8 cm	APR	A	WDA
13	Marimuthu	48	M	8150	-	+	+	-	-	Ulceroproliferative	< 8 cm	APR	C	MDA
14	Saroja	50	F	20738	+	+	-	-	-	Ulceroproliferative	> 8 cm	LAR	B	WDA
15	Maheswari	25	F	7925	+	-	-	-	-	Tubular	< 8 cm	APR	A	WDA
16	Marimuthu	47	M	15595	-	-	+	-	+	Ulceroproliferative	< 8 cm	APR	B	WDA
17	Babu	24	M	44494	+	-	-	-	-	Annular	> 8 cm	LAR	B	MDA
18	Thiruvengadam	54	M	26548	+	+	+	-	-	Ulceroproliferative	< 8 cm	APR	A	MDA
19	Babu	41	M	29003	-	-	-	-	-	Annular	< 8 cm	APR	C	BL
20	Kousalya	71	F	27589	-	+	-	-	-	Tubular	< 8 cm	APR	B	WDA
21	Chinnappan	72	M	31514	+	-	+	-	+	Ulceroproliferative	> 8 cm	AR	A	MDA
22	Kumaravel	51	M	40830	+	-	-	-	-	Annular	> 8 cm	AR	B	MDA
23	Raju	19	M	16329	+	-	-	+	-	Annular	< 8 cm	Colostomy		MDA
24	Rathinum	58	M	27571	+	+	+	-	-	Ulceroproliferative	< 8 cm	APR	B	WDA
25	Sukumaran	62	M	23242	-	-	-	-	-	Ulceroproliferative	> 8 cm	APR	A	WDA

S. No.	NAME	AGE	SEX	IP No.	SYMPTOMS					COLONOSCOPY	SITE	SURGERY
					Bld PR	Alt. bowel habit	Tene	Obs	Pain abd			
26	Marimuthu	61	M	26412	+	+	-	-	+	Ulceroproliferative	< 8 cm	LAPR
27	Venkatesan	61	M	26451	+	-	+	-	-	Tubular	< 8 cm	APR
28	Ramalingam	56	M	22821	+	-	-	-	-	Ulceroproliferative	> 8 cm	APR
29	Arivu	33	M	25168	-	+	+	-	+	Annular	< 8 cm	APR
30	Sundaresan	60	M	27820	+	+	+	+	-	Tubular	< 8 cm	Colostomy
31	Annammal	40	F	36897	+	-	-	-	-	Ulceroproliferative	> 8 cm	AR
32	Kanimozhi	18	F	32343	-	+	-	+	-	Annular	< 8 cm	Colostomy
33	Ramalingam	58	M	4670	-	+	-	-	-	Ulceroproliferative	< 8 cm	APR
34	Sundarammal	62	F	22460	+	+	-	-	-	Tubular	< 8 cm	APR
35	Somasundaram	63	M	17781	-	+	+	-	+	Ulceroproliferative	> 8 cm	APR
36	Subramani	61	M	23618	+	-	-	-	-	Annular	< 8 cm	Colostomy
37	Pattammal	63	F	36189	-	-	-	-	-	Annular	< 8 cm	APR

APR - Abdomino-Perineal Resection.
AR - Anterior Resection.
LAR - Laproscopic Anterior Resection.
LAPR - Laproscopic Abdomino-Perineal Resection.
< 8 cm - Lower one-third.
> 8 cm - Upper & Middle-third.

WDA - Well Differentiated Adenocarcinoma.
MDA - Moderately Differentiated Adenocarcinoma.
PDA - Poorly Differentiated Adenocarcinoma.
MM - Malignant Melanoma.
NET - Neuro Endocrine Tumor.
BL - Burkitt's Lymphoma.

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