LAPAROSCOPIC MANAGEMENT OF RECTAL CANCER

Essay

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Ahmed Aboarrosh

List of contents

List of tables

List of figures

List of figures (continues)

List of figures (continues)

List of abbreviations

Abb.	Full term

ACR.....American College of Radiology

ACS.....American cancer society

AICR.....American Institute for Cancer Research

AJCC.....American Joint Committee on Cancer

APC.....Adenomatous polyposis coli gene

APR.....Abdominoperineal resection

ASA.....American Society of Anesthesiologists

BMI.....Body mass index

CAP.....College of American Pathologists

CEA.....Carcinoembryonic antigen

CIA.....Common iliac artery

CIN.....Chromosomal instability

CRC.....Colorectal cancer

CRM.....Circumferential resection margin

CRT.....Chemoradiotherapy

CT.....Computed Tomography

CTC.....Computed Tomographic colonography

DCBE.....Double contrast barium enema

DRE.....Digital rectal examination

EGFR.....Endothelial (epidermal) growth factor receptor

ERUS.....Endorectal ultrasound

FAP.....Familial adenomatous polyposis

FDG.....Fluoro-deoxy-glucose

FIT.....Fecal Immunochemical Test

FOBT.....Fecal Occult Blood Test

HNPCC.....Hereditary Non-Polyposis Colorectal Cancer

List of abbreviations (continue)

Abb.	Full term

IBD.....Inflammatory bowel disease

IMA.....Inferior mesenteric artery

IMV.....Inferior mesenteric vein

ISR.....Intersphincteric resection

LAR.....Low anterior resection

LN.....Lymph node

LOH.....Loss of heterozygosity

MAC.....Modified Astler-Coller classification

MBP.....Mechanical bowel preparation

MMR.....Mismatch repair genes

MRF.....Mesorectal fascia

MRI.....Magnetic resonance imaging

MSI.....Microsatellite instability

NCCN.....National Comprehensive Cancer Network

NPO.....Nil per os, Latin for "nothing by mouth"

PET.....Positron emission tomography

QOL.....Quality of life

SSI.....Surgical site infection

TGFβ.....Tumor growth factor beta

TGFβRII.....Transforming growth factor beta receptor type II

TME.....Total mesorectal excision

TNM.....Tumor-Node-Metastasis

VEGF.....Vascular endothelial growth factor

WCRF.....World Cancer Research Fund

WHO.....World Health Organization

5-FU.....5-Fluorouracil

Introduction

Worldwide, colorectal cancer (CRC) is the 4th most common cancer in males and the 2nd most common in females. Rectal cancer accounts for one third of all CRCs and in the USA 41,420 new rectal cancer cases were estimated in 2007 according to the American cancer society (ACS) **(Jemal et al. 2007).**

In Egypt CRC is the 6th most common cancer in males and the 5th most common in females, with a relative frequency of 10-12% of gastrointestinal tumors where rectal cancer represents 51% of CRC cases according to the National Cancer Institution in Egypt **(Mokhtar 2004).**

The history of modern rectal cancer resection dates back to 1884, when Czerny described the first abdominoperineal resection (APR). In 1908, Miles improved the APR. He emphasized the importance of performing a wide perineal excision including removal of the pelvic contents of the rectum, the abdominal attachments of the rectum with a high arterial ligation, and the iliac lymph nodes (LNs). During the last two decades, William Heald popularized the total mesorectal excision (TME) technique **(Dalal and Bleday 2007).**

Treatment and surgical techniques for rectal cancer patients have rapidly changed over the last two decades in order to improve the therapeutic outcome. Many strategies have been introduced including radiotherapy, chemotherapy, and TME. In addition

function-preserving techniques have also been developed to preserve anal function by performing low anterior resection (LAR) instead of APR .This is supported by the development of auto sutures and double stapling techniques. Attempts were made to preserve urinary and sexual functions by changing radical LNs dissection to less invasive surgery in order to spare the autonomic nerves **(Nesbakken et al. 2000).**

The primary aims of rectal cancer surgery are to achieve oncological clearance of the tumor, to minimize local recurrence and to prolong survival. Accurate preoperative staging and precise surgical technique using the principles of TME are instrumental in achieving this goal. Postoperative urinary and sexual dysfunction resulting from damage to the pelvic hypogastric and splanchnic nerves are recognized complications of rectal resection **(Jayne et al. 2005).**

Recently, laparoscopic surgery in various gastrointestinal diseases including rectal cancer is increasingly popular because it can provides less pain, shorter hospital stay, faster postoperative recovery, and better cosmetic appearance compared to open surgery **(Strohlein et al. 2008).**

Laparoscopic rectal resection is considerably more difficult than colon resection, due to the narrow confines of the bony pelvis, and the need to identify retroperitoneal structures such as the nerves that control sexual and bladder function **(Weiser and Milsom 2000).**

Laparotomy and TME, is currently the accepted standard of care for middle and low rectal cancers. This technique has consistently been associated with low recurrence and optimal survival. Nevertheless laparoscopic resection of rectal cancer must show equivalent results with open surgery in order to become an accepted surgical modality for rectal cancer **(Law and Chu 2002).**

Laparoscopic surgery for rectal cancer is yet a complicated operation requiring highly skilled surgeons and sophisticated instruments **(Bianchi et al. 2007)**, and its oncological outcomes remain questionable **(Miyajima et al. 2009).** It is currently an active field of research.

Aim of the essay

The aim of this essay is to evaluate the role of laparoscopic surgery in rectal carcinoma and demonstrate the advantages and disadvantages in comparison with the open technique.

Surgical anatomy of the rectum

Location and description

The rectum is approximately 5 inches long and begins in front of the 3rd sacral vertebra as a continuation of the sigmoid colon. It passes downward, following the curve of the sacrum and coccyx, and ends in front of the tip of the coccyx by piercing the pelvic diaphragm and continuous with the anal canal **(Snell 2007).**

The first 4 cm from the anal verge comprise the anal canal; the next three 4 cm sections make up the lower, middle, and upper thirds of the rectum. These dimensions are approximately correct when the rectum is either stretched from above or lifted with a rigid proctoscope. If the rectum is collapsed into the sacral hollow, however, these lengths are exaggerated, and 3 cm each would be a better estimate of the lower, middle, and upper thirds (Fig. 1) **(Staley and Wood 2010).**

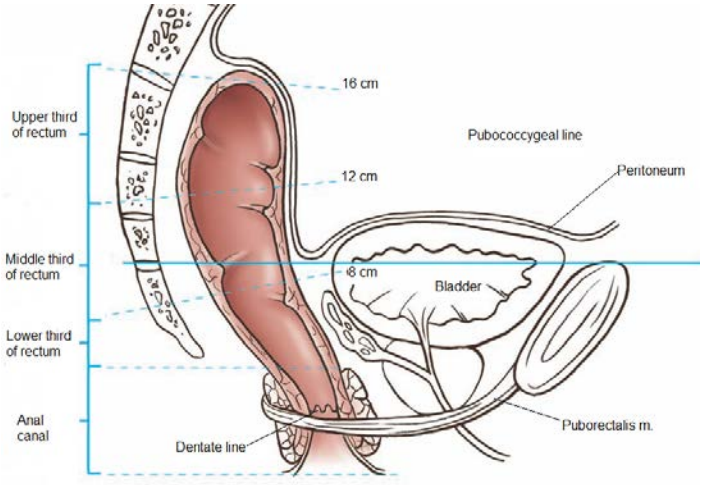

Fig. 1. Location and description of the rectum (Staley and Wood 2010)

The junction between the sigmoid colon and the rectum is at : A point opposite the left sacroiliac joint, Level of the 3rd sacral vertebra, Level at which the sigmoid mesentery disappears, Level at which sacculations and epiploic appendages disappear and taeniae broaden to form a complete muscle layer (long transition), Level at which the superior rectal artery divides into right and left branches, Construction with anterior angulation (proctoscopy), Level of superior rectal fold (inconstant) (**Skandalakis et al. 2004).**

The rectum possesses three involutions or curves known as the valves of Houston. They are lost after full surgical mobilization of the rectum, a maneuver that may provide about 5 cm of additional length to the rectum, greatly facilitating the surgeon's ability to fashion an anastomosis deep in the pelvis **(Fry et al. 2008).**

Pararectal fascia

The endopelvic fascia is a thick layer of parietal peritoneum that lines the walls and floor of the pelvis. The portion that is closely applied to the periosteum of the anterior sacrum is the presacral fascia. The fascia propria of the rectum is a thin condensation of the endopelvic fascia that forms an envelope around the mesorectum and continues distally to help form the lateral rectal stalks. The lateral rectal stalks or ligaments are actually anterolateral structures containing the middle rectal artery. The stalks reside in close proximity to the mixed autonomic nerves (containing both sympathic and parasympathetic nerves) (Fig. 2) **(Fry et al. 2008).**