Recent Modalities in Surgical Management of Colon Cancer

An essay
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By

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Ayman Rabie Hassan Ibrahim Etman

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List of Abbreviations

AAA	:	Abdominal aortic aneurysms
AP-1	:	Protein activator 1
CLS	:	Conventional laparoscopic surgery
CME	:	Complete mesocolic excision
COX-2	:	Cyclooxygenase 2
CRP	:	C-reactive protein
CRS	:	Cytoreductive surgery
CT	:	Computed tomography
CVL	:	Central vascular ligation
DCBE	:	Double contrast barium enema
DNA	:	Deoxyribonucleic acid
EGFR	:	Epidermal growth Factor
ERAS	:	Enhanced recovery after surgery
FAP	:	Familial adenomatous polyposis
HALS	:	Hand-assisted laparoscopic surgery
HIPEC	:	Hyperthermic intraperitoneal chemo-therapy
HNPCC	:	Hereditary non-polyposis colorectal cancer
ICG	:	Indocyanine green
IMA	:	Inferior Mesenteric Artery
JPS	:	Juvenile polyposis syndrome
LLQ	:	Left lower quadrant
LMWH	:	Low Molecular Weight heparin
MCL	:	Mid-clavicular line
MRI	:	Magnetic resonance imaging
NIRF	:	Near-infrared fluorescence camera system
NOSE	:	Natural orifice specimen extraction
PET	:	Positron Emission Tomography

List of Abbreviations (Cont.)

PJS	:	Peutz-Jeghers syndrome
POSSUM	:	Physical and Operative Severity Score for the Mortality and Morbidity
RBC	:	Red-blood-cell
RLQ	:	Right lower quadrant
RUQ	:	Right upper quadrant
SEMS	:	Self-expandable metal stents
SFM	:	Splenic flexure mobilization
SILC	:	Single incision laparoscopic colectomy
SILS	:	Single Incision Laparoscopic Surgery
SMA	:	Superior Mesenteric Artery
SMV	:	Superior Mesenteric Vein
SUL	:	Spinoumbilical line
TME	:	Total mesorectal excision
WCC	:	White cell count

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Introduction

Colon cancer is the third most common type of cancer worldwide and a leading cause of cancer death. It is estimated that over 73, 000 men and 70, 000 women will be diagnosed with colon cancer annually, and that nearly 52, 000 people died of colon cancer in 2012. Unfortunately, up to 50% of colon cancer patients will be diagnosed with hepatic metastases at any time in their disease course, and between 15% and 25% have liver metastases at the time of diagnosis **(McKeown et al., 2014).**

Colon cancer results from the progressive accumulation of genetic and epigenetic alterations that lead to the transformation of normal colonic epithelium to colon adenocarcinoma **(Elrasheid et al., 2013).**

Clinical manifestations of Colon cancer depend on the location of the lesion. Both right and left colon lesions occasionally cause hematochezia, but more often bleeding is occult, causing anemia and fatigue. Up to 30% of patients with colonic carcinoma are primarily diagnosed in an acute stage with sub/obstructing symptoms **(Kolfschoten et al., 2012).**

Appropriate diagnosis and staging are crucial to ensure a correct treatment strategy. In the last 10 years the mortality rate of Colon cancer has decreased by more than 20% due to the rising developments in diagnostic techniques and optimization of surgical, adjuvant and also palliative therapies **(Kekelidze et al., 2013).**

The most used modalities for staging of Colon cancer are chest/abdomen/pelvis CT and magnetic resonance imaging (MRI). Also a complete colonoscopy up to the cecum, coupled with biopsy for histopathological examination, is considered the gold standard to diagnose colonic lesions, in view of its high diagnostic performance. This procedure allows the tumor localization and possibly the endoscopic excision of polyps, so simultaneously representing a diagnostic and a therapeutic opportunity **(Barret et al., 2013).**

Colonic cancer are classified according to the TNM system, local invasion depth (T stage), lymph node involvement (N stage) and presence of distant metastases (M stage). These stages are combined into an overall stage definition, which provides the basis for therapeutic decisions **(Edge et al., 2010).**

Colon cancer management continues to evolve with significant advances in chemotherapy, surgical technique and palliative interventions. These advances may be attributed to a better understanding of the disease genetics, improved surveillance and technical advances in the operations, increasing indications for the use neo adjuvant and adjuvant chemotherapy, and better palliation **(Chokshi et al., 2009).**

Primary colon cancers without systemic disease are treated mainly by surgery with complete mesocolic excision (CME) with arteries and veins ligated as close as possible to the main vascular trunk to have lower local recurrence rate and improved survival. Colonic segmental resection is

performed according to the site of the tumor; right hemicolectomy transverse colectomy, left hemicolectomy or total colectomy are the most common surgical procedures and it is always indicated in absence of metastases **(Sehgal et al., 2014).**

In the emergency setting, when presenting symptoms of obstruction, perforation and bleeding, segmental colectomy for resection of the tumour, with or without fecal diversion is indicated. In presence of unresectable metastatic lesions or as initially palliation of obstructing Colonic cancer, the use of self-expandable metal stents (SEMS) is gaining wide acceptance, also to allow a quick start of neo adjuvant chemotherapy or chemo-radiation. The colonic stent insertion effectively decompresses the obstructed colon and surgery can be performed electively at a later stage **(Fuccio et al., 2014).**

Conventional laparoscopic surgery (CLS) with CME, is today considered a safe technique and spread all over the world, single-incision laparoscopic surgery (SILS) appears to offer cosmetic advantages over CLS, with no compromise of surgical morbidity, oncological appropriateness or increased cost **(Yang et al., 2013).**

Laparoscopic and robotic surgery for colon surgery have the same advantages in terms of faster recovery, but robotic-assisted colectomy significantly increases the costs of care without providing clear reductions in overall morbidity or length of stay, so a critical appraisal of the benefits offered

in comparison with the resources consumed is undergoing **(Baek et al., 2013).**

As operative and non-operative therapies have evolved and improved, the management of colon cancer has become multidisciplinary and more complex, particularly in the face of advanced disease. The role of surgery in the management of advanced colon cancer continues to evolve as the efficacy of chemotherapy in decreasing tumor burden increases, thereby increasing the susceptibility of the tumor to resection. Despite these gains, the overall impact of combination regimens in metastatic therapy has been relatively modest with improved two-year survivals and no substantive gains in five-year survivals **(Kanthan et al., 2012).**

Aim of the work

To review the recent modalities in surgical management of multi focal colon cancer.

Chapter One
Anatomy

Anatomy of the colon:

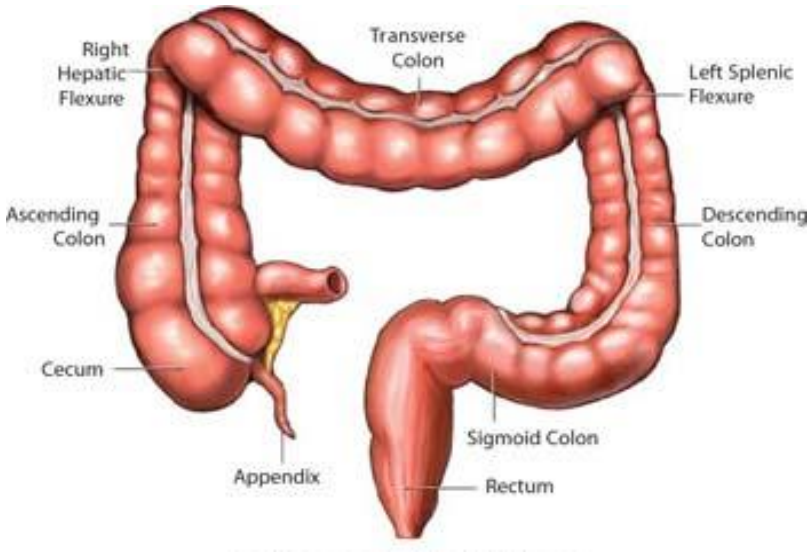

Fig (1): Anatomy of the Colon **(Beck et al., 2011)**

Ascending Colon:

The ascending colon is approximately 15 cm long. It ascends, from the level of the ileocecal junction to the right colic or hepatic flexure. It lies lateral to the psoas muscle and anterior to the iliacus, the quadratus lumborum, and the lower pole of the right kidney. The ascending colon is covered with peritoneum anteriorly and on both sides. In addition, fragile adhesions between the right abdominal wall and its anterior aspect, known as Jackson's membrane, may be present. The posterior surface of ascending colon is not covered with peritoneum, which is instead replaced by an areolar tissue (fascia of Toldt). In the lateral peritoneal