Current Role of Laparoscopy in Management of Pelvi-abdominal Malignancies

An Essay

Submitted For fulfillment Of Master Degree In

Surgical Oncology

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2010

Acknowledgement

To my professors Dr. Sherif, Dr. Ahmed and Dr. Abd El Hamid who helped me so much and to my wife that without her I couldn't do this work I'm saying to them all …… thanks

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List of abbreviations

ACS	The American college of surgeon
BMI	Body mass index
CLASICC	The Conventional Versus Laparoscopic-Assisted Surgery in Colorectal Cancer trial
COLOR	The Colon carcinoma Laparoscopic or open Resection trial
COST	Clinical outcomes of Surgical Therapy
EBL	Estimated blood loss
EMR	Endoscopic mucosal resection
E-NOTES	Embryonic natural orifice transluminal endoscopic surgery
EOC	Early ovarian cancers
FIGO	Federation of Obstetrics and Gynecology
GJ	Gastrojugenostomy
GOG	The Gynecologic Oncology Group
HALRC	Hand-assisted laparoscopic radical cystectomy
HALS	Hand-assisted laparoscopic surgery
HCC	Hepatocellular carcinoma
LADG	Laparoscopic assisted distal gastrectomy
LARVH	Laparoscopic assisted radical vaginal hysterectomy
LAVH	Laparoscopic assisted vaginal hysterectomy
LESS	Laparo-endoscopic single-site surgery
LLR	Laparoscopic liver resection
LRC	Laparoscopic radical cystectomy
LRN	Laparoscopic radical nephrectomy
LTME	Laparoscopictotal mesorectal excision

LUS	Laparoscopic ultrasound
MA-NOS	Minimally assisted natural orifice surgery
MDE	Modified Devine (gastrojugenostomy)
NOTES	Natural orifice transluminal endoscopic surgery
OPN	Open partial nephrectomy
ORC	Open radical cystectomy
OTME	Opentotal mesorectal excision
PD	Pancreaticoduodenectomy
PSVT	Portal or splenic vein thrombosis
QOL	The quality of life
RAG	Robotic assisted gastrectomy
RAH	Radical abdominal hysterectomy
RALRH	Robot assisted laparoscopic radical hysterectomy
RARC	Robotic assisted radical cystectomy
RCC	Renal cell carcinoma
RFA	Radiofrequency ablation
RPN	Robotic partial nephrectomy
SILS	Single-incision laparoscopic surgery
SN	The sentinel node
SPA	Single-port access
TLRH	Total laparoscopic radical hysterectomy
TME	Total mesorectal excision
TST	Triangulating stapling technique

Aim of the work

The aim of this work is to provide highlights on the current value of laparoscopy in diagnosis, staging and treatment of pelvi-abdominal malignancy with special emphasis on gastrointestinal, urinary, gynecological and other pelvi-abdominal malignancies.

Introduction

Laparoscopy has become a widely accepted technical platform in nearly all areas of surgery since its introduction with laparoscopic cholecystectomy in the late 1980s. The laparoscopic approach is now commonly used in colorectal, gastrointestinal, solid organ and obesity surgery and is preferred by surgeons and patients. (1)

The laparoscopic era has been rapidly advancing, with continuous effort toward expanding the scope of procedures as well as enhancing cosmesis with even smaller incisions (needlescopic, 2–3 mm) in attempts to further reduce perioperative pain and analgesic requirements while maintaining similar outcomes for patients undergoing these procedures. (2)

When compared with traditional open procedures, an additional benefit of laparoscopy is the decreased immunologic insult. In fact, the physiologic stress response has been shown by several investigators to be lower in patients undergoing laparoscopic versus open abdominal surgery for many procedures including cholecystectomy, colon resection, gastric resection, hysterectomy, and fundoplication. This decreased stress is a key component in the trend toward decreased morbidity with laparoscopy versus conventional open techniques regardless of the specific procedure.(3)

Surgical extirpation of malignancy remains the only hope for cure and the best means of palliation for many forms of cancer, laparoscopy offers several important advantages to the cancer patient needing surgery: less bleeding, less trauma, less risk of incisional hernias, wound adhesions, and postoperative infection, and quicker& less painful recovery. Even for patients with large abdominal tumors, laparoscopic surgery may still be appropriate and superior to open surgery. (4)

Laparoscopy is used today as a diagnostic and staging tool; to sample tissue and search for metastases, to provide palliative care (e.g., to create a bypass in patients with unresectable disease) and alleviate symptoms (e.g., in patients with bowel obstructions); and to remove masses and perform other surgical interventions with curative intent. (5)

The implementation of these techniques for oncologic indications in surgical practice has progressed at a much slower pace, however. In general, the surgical community has been hesitant to use minimally invasive techniques as part of cancer treatments, because of concerns that a minimally invasive surgical approach will compromise the oncologic principles of the treatment as the adequacy of resection of the primary tumor, the ability to perform a similar extent of lymphadenectomy to an open case. (5)

Although it is established that diagnostic laparoscopy is beneficial in improving diagnosis and patient outcomes in certain malignancies, there are only a handful of examples where the minimally invasive surgical treatment of cancer has been accepted widely. Colon cancer is the most notable, with several large, prospective, multicenter randomized control trials demonstrating similar oncologic outcomes with its corresponding open surgical treatment. (5)

Current role of laparoscopy in management of gastrointestinal malignancies

Stomach

Carcinoma of the stomach was the leading cause of cancer related death worldwide through most of the 20th century. It now ranks second only to lung cancer, and an estimated 875,000 new cases are diagnosed annually worldwide, it is estimated that 22,700 new cases are diagnosed annually in the United States, with approximately 11,800 deaths per year. The prognosis for this disease remains poor and the only proven, potentially curative treatment for gastric cancer is surgical resection of all gross and microscopic disease. (6)

Kitano et al first described laparoscopic surgery for gastric cancer in 1994; its safety and feasibility have been increasingly demonstrated. In several series, it had resulted in less postoperative pain, faster recovery, shorter hospital stay, and better quality of life, compared with the open surgery. (7)

The Eastern experience with laparoscopic gastrectomy has been extensive, associated with the increased incidence of early gastric cancers. In 1992, Ohgami reported the first laparoscopic wedge resection (LWR) for the treatment of early gastric cancer, followed shortly after by the first laparoscopic-assisted distal gastrectomy for adenocarcinomas in 1994 and the first laparoscopic-assisted total gastrectomy with a D2 lymphadenectomy for gastric adenocarcinomas, reported in 1999.In 1996, Azagraand his colleagues reported the first laparoscopic total gastrectomy for cancer. (8)

Recently, randomized controlled trials have shown the technical feasibility of laparoscopic gastrectomy and perigastric lymph node dissection for early gastric cancer. These studies noted very low surgical mortality and morbidity,

improvement of postoperative quality of life, and long-term survival rates comparable to those obtained with open surgery. (9)

Even in elderly patients a multicenter study was done by G.S.Cho and his colleagues (2009) concluded that, Laparoscopic subtotal gastrectomy is a safe treatment for elderly patients with gastric cancer, even though they have higher rates of preoperative co-morbidity. (10)

Occasionally laparoscopy can be used now to diagnose stage and treat or even to palliate gastric cancer; staging laparoscopy can range from simply inspecting the liver and peritoneum to extensive dissection which may include lesser sac exploration and the use of laparoscopic ultrasound (LUS). (11)

Laparoscopic ultrasound (LUS) defines the depth of tumor penetration, nodal involvement, occult liver metastasis, retroperitoneal metastases, small tumors, invasion of adjacent layers, and precise tumor location. During laparoscopy, the surgeon cannot rely on tactile senses and should; therefore, using laparoscopic ultrasound facilitates the diagnostic procedure. Also In females, the pelvis must be inspected for a Krukenberg tumor. (11)

In Japan, screening with laparoscopic ultrasound enables accurate diagnosis and staging of early gastric cancers in 20% of the patients. These neoplasms could be managed by either endoscopic mucosal resection (EMR) or laparoscopic gastrectomy without extended lymph node dissection. If occult metastasis is identified at staging laparoscopy, laparoscopic bypass can be performed for symptomatic patients. (12)

Laparoscopic treatment of gastric cancer had been established from early even to late stages of gastric cancer. Pioneers in laparoscopic gastric surgery have demonstrated various advantages and the oncologic safety of the procedure.

Laparoscopic assisted distal gastrectomy (LADG) patients have less intraoperative blood loss and shorter intervals until walking, oral intake, and flatus. (LADG) patients also had a shorter hospital stay, postoperative fever, and pain. In response to these results, many gastric surgeons have recently become interested in the introduction of (LADG) into their hospital as a standard surgical procedure for early gastric cancers. (13)

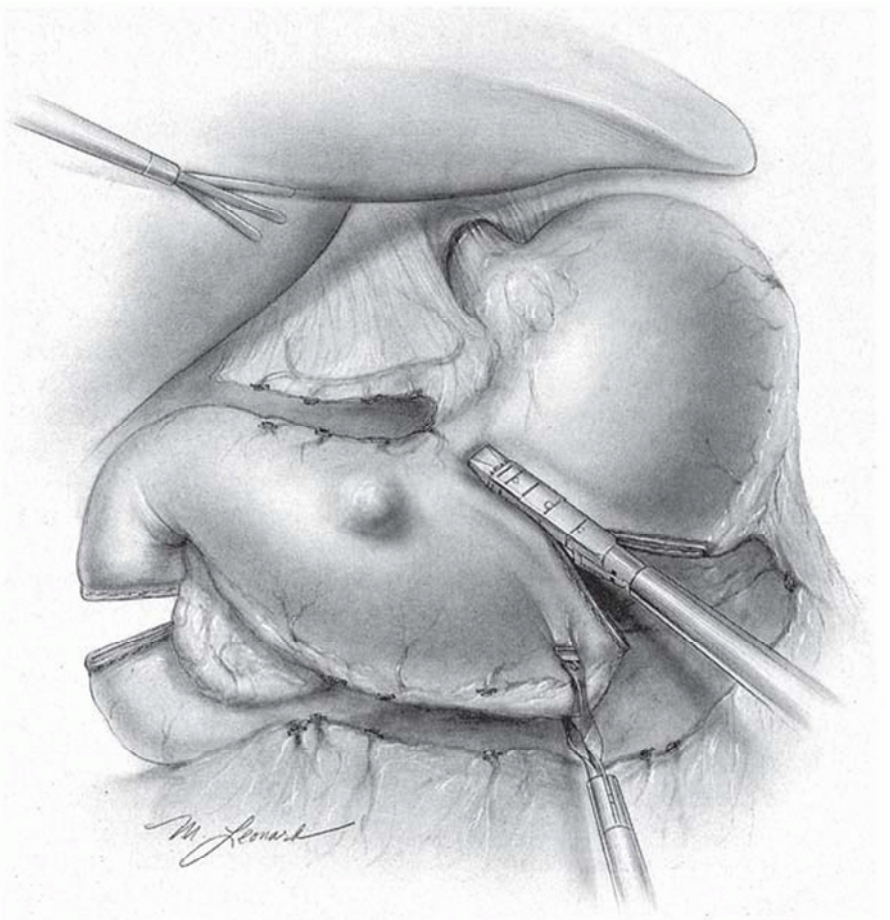

Fig.1: Distal gastrectomy using a linear endoscopic stapler.

Laparoscopic assisted distal gastrectomy is done now with many techniques either hand assisted technique or totally laparoscopic (14), either done with

extracorporeal circular-stapled Billroth-I anastomosis which is difficult in obese patients as it requires the duodenal stump to be lifted outside of the incision or intracorporeal Billroth-I reconstruction by a ‘‘triangulating stapling technique’’ (TST) that uses laparoscopic linear stapling devices. (15) Or intracorporeal anastomosis using a circular stapler in a good visual field by implementing an abdominal wall lifting method using a retractor. (16)

Also laparoscopic Billroth-II gastrectomy is also being done. The first reported laparoscopic Billroth-II gastrectomy for gastric cancer was in the year 1996 from Spain. The disadvantages of total laparoscopic Billroth-II gastrectomy are that it is time consuming, technique dependent and more expensive; but it is still feasible, safe and that it provides an oncologic resection similar to that of open resection. Its major benefits are avoidance of major incisions in the patients, decreased blood loss, rapid recovery, and earlier hospital discharge. (17)

Short term results of laparoscopic gastrectomy could be concluded by a meta-analysis done by Xin-Zu Chen and his colleagues (2009) on 6 randomized controlled trials of 629 (LADG) of early gastric cancer patients , demonstrated that laparoscopic surgery can induce better early recovery. Decreased intraoperative blood loss, the time to oral intake and hospital stay were shortened of only approximately 1/2 and 2 days, respectively. The postoperative early morbidity of (LADG) might be decreased, but the mortality was not significantly increased.(18)

Huscher and his colleagues, from Italy reported long term results of laparoscopic gastrectomy through a prospective randomized trial, reporting on 5-year clinical outcomes of laparoscopic-assisted subtotal gastrectomy compared with open subtotal gastrectomy for stage-matched adenocarcinomas, and demonstrated both safety and feasibility of the laparoscopic approach. (19)

Also Michitaka and his colleagues, (2007) in a single institution study of 94 patients underwent (LADG) and followed up for 5 years demonstrateda5-year recurrence-free survival of 95.6% and an overall 5-year survival of 90%. (20)

Palliative procedures in advanced gastric cancers could also are performed, as in cases of pyloric obstruction by an unresectable gastric cancer or duodenal obstruction by local invasion of advanced unresectable gastric tumor. This is being done by laparoscopic gastrojugenostomy (GJ) either through the standard (loop GJ) technique or by the modified Devine (MDE) technique, which is done through complete division of the stomach to exclude the antrum and roux-en-y gastrojugenostomy, this is to guard against delayed gastric emptying and retrograde reflux of jugenal contents into the stomach which may lead to deterioration of patient condition. (21)

The most common and serious complication in laparoscopic gastric surgery is vascular injury resulting in bleeding or organ ischemia. The potential risk factors of surgical morbidity and mortality after laparoscopic gastric cancer surgery were: age, extent of lymph node dissection, combined resection, Billroth II reconstruction, operation time, and obesity. Radical lymph node dissection is also considered an important risk factor for complications after laparoscopic gastric surgery. (22)

Kitano and his colleagues,(23) conducted a large multicenter retrospective study in Japan and reported laparoscopic gastrectomy morbidity and mortality figures of 14.8% and 0%, respectively. Kim and his colleagues,(24) reported similar results of 18.6% and 0.7%, respectively. Kim and his colleagues detailed the causes of intraoperative bleeding during laparoscopic gastrectomy where most common causes were ultrasonic dissectors (46.1%),electrocautery induced damage (20.1%), manipulations of dissectors, graspers, and clips. (25)