ROLE OF LAPAROSCOPY IN ASCITES

DR. HUSSAIN AOUDA; MBCHB, CABS, MRCS, D.MAS
CONSULTANTANT GENERAL SURGERY AND LAPAROSCOPIC SURGEON
HILLA TEACHING GENERAL HOSPITAL, BABYLON, IRAQ
MEMBER OF WORLD ASSOCIATION OF LAPAROSCOPIC SURGEONS

Prof. Dr. R. K. Mishra; M.MAS; MRCS.
SENIOR CONSULTANT LAPAROSCOPIC SURGEON
DIRECTOR, LAPAROSCOPY HOSPITAL, NEW DELHI
MEMBER WORLD ASSOCIATION OF LAPAROSCOPIC SURGEON (WALS)
MEMBER INDIAN ASSOCIATION OF GASTROINTESTINAL ENDOSURGEONS (IAGES)
MEMBER SOCIETY OF AMERICAN GASTROINTESTINAL AND ENDOSCOPIC SURGEONS (SAGES)

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ABSTRACT

Laparoscopy has a valuable roles in diagnosis, preoperative assessment, and therapy of ascites.It was used in diagnosis and to confirm the diagnosis in ascites of unknown origin which could be cirrhotic or non cirrhotic as carcinoma peritoneie, tuberculous peritonitis or nephrogenic origin. It is also used in preoperative assessment and staging of gastric, pancreatic and liver tumour.Thrapeutic roles was also discussed as in hemorrhagic pancreatitis, chylous ascitis and catheter placement for dialysis. Precautions and operative procedures also discussed.

AIM

The aim of this study was to clarify the role of laparoscopy in ascites and its extension other than the diagnostic laparoscopy for pre operative assessment and staging as in staging laparoscopy in patients with locally advanced gastric cancer', pancreatic cancer, and to discuss the procedure of the new therapeutic manoeuvres to patients with cirrhotic, malignant, chylous ,and nephrogenic ascites.

MATERIALS AND METHODS

A literature search was performed using search engine Google & Online Springer Library facility available at Laparoscopy Hospital. The following search terms were used:

Ascites; malignant ascites, roles of laparoscopy in ascites,tuberculous ascites 'diagnostic laparoscopy, Selected papers were screened for further references, operative procedure were

selected only if they are universally accepted procedures and the Institution where the study was done is specialized institution for laparoscopic surgery.

INTRODUCTION

DEFINITION

Ascites is the accumulation of protein-containing (ascitic) fluid in the abdominal cavity. Ascites tends to occur in long-standing (chronic) rather than in short-lived (acute) disorders. It occurs most commonly in cirrhosis (severe scarring of the liver), especially in cirrhosis caused by alcoholism or viral hepatitis. It may occur in other liver disorders, such as severe alcoholic hepatitis without cirrhosis, chronic hepatitis, and obstruction of the hepatic vein (Budd-Chiari syndrome). Ascites can also occur in disorders unrelated to the liver, such as cancer, heart failure, kidney failure, inflammation of the pancreas (pancreatitis), and tuberculosis affecting the lining of the abdominal cavity.In people with a liver disorder, ascitic fluid leaks from the surface of the liver and intestine. A combination of factors is responsible. They include portal hypertension, decreased ability of the blood vessels to retain fluid, fluid retention by the kidneys, and alterations in various hormones and chemicals that regulate bodily fluids [1].

MALIGNANT ASCITES

Malignancy-related ascites signifies advanced disease in most cases and is associated with a dismal prognosis. Exceptions are ovarian carcinoma and lymphoma, which may respond to debulking surgery and chemotherapy, respectively. The mechanism of ascites formation depends on the location of the tumour. Peritoneal carcinomatosis produces exudation of pertinacious fluid into the peritoneal cavity, whereas liver metastases or primary hepatic malignancy induces ascites likely by producing portal hypertension, either from vascular occlusion by the tumor or arteriovenous fistulae within the tumor. Finally, chylous ascites can result from lymph node involvement with tumor.

DIAGNOSIS OF ASCITES

Ascites usually can be detected clinically by the presence of fullness in the flanks, shifting dullness, generalized abdominal distention with a fluid wave, and umbilicus eversion. In obese

patients, moderate amounts of ascitic fluid may be difficult to detect [2] there are two form of ascites (1):ascites with generalized odema as cardiac failure,malnutrition,acute nephritis, cirrhosis (2):ascites without generalized oedema :as in TB,malignancy,pyogenic ascites and chronic liver disease. Aspiration of ascites can help by studying: protein, cell count, gram stain, culture stain, and AFB culture. Cytology is unreliable.

ASCITES WITHOUT OEDEMA

PROTEIN	GRAM/L	WBC/CMM
Malignant	Over25 (75%)	Over 1,000(50%)
TB	Over25 (50%)	Over1, 000(70%)
Pyogenic	Over 25	Usually lymphocytes polymorphs
Cirrhosis	Under25 (95%)	Under 250(90%)

TUBERCULOUS ASCITES

Tuberculosis (TB) causes some 3 million deaths per year worldwide and is increasing in incidence in developed, and developing Countries. Abdominal TB, which may involve the gastrointestinal tract, peritoneum, lymph nodes or solid viscera, constitutes up to 12% of extrapulmonary TB and 1-3% of the total (3).Tuberculosis can involve any part of the gastrointestinal tract and is the sixth most frequent site of extrapulmonary involvement. Both the incidence and severity of abdominal tuberculosis are expected to increase with increasing incidence of HIV infection. Peritoneal tuberculosis occurs in three forms: wet type with ascitis, dry type with adhesions, and fibrotic type with omental thickening and loculated ascites [4].

In tuberculosis peritonitis, the peritoneum is studded with multiple yellow-white tubercles. It is thick and hyperaemic with a loss of its shiny luster. The omentum is also thickened.

Peritoneal tuberculosis occurs in 3 forms: (i) Wet type with ascitis; (ii) Encysted (loculated) type with a localized abdominal swelling; and (iii) Fibrotic type with abdominal masses composed of mesenteric and omental thickening, with matted bowel loops felt as lump(s) in the abdomen. A combination of these types is also common [5]

DIAGNOSIS OF TB

Presence of TB at other sites or a patient with a family history may be helpful. Ascites is a common presentation of peritoneal tuberculosis.

Clinical features of peritoneal tuberculosis in 22 patients. [6]

Symptoms	Number	Signs	Number %
• Abdominal pain	17 (77%)	Ascites	14 (63%)
• Fever	15 (68%)	Abdominal tenderness	8 (36%)
• Weight loss	16 (72%)	Peripheral lymph node	3 (13%)
• Abdominal swelling	10 (50%)	Hepatomegaly	4 (18%)
• Anorexia	8 (36%)	Abdominal mass	2 (9%)
• Night sweat	5 (22%)		
• Cough	3 (13%)		

LAPAROSCOPIC FINDINGS IN TUBERCULOSIS

Bhargava et al studied 87 patients with high protein ascites, of which 38 were diagnosed as having tuberculosis. They found visual appearances to be more helpful (95% accurate) than histology, culture or guinea pig inoculation (82, 3 and 37.5% sensitivity respectively). Caseating granulomas may be found in 85-90 per cent of the biopsies. The laparoscopic findings in peritoneal tuberculosis can be grouped into 3 categories :

(i) Thickened peritoneum with tubercles : Multiple, yellowish white, uniform sized (about 4-5 mm)tubercles diffusely distributed on the parietal peritoneum. The peritoneum is thickened, hyperemic and lacks its usual shiny luster. The omentum, liver and spleen can also be studded with tubercles

(ii) Thickened peritoneum without tubercles.

(iii) Fibro adhesive peritonitis with markedly thickened peritoneum and multiple thick adhesions fixing the viscera [5].

ROLES OF LAPAROSCOPY IN ASCITES

1. Diagnostic roles

2. Pretherapeutic, observation and staging of diseases

3. Therapeutic roles

The overall accuracy of 97%4 as lesions is seen under roles of laparoscopy in diagnosis of ascites.

Diagnostic laparoscopy is a cost effective procedure with overall accuracy of 97% [4] as lesions are seen under direct vision with magnification. Lesions less than 1 mm can be identified. Moreover, directed biopsies can be obtained with very low risk of complications. As diagnostic laparoscopy is an invasive procedure there are certain complications reported with this procedure i.e. haemorrhage, perforation, and air embolism. Diagnostic laparoscopy is indicated for accurate diagnosis of ascites when abdominal ultrasonography, CT abdomen and diagnostic paracentesis have failed to determine the cause of ascites [6]. Laparoscopy is very sensitive for small malignant or benign peritoneal implants. If size of the peritoneal nodules is uniform these are more likely to be benign because in malignant peritoneal spread the nodules are of varying sizes. [7]

LIVER BIOPSY PROCEDURE IN ASCITES

Ascites of unknown origin is a very fruitful area. Percutaneous liver biopsies can be technically difficult or impossible in this type of cases. The removal of a certain volume of fluid under visual control and positioning of the patient (reverse Trendelenburg) can display the liver or upper abdominal organs very well. Fluid specimens can be obtained safely as well as biopsies from any suspicious area. They recommended the use of palpation probe which is hollow and insulated. It can be applied for suction or, in case of bleeding from the biopsy site; it can be used as a coagulation probe [8].

PROCEDURE OF DIAGNOSTIC LAPAROSCOPY IN ASCITES

Nasir et al [9] applied the procedure in which all patients were kept nil per os before laparoscopy. After written consent, intravenous line was maintained and third generation cephalosporin was given before the procedure. After positioning, cleaning and draping, injection

2% Xylocaine was instilled as local anaesthetic agent in the periumblical area. Pulse oximetery, blood pressure and oxygen saturation were monitored prior and duration the procedure. Closed technique was employed for establishing pueumo-peitoneum with the help of Versus needle which was inserted at right angle to the abdominal wall, followed by insufflation of air. After removal of Versus needle trocar was inserted carefully into the abdominal wall. Laparoscopy was performed using Olympus A5211 Laparoscope. Camera port was made at the anterior axillary line on left side of abdomen.

Ascitic fluid aspiration was carried out. Laparoscopic peritoneoscopy was performed in systematic manner. Any abnormality was recorded according to the nature, size, colour and anatomic details of the lesion. Multiple biopsies were obtained after making a third port according to the feasibility and anatomic site of the lesion. Before withholding the biopsy sites were reevaluated, sites of insertion were stitched and aseptic dressings were carried out. In the post procedure blood pressure, pulse, respiratory rate, and temperature monitoring along with abdominal examination was done. Intravenous Pethedine was used as analgesic while a second shot of third generation cephalosporin was given 8 hours post procedure.

Patients with uneventful recovery were discharged within 24 hours after the procedure [9].

PRETHERAPEUTIC, OBSERVATION AND STAGING OF DISEASES

Why preoperative laparoscopic staging important in liver pancreas, lymphoma and gastric tumour? In suspected primary or secondary lesions, lesions smaller than 1-2 cm will escape detection in computed tomographic (CT) scan or ultrasonic examination. In contrast, a 1-2 mm lesion can be discovered looking through a modern endoscopic telescope. The parietal peritoneum is a very important area for staging. It is advisable when planning curative liver resection to perform a laparoscopic examination on the patient just prior to surgery to ensure that the preoperative diagnosis with respect to operability is correct. In many instances, the surgeon will change his mind after seeing previously undetected lesions or wide dissemination. Particular attention should be paid to “operable" carcinomas of the pancreas, where (in one-third of the cases) the parietal peritoneum or liver can be involved, excluding major intervention. The palpable mass also provides a good example of the usefulness of this procedure. The surgeon can evaluate the size, consistency, vascularity, fixation, and many other aspects of the tumor, and obtain a biopsy from an avascular area. The palpation probe, which is introduced through a

second accessory trocar under visual control, is essential to the surgeon because tactile sensation during palpation can be conveyed to the operator. Many solitary lesions described as a "solid mass" in the liver were discovered to be of cystic appearance. This is particularly true of hemangiomas.Accurate preoperative staging can be of great help in assessing the progress of the disease and the appropriate treatment [8].

More accurate preoperative staging is necessary to determine the treatment strategy for locally advanced gastric cancer. Laparoscopy has been suggested as an appropriate staging modality [10].

Laparoscopy has been used in Gastric carcinoma as part of the pretherapeutic staging protocol and to perform palliative derivations or even gastrectomy. However, its role in the selection of patients for resection or for the best therapeutic option has not been definitively stated. They proposed a simple staging system based on laparoscopic findings only in order to define a treatment algorithm before surgical treatment is undertaken [11].

THERAPEUTIC ROLES

Laparoscopic technique can be used to introduce peritoneal dialysis catheters [12].

LAPAROSCOPIC PERITONEAL DIALYSIS CATHETER PLACEMENT

Laparoscopic secure placement of continuous ambulatory peritoneal (abdominal) dialysis catheters is a simple, safe, and viable operation, even in patients with previous lower-abdominal operations. The same technique can be used to rescue dysfunctional catheters that are displaced or obstructed by adhesion and omental wrapping, thus increasing catheter longevity. Laparoscopic placement allows for thorough inspection of the peritoneal cavity and greater distal catheter inspection and placement, as well as reducing the risk of iatrogenic intra-abdominal visceral or vascular injury.

The current video-assisted laparoscopic technique is an effective means for managing several problems related to peritoneal dialysis such as catheter malfunction, preimplantation evaluation, location of the source of the dialysate leak, and assessment of the causes for peritonitis. Thus, this technique should always be considered when the these problems arise.

PROCEDURE OF PERITONEAL DIALYSIS CATHETER INSERTION

INDICATIONS:

There are two general forms or dialysis: haemodialysis, using the bloodstream, and peritoneal dialysis, using the lining of the abdominal cavity. To facilitate the latter, a tube is inserted into the abdominal cavity to allow for the infusion of fluids to help cleanse the body of waste products that accumulate in the face of kidney failure. Candidates for peritoneal dialysis must be relatively independent and be able to perform their own dialysis. Catheters are also sometimes inserted for excessive fluid (ascites) and for some unusual malignancies.

PROCEDURE:

Similar to other laparoscopic procedures, a camera is used to visualize the abdominal contents, avoiding the larger incisions associated with more traditional methods. The catheter can be placed in a dependent portion of the abdominal cavity to maximize its function.

PRE-OP PREP:

Routine studies are ordered and the patient requires an empty stomach for about eight hours prior to surgery.

INPATIENT VS. OUTPATIENT:

This procedure can be done as an outpatient, with overnight stay in the hospital occasionally necessary.

RECOVERY:

Patients recover much faster when compared to the open procedure. Since the surgery is usually done on patients with renal failure, the disease process tends to be more of a limiting factor than the procedure itself [13].

2-Laparoscopic assisted peritoneo venous shunt (Denver Shunt) its placement as an alternative to surgery or percutaneous procedure in ascites .This laparoscopic assisted procedure although the

percutaneous technique is the easiest, fastest, and least invasive procedure. It is recommended if a peritoneal biopsy and/or abdominal exploration is required for a definitive diagnosis[14].

3-In chylous ascites laparoscopic diagnosis, identication of the duct and ligation of the leaking lymphatic duct. Metsunaga et al reported 2 patients with congenital chylous ascites who underwent successful lymphatic duct ligation after a laparoscopic lymphoid dye test. Fetal ascites had been detected in both cases, and both babies were born with marked abdominal swelling. Given that conservative treatment by medium-chain triglyceride (MCT) milk and total parenteral nutrition (TPN) was ineffective, the authors elected to perform lymphatic duct ligation on the 95th postnatal day in the former case and on the 27th postnatal day in the latter case. Lipophilic dye was administered preoperatively both through oral and subcutaneous routes, and the peritoneal cavity was explored using laparoscopy. This laparoscopic lymphoid dye test precisely identified the area of chylous leakage, and the authors were able to repair the malformed lymphatic duct directly at laparotomy. Both postoperative courses have been favourable with no recurrence of symptoms. The lymphatic duct ligation should be considered in cases resistant to conservative treatment for over a month. The present laparoscopic lymphoid dye test is a novel and useful procedure that allows surgeons to identify the exact location of chylous leakage, and thus successfully ligate the lymphatic duct15].

PRECAUTIOTIONS

1. In those patients with abdominal wall varices,trocar and needle placement should be undertaken in an area remote from the varices.It is important to obtain appropriate clotting studies in those patients with a history of bleeding disorders or diffuse liver disease. These studies include bleeding time, platelets count, prothrombin time; abnormal values should be corrected prior to the operative events [16].

2. In all laparoscopic procedures adequate wound closure should practiced.Atrocar site 10mm or greater at risk to develop a hernia and must be closed. In patients with ascites, the fascia must be closed at all trocars to prevent a leak [17].

3. Risk of port site metastasis it is reported although with less incidence in laparoscopy of upper GIT malignancy [18].

4. Risk of peritoneal; infection when patients with cirrhosis undergo elective or emergency surgery, they are at significant risk for postoperative complications may lead to death [19].

INFECTION OF ASCITIC FLUID

Spontaneous bacterial peritonitis of ascites is an important complication of cirrhosis that is present in up to 20% of patients with an acute gastrointestinal hemorrhage at the time of admission to a medical facility. Appropriate prophylaxis can prevent the significant morbidity and mortality associated with SBP. Pharmacologic prophylaxis of SBP is recommended for patients with cirrhosis who are admitted to the hospital because of gastrointestinal bleeding and ascites and for patients who have had a previous episode of SBP. Norfloxacin (Noroxin), a poorly absorbed oral fluoroquinolone that selectively inhibits gram-negative flora, is the drug of choice. The usual dose for prophylaxis of SBP is 400 mg of norfloxacin a day. It has been shown to decrease the incidence of gram-negative infections when given for 7 days in patients with ascites who present with gastrointestinal hemorrhage. Used indefinitely, it reduces the rate of recurrent SBP from 68% to 20%.

PROPHYLAXIS AND MANAGEMENT OF ASCITIC FLUID INFECTION

ANTIBIOTICS

All patients with an ascites PMN count of 250/mm^3 or higher should be given intravenous cefotaxime sodium (Claforan) (2 g every 8 hours for 5 days). The dosage does not need to be altered in patients with hepatic or renal insufficiency. Other antibiotics (eg, ceftriaxone sodium [Rocephin], aztreonam [Azactam], oral ofloxacin [Floxin]) have been studied for the treatment of SBP, but the widest experience has been with cefotaxime.

PARACENTESIS

It is not essential to repeat a paracentesis if the patient improves clinically. However, the need for a second paracentesis must be made on an individual basis [20].

DISCUSSION:

Although the determination of the etiology of ascites is usually straight forward by history, physical examination, and analysis of ascitic fluid, the diagnosis of tuberculous or carcinomatous ascites may be elusive. In such cases, laparoscopy with biopsy is highly accurate [21]. Peritoneal mesothelioma is frequently missed on ascitic fluid by cytology and by blind biopsy. This entity is readily diagnosed by laparoscopy with peritoneal biopsy. Laparoscopy may be useful in the evaluation of hepatic malignancy (either primary or metastatic).Eighty percent to 90% of these lesions are present on the hepatic surface and up to 2/3 of the liver surface may be inspected by laparoscopy. When surgical resection is a therapeutic option, laparoscopy may reveal small (1 cm or less) metastatic lesions, peritoneal metastases, or cirrhosis, which represent contraindications to resection and are frequently missed on CT, MRI, and US. The use of laparoscopic ultrasound allows detection of deeper lesions and vascular infiltration [22].

In studying the role of Laparoscopy in the diagnosis and differential diagnosis ascites

Out of 2,500 patients who underwent laparoscopy 772 (30.89%) had ascites; liver cirrhosis underlay it in 57.78%, peritoneal carcinosis in 26.29%, primary and metastatic carcinoma, respectively, in 12.95%, tuberculous peritonitis in 1.42%, more rarely other diseases. Liver cirrhosis, malignant tumours and the other hepatic affections with concomitant ascites in their course can certainly be diagnosed laparoscopically. Laparoscopy with oriented biopsy of peritoneum and liver is of decisive importance in differentiating peritoneal carcinosis from tuberculosis. In peritoneal carcinosis the diagnosis (as based in clinical and laboratory findings) coincided perfectly with the laparoscopic and histologic one in 24.5%, partially in 45.5%. In 30% there was no congruence at all. Laparoscopy and the test methods associated with it contributed to the accurate diagnosis of peritoneal carcinosis in 75.5% of the patients. Ovarian carcinoma (20.9%) and cancer of the stomach (16.3%) underlay peritoneal carcinosis most frequently, other diseases by far more seldom [23]. Another study evaluate laparoscopy in ascites Diagnostic peritoneoscopies were performed in 226 patients with ascites. Satisfactory examination was possible in 220 patients. Clinical diagnosis was confirmed at peritoneoscopy in 82.7% of patients. Peritoneoscopic examination corrected the clinical diagnosis in 13.7%, was inconclusive in 2.6% and was incorrect in 0.8% of cases. It was 100% diagnostic in malignant peritonitis and 89.5% in patients with tuberculous peritonitis. Pseudomyxoma peritoneai and mesothelioma were suspected in one patient each at peritoneoscopy and was confirmed

histologically. The utility of routine ascitic fluid examination was reviewed in all patients. The ascitic fluid was transudative in 81.9%, exudative in 8.6% and indeterminate in 9.5% of patients with cirrhosis of liver. Patients with tuberculous pertitonitis had exudative, transudative and indeterminate ascites in 71.8%, 3.2% and 25% respectively. The ascites in patients with malignant peritonitis was either exudative (80%) or indeterminate (20%). There was considerable overlap in the nature of ascites present in the three groups of patients. We therefore conclude that peritoneoscopy is the most valuable investigation in the diagnosis of ascites, particularly in exudative and indeterminate types [24].

THE VALUE OF LAPAROSCOPIC DIAGNOSIS OF TB

The laparoscopic and pathological diagnoses of 43 patients who underwent abdominal laparoscopy for various indications are presented. Major indications for the laparoscopy included hepatomegaly in 32 patients, ascites in 28, and pyrexia of unknown origin (PUO) in 18 patients. A combination of two or more of these indications was a more common feature. The most frequently encountered laparoscopic diagnoses were tuberculosis and chronic liver disease (16 patients each), followed by cancer (9 patients). However, on pathological examination of peritoneal or liver biopsy tissue and on follow-up, tuberculosis was confirmed in 12 patients, chronic liver disease in 14 patients and hepatocellular carcinoma in 11 patients. No complications were encountered during the laparoscopy. Our findings indicate that abdominal laparoscopy is a safe, quick and inexpensive diagnostic tool, particularly when appropriate and adequate tissue is taken for pathological examination. In such instances, laparoscopy would save an unnecessary laparotomy, especially where tuberculosis and cancer are considered in the differential diagnosis [25].

Due to its high accuracy some suggest PCR before laparoscopy .In the light of our accumulated experience, we would suggest that PCR of ascetic fluid obtained by US-guided fine needle aspiration is now the investigation of choice for patients with the described clinical and radiological presentations and should at least be attempted before surgical intervention. . If the result was negative, diagnostic laparoscopy or, if this was not feasible, laparotomy should be performed [26].

PRETHERAPEUTIC GASTRIC CARCINOM ASSESSMENT

A pretherapeutic staging system to design operative or neoadjuvant treatments in gastric cancer is needed. It can be done under local anaesthesia sensitive predictor of peritoneal recurrence [27]

Regarding complications of dialysis catheter insertion Tiong H Y et al reported surgical early and late complications of dialysis catheter. Of open Tenckhoff catheter insertion under local anaesthesia in a single institution.

METHODS: A review was carried out on 164 insertions in 139 patients over a three-year period. Tenckhoff catheter insertion for CAPD is a procedure associated with significant surgical morbidity. Patients with diabetes mellitus, glomerulonephritis and ongoing sepsis are at greater risk of early complications, and hence, must have their conditions stabilised or treated before surgery. In addition, prolonged surgical time and patients with previous abdominal surgery are at increased risk. The rate of complications may be improved by early consideration of patients with poor tolerance of local anaesthetic surgery or with previous abdominal surgery for laparoscopic insertion under general anaesthesia. To prevent late complications dominated by CAPD peritonitis, patients' nutritional status and care of the catheter should both be optimised [28].

New technique for dialysis catheter using laparoscopy; Open insertion of peritoneal dialysis (PD) catheters is the standard surgical technique, but it is associated with a relatively high incidence of catheter outflow obstruction and dialysis leak. Omental wrapping is the most common cause of mechanical problems; laparoscopic omental fixation technique is of higher value in addition to laparoscopic surgery also enabled diagnosis of intraabdominal pathologies and treatment of the accompanying surgical problems during the same operation [29].

The risk of port-site metastases in those undergoing laparoscopy for gynaecologic malignancy was highest in those with ascites in a study of 82 patients. The study participants underwent 87 procedures that involved 330 trocar sites. The overall risk of port-site metastases per procedure was 2.3%, and per port site was 2.4%, Dr. Nimesh Nagarsheth reported at an international congress sponsored by the Society of Laparoendoscopic Surgeons.The patients included 39 with endometrial cancer, 29 with ovarian cancer, and 14 with cervical cancer. Twenty of those were treated for recurrent cancer, and 10 had ascites. They were followed for an average of 361 days, said Dr. Nagarsheth of Mount Sinai Medical Center, New York. Port-site metastases occurred in two patients. The first developed metastases at five sites, and was diagnosed 13 days after

second-look laparoscopy for stage IIIB ovarian cancer. The second had metastases at three sites, and was diagnosed 46 days after second-look laparoscopy for stage IIIC primary peritoneal cancer. Both patients had ascites [30].

CONCLUSION:

Laparoscopy in ascites is a safe and cost effective diagnostic modality and its rules extended the diagnostic procedure providing in unexplained cause of ascites definitive diagnosis. In such instances, laparoscopy would save an unnecessary laparotomy; especially where tuberculosis and cancer are considered in the differential diagnosis staging laparoscopy with peritoneal lavage cytology is a safe, effective tool in patients with locally advanced gastric cancer, especially in patients receiving neoadjuvant chemotherapy. In pancreatic car. The ability of minimally invasive surgeons and endoscopists to diagnose and palliate unrespectable pancreatic cancer is likely to continue to improve and these techniques will play an increasingly important role in the care of patients with pancreatic cancer. Likewise, the accuracy of radiological imaging techniques to detect unrespectable disease will also continue to advance and further decrease the incidence of nontherapeutic laparotomies. It is valuable in many therapeutic uses as in staging of tumour, catheter placement in nephrogenic ascites.

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