

Multi-Detector Computed Tomography Evaluation of Post Pelvi-Abdominal Surgical Complications

Hager Mohsen Saleh Mohamed¹, Mohamed Refaat Habba, Ahmed Tohamy Ahmed²

¹Radiology Department, Ismailia general hospital

²Radiology Department, Faculty of Medicine, Suez Canal University

*Corresponding Author: Hager Mohsen Saleh Mohamed, Phone No.: (+201009330947), E-mail: dr.hagoor2013@gmail.com

ABSTRACT

Background: Due to the common problems after pelvic-abdominal procedures, the post-operative abdomen is tough. Hence, every radiologist must be extremely accurate in identifying these problems in order to rapidly identify potentially life-threatening situations and initiate necessary care immediately.

Aim: To the early diagnosis and for adequate treatment planning through using the Multi-Detector Computed Tomography (MDCT) in the diagnosis of post-operative pelvi-abdominal surgical complications.

Patients and Methods: This was a descriptive cross-sectional study carried out on 50 adult patients who were referred to the surgery clinic of Ismailia Suez Canal University and Ismailia General Hospitals suspected to have post pelvi-abdominal surgical complications. MDCT was done to all patients and the findings were interpreted by two specialty-certified radiologists.

Results: Our results showed that the most common pre-surgical diagnosis was malignancy and recurrence in 38 patients (76%). Our study showed that recurrent malignancy was the most frequent findings, and 60% of the patients were managed conservatively.

Conclusion: Computed tomography (CT) was used as gold standard tool in the evaluation of all patients included in this study as it is presently the workhorse to assess post-operative problems, with the exception of MRI for probable recurrence of rectal cancer or inflammatory bowel disease.

Keywords: Multi detector, Tomography, Evaluation.

INTRODUCTION

Knowing the most common problems following pelvic-abdominal surgery is crucial for every radiologist because it allows them to quickly identify potentially life-threatening circumstances and arrange for appropriate treatment. The post-operative abdomen can be difficult⁽¹⁾. Many pelvic-abdominal procedures, including cholecystectomy, appendectomy, large bowel resection or colostomy, abdominal wall hernia repair, and exploratory laparotomy, are carried out for various disorders. Here, a variety of lesions affecting the abdominal wall and intraperitoneal tissues are presented even now, in this age of modern medicine to highlight the need of CT in their diagnosis and treatment⁽²⁾.

The first steps in reducing misinterpretation of potentially life-threatening problems following pelvic-abdominal surgeries are to get familiar with the different surgical procedures, particularly the most common anastomosis, and their most prevalent consequences⁽³⁾.

The radiologist frequently encounters altered anatomic findings that make it difficult to distinguish between a postoperative result that is expected and a true problem. Hence, prior to conducting a diagnostic examination in such circumstances, consultation with the referring surgeon is strongly encouraged⁽³⁾.

In this situation, abdominal Ultrasound (US) is frequently the first imaging method used. However, additional imaging methods are almost always required to supplement ultrasound findings. A reliable imaging technique for evaluating suspected biliary and vascular damage is CT⁽⁴⁾.

As the most frequent cause of morbidity following gastrointestinal procedures, intraabdominal abscesses

have a significant risk of fatal consequences when connected to systemic sepsis⁽⁵⁾. According to reports, the morbidity and mortality rate is 10%–40%. More sensitive and specific than pouchography or fluoroscopy, multi-detector CT has been said to have a 90% accuracy rate in determining the size and location of abscesses⁽⁶⁾.

The ability to obtain high-resolution pictures using Multi-Detector CT allows the radiologist to be a key player in the postoperative evaluation of patients after colon surgery. When possible, the radiologist should be briefed on the study's specific rationale, the specific type of surgery performed (ranging from a simple segmental bowel excision to a more comprehensive radical resection) & the specific types of anastomoses used⁽⁷⁾.

In order to distinguish between expected benign findings and those linked to more concerning disease entities, the idea behind using CT is that axial Multi-Detector CT combined with multiplanar reformation provides excellent visualization of both normal postoperative anatomy and typical postoperative problems.

PATIENTS AND METHODS

This descriptive cross-sectional study was carried out on patients who were referred to the surgery clinic of Ismailia Suez Canal University and Ismailia General Hospitals suspected to have post pelvi-abdominal surgical complications. The study was performed on 50 cases who underwent pelvi-abdominal surgeries and were operated on at Suez Canal University Hospital and Ismailia General Hospitals, and were

suspected of having pelvi-abdominal surgical complications.

Inclusion criteria: Patients underwent pelvi-abdominal surgical operations, having postoperative symptoms (e.g. abdominal pain, swelling, symptoms of intestinal obstruction) that suggest post-operative surgical complications.

Exclusion criteria: Contraindication to the I.V. contrast agents for example severe allergic reaction, terminal liver or renal failure (serum creatinine > 2 mg/dl), hemodynamically unstable patients (such as the cases with persistent hypotension unresponsive to fluid resuscitation) and those who refuse to participate in the study.

Data Collection: Each patient underwent the following: Complete medical history involving personal data (name, age, gender, occupation, address and special habits) and clinical data (abdominal swelling, toxic manifestations, weight changes). General examination. Clinical examination of the abdomen. Laboratory investigations including renal function tests (urea and creatinine). The patients were conducted following the protocol of the service for upper abdomen and pelvis studies. They were in supine position with the arms above head. Optimal contrast was conducted to obtain the most accurate diagnosis, through non-enhanced CT (NECT) [early arterial phase: 15-20 sec, late arterial phase: 35-40 sec, hepatic or late portal phase: 70-80 sec, nephrogenic phase: 100 sec and delayed phase: 6-10 minutes]. Not all phases to be done for each patient. The selected phase of CT scan varies according to the clinical condition of the patient).

Total amount of contrast: In many protocols, a standard dose was administered based on the patient's weight: Weight < 75kg: 100cc, weight 75-90kg: 120cc and weight > 90kg: 150cc. CT technique was done to all patients and the findings were interpreted by two specialty-certified radiologists.

Ethical Approval: The study was approved by the Ethics Board of Suez Canal University and the patients were given all the information they need about the trial. An informed written consent was taken from each participant in the study. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

We'll be utilizing SPSS 15 (SPSS Inc., Chicago, IL, USA) to analyze the information we collect. Statistical information will be presented as means SD, whereas qualitative information was provided as raw numbers & percentages. The significance of differences in quantitative variables was examined using the Student

t test and the analysis of variance (ANOVA), while differences in qualitative variables will be examined using the Chi Square test. The significance level was set at a p-value of less than 0.05.

RESULTS

The mean age of our study population was 47.32 ± 10.57 years, where the studied patients were ranged from 28 to 65 years. Most of the studied group (56%) were from 50-60, while (28%) were less than 40 years (4% from 40-50 y and 12% more than 60 y). As regards sex distribution, 80% of the studied group were females and 20% were males (Table 1).

Table (1): Demographic data among the studied group

Demographic data	Study group (n=50)
Age/ years	
Mean ± SD	47.32±10.57
Min-Max	28-65
<40 y	14 (28%)
40-50 y	2 (4%)
50-60 y	28 (56%)
>60 y	6 (12%)
Sex	
Male	10 (20%)
Female	40 (80%)

As observed in table (2), variable clinical presentations were observed, and some cases shared more than one presentation. Generalized abdominal pain was found in 40 patients (80%), 10 cases were presented with anterior abdominal wall swelling (20%) and 8 cases were presented with persistent vomiting and fever (16%). Four cases were presented with constipation (8%), 2 patients were presented with offensive vaginal discharge, 2 with rapid weight loss (4%) and dyspnea was also represented by (4%).

Table (2): Distribution of study population in terms of clinical presentation

Clinical Presentation	Study group (n=50)	
	No	%
Generalized abdominal Pain	40	80.0
Anterior abdominal wall Swelling	10	20.0
Persistent Vomiting	8	16.0
Fever	8	16.0
Constipation	4	8.0
Offensive Vaginal discharge	2	4.0
Rapid Weight loss	2	4.0
Dyspnea	2	4.0

Table (3) showed that, diabetes mellitus and hypertension were found in 29 patients (58%), 17

patients had diabetes only (34%), while 4 patients (8%) had no associated co-morbid disease.

Table (3): Associated Medical history among the studied group

Co-Morbid Disease	Study group (n=50)	
	No	%
DM+HTN	29	58.0
DM	17	34.0
No	4	8.0

Table (4) showed that the most common indication was the malignancy and recurrence in 36 patients (72%), while other causes were abdominal wall hernia in 6 patients (12%), 2 patients had hypersplenism (4%), 2 patients had CS because of IUFD (4%) and 2 patients underwent exploration after trauma (4%).

Table (4): Pre surgical diagnosis and the indication for surgery among the studied group

Surgery Indication	Study group (n=50)	
	No	%
Malignancy and recurrence:	36	72%
Adnexal mass	10	20.0
Colon cancer	6	12.0
Renal mass	6	12.0
Pancreatic cancer	6	12.0
Hepatic focal lesion	2	4.0
Uterine leiomyosarcoma	2	4.0
Malignant GIST (from the lesser sac)	2	4.0
Hernia	6	12.0
Trauma	2	4.0
Other:		
Hypersplenism	2	4.0
CS	2	4.0
Uterine adenomyosis	2	4.0

Table (5) displayed the distribution of study population according to the type of surgery as follow: 46 patients (92%) underwent laparotomy while 4 patients underwent laparoscopic operations.

10 patients underwent TAH & BSO (20%), 6 patients underwent colostomy (12%), 10 patients were operated for hernia repair (20%), 4 patients underwent nephrectomy (8%), 4 patients operated for small bowel resection anastomosis, 4 patients underwent Whipple operation (8%).

2 cases underwent partial gastrectomy (4%), 2 cases underwent splenectomy (4%), 2 patients were operated for GIST excision (4%), 2 cases underwent liver segmentectomy (4%), 2 cases underwent exploration (4%).

Table (5): Type of surgery among the studied group

Type of surgery	Study group (n=50)	
	No	%
Laparotomy	46	92.0
Laparoscopic	4	8.0
Surgical operations		
TAH & BSO	10	20.0
Hernia repair	10	20.0
Colostomy	6	12.0
Nephrectomy	4	8.0
Small bowel resection anastomosis	4	8.0
Whipple	4	8.0
Partial gastrectomy	2	4.0
Splenectomy	2	4.0
GIST excision	2	4.0
Liver segmentectomy	2	4.0
Exploration	2	4.0
Hysterectomy	2	4.0
Cesarean section	2	4.0

Table (6) showed that the most frequent findings were recurrent malignancy 12 cases (24%): omental deposits 4 patients (8%), nodal recurrence in 2 patients (4%), 2 patients presented with IO and stoma recurrence (4%), 2 patients with GIST recurrence and 2 patients with recurrent colonic mass (4%).

Regarding post-operative fluid collection (hematoma/abscess), hematoma was noted in 6 patients (12%): 2 of them at the anterior abdominal wall (4%), 2 perinephric (4%) and 2 liver hematoma (4%).

Another six patients were presented by abscess (12%): anterior abdominal wall in 2 patients (4%), sub-phrenic in 2 patients (4%) and ileo-psoas in 2 patients (4%). Anastomotic leak versus bowel perforation in 4 patients (8%), 4 patients were represented by fibrosis post laparoscopy (8%) and 4 patients presented with IO (8%).

Regarding hernia, incisional in 8 patients (16%) and recurrent in 2 patients (4%). 2 patients presented with pneumoperitoneum (4%), post-partum endometritis in 2 patients (4%), iatrogenic ureteric injury in 2 patients (4%), and anterior abdominal wall seroma in 2 patients.

Table (6): CT findings among the studied group

CT diagnosis	Study group (n=50)	
	No	%
Co existent Malignancy and recurrence :	12	24%
Omental deposits	4	8.0
Nodal recurrence	2	4.0
GIST recurrence	2	4.0
Recurrent colon cancer	2	4.0
Stoma recurrence +Intestinal obstruction	2	4.0
Hernia:	10	20.0
Incisional hernia	8	16.0
Recurrent hernia	2	4.0
Hematoma:	6	12.0
Anterior abdominal wall hematoma	2	4.0
Perinephric hematoma	2	4.0
Liver hematoma	2	4.0
Abscess:	6	12.0
Anterior abdominal wall abscess	2	4.0
Sub-phrenic abscess	2	4.0
Ileo-psoas abscess	2	4.0
Intestinal obstruction	4	8.0
Anastomotic leak versus bowel perforation	4	8.0
Post-operative anterior abdominal wall seroma	2	4.0
Pneumoperitoneum	2	4.0
Iatrogenic ureteric injury	2	4.0
Post-partum endometritis	2	4.0

DISCUSSION

Except in cases of suspected rectal cancer recurrence or inflammatory bowel illness, magnetic resonance imaging (MRI) is currently the gold standard for assessing late postoperative problems (1).

A valid basis for choosing between CT allows for the reliable diagnosis of postoperative seromas, abdominal wall abscesses and fistulas, haemorrhages with or without active bleeding, intestinal obstruction, peritonitis, and recurrent hernias, regardless of whether the patient is undergoing conservative treatment, interventional treatment, or surgical treatment (8).

This study was conducted on fifty patients. According to demographic profile, the age of our study group ranged from 28 to 65 years, mean age was 47.32 ± 10.57 years. Most of the studied group (56%) was from 50-60 years, while 28% were less than 40 years, 4% were from 40-50 years and 12% were more than 60 years. 40 cases were females while only 10 cases were males, thus females outnumbered males with a male to female ratio 0.4. **Dhaigude et al.** (9) examined 100 patients; the mean age of the cases was

39.88±13.06 years (range 23-75). Male patients were 48%, while female patients were 52%. According to **Chauhan et al.** (10), out of 50 cases that underwent elective laparotomy 11 (22%) cases were male and 39 (78%) cases were female and age varied from 10-56 years.

Robleda et al. (10) stated that pain is one of the postoperative signs that has received the most attention and has been experienced by the majority of cases, approximately 80% of patients reported nausea and vomiting, as well as pain (20% to 28% for nausea and 5% to 8% for vomiting) after diverse surgical procedures. These figures are comparable to those observed in our research, where we discovered an incidence of generalized abdominal pain in 40 patients (80%), 10 cases were presented with anterior abdominal wall swelling (20%), 8 cases were presented with persistent vomiting and fever (16%). **Lakshay et al.** (11) found that 76.9% of cases complained from abdominal pain and other common complaints involved nausea (63.4%), vomiting (57.2%), urinary symptoms (38.3%), loss of appetite (21.2%), constipation (19.3%), diarrhea (10.6%), abdominal distension (5.7%), per vaginal bleeding (3.4%), gastro-intestinal bleed (2.7%) and jaundice (1.9%).

Regarding co-morbid diseases and its association with the post-operative complications, our study found that 29 patients (58%) had diabetes mellitus and hypertension, 17 patients had diabetes only (34%), while 4 patients (8%) had no associated co-morbid disease. **Sun et al.** (12) found that cases with hyperglycemia, hypertension, and hyperlipidemia had a substantially greater likelihood of developing adverse post-operative complications compared to patients without any correlated morbidity (32 patients had DM and 29 patients had hypertension), which is in agreement with the present findings.

Considering the post-operative surgical CT findings, our study showed that the most frequent findings were co-existent recurrent malignancy (at the early period of follow-up <2 years) 12 cases (24%): omental deposits 4 patients (8%), nodal recurrence in 2 patients (4%), 2 patients presented with IO and stoma recurrence (4%) and 2 patients with recurrent colonic mass (4%). **Turan et al.** (13) found that 48 (5.9%) patients of a total of 1576 who were operated for endometrial cancer omental deposits were found on follow-up by CT. **Chang-Hyun et al.** (14) reported at the time of last follow-up that recurrence occurred in 266 (20.5%) patients among 1,299 patients with gastric cancer who underwent curative operations at the Department of Surgery, Inje University Seoul Paik Hospital.

Regarding post-operative fluid collection (hematoma/abscess), hematoma was noted in 6 patients (12%): 2 of them at the anterior abdominal wall (4%), 2 perinephric (4%) and 2 liver hematoma (4%). Two of those patients were presented early post-

operative (<24h), while the remaining 4 patients presented late. These findings are consistent with what has been reported in the literature by **Sharma** ⁽¹⁵⁾ where the incidence of post pancreatectomy hemorrhage was 4.47 % (24 out of 536).

CONCLUSION

It may seem difficult to image post-operative pelvic-abdominal surgical complications since they are a variety of disorders with varying imaging appearances. Making the right diagnosis is aided by a methodical approach and linkage with surgical, clinical, and developmental data. CT was used as gold standard tool in the evaluation of all patients included in this study as it is the gold standard at the moment for assessing postoperative problems, with the exception of MRI for possible rectal cancer or inflammatory bowel disease recurrence.

DECLARATIONS

- **Consent for publication:** I attest that all authors agreed to submit the work.
- **Availability of data and material:** Available
- **Competing interests:** None
- **Funding:** No fund
- **Conflicts of interest:** No conflicts of interest.

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