

CT Patterns of Peritoneal Metastasis in Patients with Abdominopelvic Malignancy

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ABSTRACT

Aim: To determine the patterns of peritoneal involvement in patients with abdominopelvic malignancies.

Methods: This was a prospective study performed from March 2014 to October 2015 at Department of Radiology Bahawal Victoria Hospital, Bahawalpur. Total 190 patients with histopathological diagnosis of primary malignancy and documented peritoneal disease on CT scan were included in this study.

Results: Mean age of the patients was 53±12 years. Ovarian cancer was the most common cancer seen in 114 (60%) patients. Omental caking was the most common 77(44.7%) pattern of peritoneal involvement followed by mixed pattern in 71(37.4%), Nodular deposits in 28(14.7%), Smudged in 10(5.3%) and Cystic in 4(2.1%) patients.

Conclusion: The results of this study reveals that the ovarian and colorectal carcinoma were the most common. Omental caking pattern of peritoneal pattern was most frequently observed in these patients followed by mixed pattern and nodular peritoneal deposits.

Keywords: Ovarian cancer, Omental caking, Colorectal cancer, Nodular deposits, Multi-detector CT

INTRODUCTION

The peritoneum is a continuous transparent membrane which lines the abdominal cavity and covers the abdominal organs (or viscera). Peritoneal reflections form the greater and lesser omenta and the natural gravitational flow determine the route of spread of intraperitoneal fluid and consequently of disease processes within the abdominal cavity^{1,2,3}.

Multi-detector CT with multi-planar reformation allows the accurate examination of complex anatomy of the peritoneal cavity and helps in understanding the pathologic processes affecting the greater and lesser omenta⁴.

Metastatic peritoneal tumors most often come from the carcinomas of ovary, stomach, pancreas, colon, uterus, and bladder⁵. Ovarian cancer is the most common abdominopelvic malignancy and at the time of diagnosis, about 70% of patients having peritoneal involvement^{6,7,8,9}.

Common sites of intraperitoneal seeding include the paracolic gutters, omentum, liver capsule and diaphragm. Thickening, nodularity, and enhancement are all signs of peritoneal carcinomatosis, however, microscopic spread of disease cannot be ruled out by any imaging modality alone and a full staging laparotomy is always required⁹⁻¹⁰. It is important to determine exact extent of peritoneal disease as it changes the staging of disease, treatment plan and prognosis of patient, i.e., early ovarian cancer

is treated with comprehensive staging laparotomy, whereas advanced but operable disease is treated with primary cyto-reductive surgery (debulking) followed by adjuvant chemotherapy⁹. Patients with unresectable disease may benefit from neoadjuvant (pre-operative) chemotherapy before debulking¹¹.

Characterization of different CT patterns of peritoneal carcinomatosis is also important as there is predilection of different malignancies for having different patterns of peritoneal disease.¹²⁻¹³ Peritoneal deposits can be seen as omental caking, cystic, nodular, smudged or may be of mixed variety.¹⁴ There may be pre-dominance of one of these patterns for different diseases^{16,17}.

Understanding, knowledge and identification of patterns of peritoneal carcinomatosis can help in diagnosis and staging of different malignancies, thereby improving the diagnostic accuracy and effectively guiding patient management. The objective of this study was to determine the patterns of peritoneal involvement in patients with abdominopelvic malignancies.

METHODOLOGY

This prospective study was performed from March 2014 to October 2015 at Department of Radiology Bahawal Victoria Hospital, Bahawalpur. Institutional Review Board and Ethics Committee approval was taken. Total 190 patients with peritoneal involvement were identified on CT scan of abdomen and pelvis. Of these, 190 patients with histopathological diagnosis of primary malignancy and documented

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peritoneal disease on CT scan were included in this study. Patients with tuberculosis and lymphoproliferative disorders were excluded from this study.

CT scans were performed on 64-slice CT scanner (Aquilion) after intravenous (I/V) contrast injection. Three-mm reconstructed images were reviewed and when necessary multiplanar reformations at different window level and settings were performed.

The patterns of peritoneal involvement were identified as smudged pattern (increased density or soft tissue permeation of the omental fat), nodular pattern (enhancing soft tissue nodules), omental caking (diffusely thickened masses replacing normal omental fat), cystic pattern (soft tissue masses with cystic component) and mixed pattern (having two or more of above described patterns). Peritoneal sites were broadly divided into pelvic, greater omentum and small bowel mesentery. Associated findings of ascites, enlarged lymph nodes and bone metastases were also evaluated. Statistical analysis was done using SPSS version 16. Frequencies and percentages were calculated for categorical while mean ± standard deviation (SD) were calculated for continuous variables and graphs made for comprehensive review of study outcomes.

RESULTS

Total 190 patients were selected for this study. Minimum age of the patients was 25 years and maximum age was 75 years with mean age 53±2 years. Ovarian cancer was found in 114(60%) patients followed by colorectal cancer 42(22.1%) patients, pancreatic cancer in 10(5.3%) patients, gastric cancer in 6(3.2%) patients, endometrial cancer 4(2.1%), gallbladder 5(2.6%), hepatocellular cancer 4(2.1%), cervical cancer 2(1.1%), renal cell carcinoma 2(1.1%) patients and Transitional cell urinary bladder cancer in on 1(0.5%) patient. (Table 1)

Table 1: Frequencies for primary cite of CA

Primary cite of CA	n	%age
Ovarian cancer	114	60.0
Colorectal cancer	42	22.1
Pancreatic cancer	10	5.3
Gastric cancer	6	3.2
Endometrial cancer	4	2.1
Gallbladder	5	2.6
Hepatocellular cancer	4	2.1
Cervical cancer	2	1.1
Renal cell carcinoma	2	1.1
Transitional cell urinary bladder cancer	1	.5

The most common pattern of peritoneal involvement was omental caking 77(40.5%) patients, mixed in 71(37.4%) patients, nodular deposits in 28(14.7%) patients, smudged in 10 (5.3%) and cystic in 4(2.1%) patients. (Table 2)

Table 2: Frequencies for pattern of peritoneal involvement

Pattern of peritoneal involvement	n	%age
Omental caking	77	40.5
Mixed	71	37.4
Nodular deposits	28	14.7
Smudged	10	5.3
Cystic	4	2.1
Total	190	100.0

DISCUSSION

Recognition of pattern of peritoneal involvement is of fundamental importance in abdominopelvic malignancies as presence and extent of peritoneal involvement changes the overall staging and management plan of patient. There are no published studies regarding this important area in our local literature. So, it was important to determine and compare patterns of peritoneal involvement in our country with the available foreign literature.

In our study minimum age of the patients was 25 years and maximum age was 75 years with mean age 53±12 years. Similar mean age was reported by Yawar et al. In our study, most common pattern of peritoneal involvement was omental caking 40.5% patients, followed by mixed in 37.4% patients, nodular deposits in 14.7% patients, smudged in 5.3% and cystic in 2.1% patients.

Motta et al¹⁶ in their study reported mixed pattern in 40% cases which is comparable with our study.

Another study by Rodriguez et al¹⁷ showed omental caking in 36% cases which is also similar with the findings of our study. In same study nodular pattern was seen in 36% cases which is very high than our study.

In another study by Yawar et al⁴ the most common pattern of peritoneal involvement was mixed in 39% patients, omental caking in 36% patients and nodular deposits in 24% patients. Findings of this study are also in agreement with our findings.

In present study ovarian cancer was found in 60% patients followed by colorectal cancer in 22.1% patients, pancreatic cancer 5.3% patients, gastric cancer in 3.2% patients, endometrial cancer 2.1%, gallbladder 2.6%, hepatocellular cancer 2.1%, cervical cancer 1.1%, renal cell carcinoma 1.1% patients and Transitional cell urinary bladder cancer in on 0.5% patient.

In one study by Yawar et al⁴ the malignancies showing peritoneal involvement in decreasing order

of frequency, were ovarian cancer in 58.12% patients, colorectal cancer 22.17% patients, pancreatic cancer 5.42% patients, gastric cancer 3.45% patients, endometrial cancer 2.96% patients, gallbladder/cholangio-carcinoma and hepatocellular cancer 2.46% patients, cervical cancer 1.48% patients, renal cell carcinoma 0.98% patients and transitional cell urinary bladder cancer 0.49% patient. All these findings are in favour of our study.

Mamlouket al¹⁸ showed ovarian carcinoma as most common. Mamlouket al¹⁸ also showed colonic and pancreatic cancers to be next in order of frequency as a causative factor of peritoneal carcinomatosis. Some other studies also reported ovarian cancer as most common^{3,16}.

CONCLUSION

The results of this study reveals that the ovarian and colorectal carcinoma were the most common. Omental caking pattern of peritoneal pattern was most frequently observed in these patients followed by mixed pattern and nodular peritoneal deposits.

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