ORIGINAL ARTICLE

PATTERNS OF PERITONEAL INVOLVEMENT IN PATIENTS WITH ABDOMINO-PELVIC MALIGNANCIES ON MULTI DETECTOR COMPUTED TOMOGRAPHY

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ABSTRACT

Background: Peritoneal carcinomatosis is a relatively common metastatic manifestation of a variety of organ-based malignancies, particularly of the ovaries and gastrointestinal tract. Objective of this study was to determine the patterns of peritoneal involvement in patients with abdomino-pelvic malignancies.

Material & Methods: This was a record basis cross-sectional study conducted at Radiology Department of Kuwait Teaching Hospital, Peshawar, Pakistan from June 5, 2016 to June 30, 2016. Electronic data identified 127 cases from December 2015 to May 2016. Those with histo-pathological diagnosis of primary malignancy and documented peritoneal disease on CT scan were included. Patients with tuberculosis and lymphoproliferative disorders were excluded. Demographic variables were gender and age in years while research variables were types of primary abdomino-pelvic malignancies causing peritoneal carcinomatosis, patterns of peritoneum involvement, common peritoneal sites of involvement and associated findings of ascites, lymphadenopathy and metastasis.

Results: Out of 127 patients, males were 42 (33.08%) and females 85 (66.92%). The mean age of patients was 49 ± 14 years. The most common type of malignancy showing peritoneal involvement was ovarian cancer in 38 (30%) cases. The most common pattern of peritoneal involvement was mixed in 43 (34%) patients. The most common site of involvement was greater omentum in 71 (56%). The most common associated finding was ascites in 65 (51%) patients.

Conclusion: The most common type of malignancy showing peritoneal involvement was ovarian cancer. The most common pattern of peritoneal involvement was mixed. The most common site of involvement was greater omentum. Most common associated finding was ascites.

KEY WORDS: Ovarian cancer; Omentum; Ascites; Computed tomography.

INTRODUCTION

The peritoneum is a thin, translucent, serous membrane and is the largest and most complexly arranged serous membrane in the body. The peritoneum that lines the abdominal wall is called the parietal peritoneum, whereas the peritoneum that covers a viscus or an organ is called a visceral peritoneum. Peritoneal reflections form the greater and lesser omenta.[1-5] Peritoneal carcinomatosis is a relatively common metastatic manifestation of a variety of organ-based malignancies, particularly of the gastrointestinal tract and ovaries.[6,7] Metastatic peritoneal tumors most often originate from the carcinomas of ovary, colon, stomach, pancreas, gall bladder, uterus, bladder etc. and some remain with unknown primary.[7,8] Ovarian cancer is the most commonest abdomino-pelvic malignancy with peritoneal disease with approximately 70% of patients having peritoneal involvement at the time of diagnosis. It spreads predominantly by direct invasion and intraperitoneal dissemination.[8-12] Prior to the advent of modern cross-sectional imaging, peritoneal disease was generally not detectable until the process had resulted in significant displacement of abdominal organs or bowel obstruction. Multidetector CT (MDCT) with multi planar images and thin slices has potentially improved the sensitivity and specificity of

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CT in detecting peritoneal deposits. Even sub centimeter implants can be detected nowadays with CT in patients with small volume disease.[10,13] Common sites of intraperitoneal seeding include the omentum, paracolic gutters, mesentery, liver capsule, pelvis and diaphragm. Thickening, nodularity, soft tissue stranding 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 required.[11,14] 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 chemotherapy.[15] Patients with unresectable disease may benefit from neoadjuvant (pre-operative) chemotherapy before debulking.[16] 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.[17-19] Peritoneal deposits can be seen as omental caking, stranding, cystic, nodular, smudged or may be of mixed variety.[19-21] There may be pre-dominance of one of these patterns for different diseases.[22,23] 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.

Recognition of pattern of peritoneal involvement is of great importance in abdomino-pelvic malignancies as presence and extent of peritoneal involvement changes the overall staging and management plan of patient. Early diagnosis of peritoneal spread in malignant disease is essential to prevent unnecessary laparotomies and to select the patients in whom complete cytoreduction is feasible.[24] Nowadays with MDCT even sub centimeter single nodule can be appreciated and disease can be diagnosed and treated at a very early stage with good prognosis for patients. Along with that primary site of the disease can be evaluated by MDCT as evident by thickening, mass formation or distortion of normal anatomical appearance of ovaries, stomach, pancreas, colon and other anatomical structures.[18] MDCT is also very helpful in patients for follow up after treatment when comparisons are done with previous CTs for response. This radiological interpretation with co-existing peritoneal disease is a road map towards accurate and final diagnosis of the patient. Patterns of omental and peritoneal involvement may not be truly diagnostic in many patients but it is very helpful to narrow down the long list of differential diagnosis. In many of the cases CT findings can actually guide the clinicians towards final diagnosis, thus further decreasing unnecessary investigations.[18,19] There are no published studies regarding this important area in our local literature especially in Khyber Pakhtunkhwa province of Pakistan. So it was important to determine and compare patterns of peritoneal involvement in our region with the available foreign literature.

The objective of this study was to determine the patterns of peritoneal involvement in patients with abdomino-pelvic malignancies.

MATERIALS AND METHODS

This was a record basis cross-sectional study conducted at Radiology Department of Kuwait Teaching Hospital, Peshawar, Pakistan from June 5, 2016 to June 30, 2016. Cases for the period from December 2015 to May 2016 were identified from electronic data base. One hundred and twenty seven patients were selected through non probability, consecutive sampling technique.

Those with histo-pathological diagnosis of primary malignancy and documented peritoneal disease on CT scan were included in this study. Patients with tuberculosis and lymphoproliferative disorders were excluded from this study. The 1st author (FA) herself with more than seven years experience in body CT reviewed the cases. CT scans were performed on 16-slice CT scanner (Toshiba Medical Systems Corporation, Tokyo) after intravenous (I/V) contrast injection. Continuous one-mm reconstructed images were reviewed and when necessary multi planar reformations at different window level and settings were performed.

Demographic variables in this study were gender and age in years while research variables were types of primary abdomino-pelvic malignancies causing peritoneal carcinomatosis, patterns of peritoneum involvement, common peritoneal sites of involvement and associated findings of ascites, lymphadenopathy and metastasis

Types of primary abdomino-pelvic malignancies causing peritoneal carcinomatosis were cancers of ovarian, colorectal, gallbladder, gastric, without any known primary, pancreatic, hepatocellular and others. 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, small bowel mesentery, serosal surfaces of bowel loops and diaphragm. Associated findings of ascites, enlarged lymph nodes and metastasis (bony/ hepatic/ splenic or lung) were also evaluated. Age in years was a numeric and the rest were nominal data.

Frequencies and percentages were calculated for nominal data while means and standard deviation (SD) were calculated for numeric data.

RESULTS

Out of 127 patients, males were 42 (33.08%) and females 85 (66.92) with male to female ratio of 1: 2. The mean age of patients was 49±14 (15-85, range of 70) years.

The type of malignancies showing peritoneal involvement were ovarian cancer in 38 (30%), colorectal cancer in 16 (13%), gallbladder cancer in 16 (13%), gastric cancer in 14 (11%), without any known primary in 11 (9%), pancreatic cancer in nine (7%), hepato-cellular cancer (HCC) in four (3%) and other cancers like cervical cancer, ampullary cancer, lymphoma, uterine cancer, vaginal cancer, pheochromocytoma, appendix mucinous carcinoma, cholangiocarcinoma and few rare carcinomas in 18 (14%). (Figure 1)

The most common pattern of peritoneal involvement was mixed in 43 patients (34%), omental caking in 36 patients (28%), nodular deposits in 32 patients (25%), smudge pattern in 13 patients (10%) and cystic pattern in three patients (3 %).

The most common sites of involvement were greater omentum in 71 (56%), followed by pelvis in 19 (14%), diaphragmatic peritoneum in 16 (13%), small bowel mesentery in 12 (10%) and serosal surfaces in nine (7 %) patients.

Associated findings were ascites in 65 (51%) patients, enlarged lymph nodes in 57 (45%) and bony/ hepatic/ splenic or lung metastasis in 37 (29%) cases.
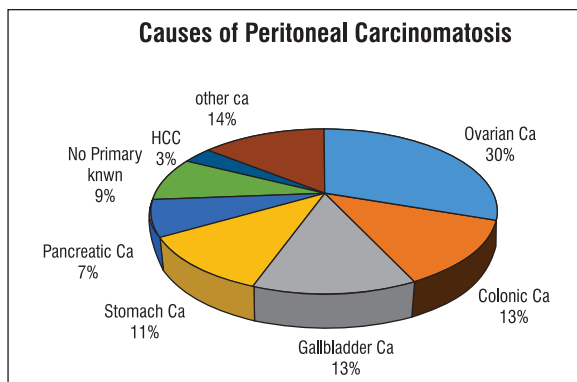

Figure 1. Causes of peritoneal carcinomatosis in patients with abdomino-pelvic malignancies on multi detector computed tomography shown as percentages.

DISCUSSION

Regarding patterns of involvement the present results were comparable to studies by Motta et al[8] and Rodriguez et al.[25] Mixed pattern of peritoneal disease was seen in 40% cases in the study by Motta et al[8] as compared to 34% in our study. Some difference was seen in nodular pattern which was seen in 25% cases in this study compared to 36% seen in study by Rodriguez et al.[25] This study showed mixed pattern being commonest pattern of involvement of peritoneum in overall malignancies followed by omental caking and nodular pattern. Study by Rodriguez et al[25] showed pelvic peritoneum involvement in 15% of cases in comparison with this current study of 14%. Ovarian cancer constituted the majority of the cases of this study. This is consistent with various studies reported in literature.[5,8,9] It is followed by colorectal carcinoma, gallbladder cancer, pancreas cancer, stomach cancer and other malignancies including hepatocellular cancer, transitional cell cancer, and endometrial cancer.[10,11,18] Mamlouk et al showed colonic cancers to be next in order of frequency as a causative factor of peritoneal carcinomatosis as evident in current study.[19] The present study showed that these malignancies cause enhancing nodular omental deposits. This is also favored by other studies.[17,19, 23] Regarding recent advances in this field, CT combined with 18F-FDG-PET has improved the sensitivity and specificity of detection of peritoneal disease. In a study by Dirisamer et al, CT detected peritoneal seeding in 26/31 (83.87%) patients, 18F-FDG-PET in 25/31 (80.64%) patients, and 18F-FDG-PET/MDCT in 30/31 (96.77%) patients, indicating a higher degree of sensitivity and specificity of combined PET-CT approach.[26] Characterization of omental disease is a subjective finding and no quantitative measurements are described in literature, however, we feel that in the hands of experienced radiologists many of the diagnostic dilemmas can be solved through better characterization of patterns of peritoneal involvement.

CONCLUSION

The most common type of malignancy showing peritoneal involvement was ovarian cancer. The most common pattern of peritoneal involvement was mixed. The most common site of involvement was greater omentum. Most common associated finding was ascites.

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AUTHORS' CONTRIBUTION

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