Original Article, PET/CT.

Diagnostic Accuracy of Positron Emission Tomography / Computed Tomography (PET/CT) for Diagnosis of Peritoneal Carcinomatosis of Colorectal Origins.

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ABSTRACT:

Background*:* Peritoneal carcinomatosis (PC) may be difficult to diagnose using multiple imaging techniques, especially when it comes to identifying small peritoneal lesions. The detection of peritoneal metastatic dissemination alters the staging of tumors and serves as a valuable prognostic factor in several malignancies. The purpose of this research was to show that positron emission tomography/computed tomography (PET/CT) is useful for diagnosing peritoneal carcinomatosis in patients with colorectal cancer. **Methods:** We enrolled 31 patients with intestinal malignancy affecting any site from ileocecal valve till anus. Specialized workstations and software were used to reconstruct the raw data. The PET/CT examinations were individually analyzed by an expert group of nuclear medicine doctors and radiologists with correlation between the conventional CT images alone with the fused PET/CT images on emphasis of the peritoneal lesions. **Results*:*** Correlation of CT findings and PET/CT findings versus the definitive nature of peritoneal nodules showed that CT had a sensitivity 60%, specificity 83.3% and overall diagnostic accuracy 64.5%, while PET/CT showed sensitivity 100%, specificity 83.3% and overall diagnostic accuracy 96.8% for detection of malignant peritoneal nodules which ware the commonest PC patterns.
Conclusion*:* PET/CT imaging is crucial to identify and characterize peritoneal carcinomatosis, especially useful for determining the stage of the disease, treatment planning, and post-treatment monitoring. also when peritoneal biopsy is unattainable to enhanced precision in determining the suitability of patients for adjuvant chemotherapy.

Keywords: PET/CT -Peritoneal metastases -CT -Colorectal Cancer.

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INTRODUCTION:

The peritoneum is a common location for the spread of secondary diseases that have originated in nearby visceral organs or far away metastatic deposits, omenta, and mesenteries. Despite advancements in imaging technology that have greatly enhanced spatial resolution, the identification of peritoneal lesions continues to pose challenges. This difficulty can be attributed to the intricate anatomical structure of the peritoneal organ, as well as the wide surface area that may harbor tumor deposits, which are often small or nodular in nature.[(1).]

Peritoneal carcinomatosis (PC) is a significant prognostic factor that has a big impact on how cancers, like colorectal and ovarian cancer, are staged. In these types of cancer, the prognostic value of peritoneal metastases surpasses that of tumor size or lymph node involvement, making it a more effective determinant of patient outcome. Early localization and diagnosis are therefore essential for any potential surgical intervention or cytoreductive therapy prior to surgical procedure[(2,3,4,).]

The staging and restaging of many tumours have been greatly enhanced by Fluorodeoxyglucose positron-emission tomography and computed tomography (CT) [^{18}F]-FDG PET/CT, which has a high accuracy for detecting primary lesions and distant metastases[(5)].

[^{18}F]-FDG PET/CT have recently been used in multiple studies to evaluate the early chemotherapy response for different cancer types. There is a scarcity of data about the efficacy of [18F]-FDG-PET/CT in evaluating the presence of peritoneal carcinomatosis (PC) originating from colorectal cancer (CRC) [(6)].

To determine if a patient is a good candidate for cytoreductive procedures and hyperthermic intraperitoneal chemotherapeutic (HIPEC), [18F] FDG-PET/CT can be used to identify individuals who have non-mucinous colorectal cancer-derived peritoneal carcinomatosis. Additionally, [18F]-FDG-PET/CT may be a useful tool for assessing the efficacy of neoadjuvant chemotherapy in treating peritoneal carcinomatosis and directing treatment plans for patients with peritoneal carcinomatosis resulting from colorectal cancer, given the strong correlation found between the quadrant exhibiting the highest metabolic activity on the scan and the most

affected region as indicated by the peritoneal cancer index score [7].

In patients with a confirmed diagnosis of colorectal cancer, the purpose of this study was to evaluate the diagnostic value of [18F]-FDG-PET/CT in the identification of peritoneal metastases.

PATEINTS AND METHODS:

Our research comprised a cohort of 31 persons who were diagnosed with intestinal cancer affecting any region from the ileocecal valve to the anus. The patients' average age was 57.9±11.5 years, with a range of 32-78 years. The male gender constituted the majority of the participants, with 64.5% of the total, while females accounted for 35.5%.

Inclusion criteria:

Individuals with suspected peritoneal deposits known to have intestinal malignancy affecting any site from ileocecal valve till anus coming for preoperative metastatic work up, post therapeutic assessment or annual follow up.

Exclusion criteria:

The study includes individuals who are at least 18 years old and have a blood glucose level of 150 mg/dl or more, as well as a serum creatinine level of 1.2 mg/dl or higher, which is within the normal range. Cognitively impaired or mentally disabled, dementia. Pregnancy/lactation.

Patients refuse participation in the study.

The research acquired permission from the Research Ethics Committee and verified that informed permission was obtained from all participants. The guarantee of maintaining the confidentiality of patient data was ensured.

The study was conducted at a PET/CT unit in a private institution, spanning from July 2022 to February 2023.

Methods:

The PET/CT equipment, including the Philips Medical Systems-Cleveland-Gemini TF (Time of flight)-USA, was used to do the examination. This device combines a 16 MDCT scanner and a PET scanner. Every patient followed the prescribed fasting period, which was six hours or less before the examination started. In accordance with standard procedure, the patient had a manual intravenous (IV) injection of (18F-FDG) 60 minutes before the commencement of the examination. The administered dose was quantified as 3.7 (MBq/kgm), with a maximum allowable dose of 370 MBq. The maximum recommended dosage for 18F-FDG

is 10 mCi/kg. Before beginning the examination, the urine bladder is emptied.

The first phase in the imaging process was using a non-contrast low-dose CT approach, which was then followed by PET scans encompassing the anatomical region from the skull to the mid-thighs. Subsequently, a series of axial imaging scans were conducted using intravenous contrast-enhanced computed tomography (CT), including the same anatomical extent spanning from the cranium to the mid-thigh region. The scans were acquired with a uniform slice thickness of 3 mm at consistent intervals. A non-ionic substance, namely Iopamidol 300 mgI/ml, was used as the contrast medium in this work. The substance was administered intravenously at a flow rate of 3-4 milliliters per second, with a prescribed dose of 1-2 milliliters per kilogram of body weight.

The following settings were used for the PET/CT scans: supine PET imaging and whole-body scanning in eight different bed positions, with an axial field of view of approximately fifteen centimeters for each bed position.

The CT parameters that were employed in this study were a slice thickness of three millimeters, an incrementation of 0.5 millimeters, a tube voltage of 120 kV, and a tube current of 50 mA. The duration of data collecting for emission measurements at each bed position in a craniocaudal orientation varied between 1 and 2 minutes. The length of the assessment ranged from 24 to 38 minutes.

Image interpretation and analysis: Special workstations and software were used to reconstruct the raw data. In order to acquire images for the purpose of qualitative and quantitative evaluation interpretation of the standard uptake value (SUV), The sagittal and coronal multiplanar planes were used to reconstruct all pictures, using the video mode feature on a Philips-Gemini TF workstation.

A consensus of nuclear medicine specialists and radiologists separately analysed all PET/CT exams, with correlation between conventional CT scans alone and fused PET/CT images on emphasis of the peritoneal lesions.

The determination of the highest uptake value for each lesion included the placement of areas of interest (ROI) on the axial attenuation-corrected PET slices. A threshold of at least five or more sport utility vehicles (SUVs) was deemed to be statistically significant.

If there is a localized elevation of the SUV that corresponds to a particular region on CT imaging, a malignant lesion is determined.

The major method used to establish a definitive diagnosis for all patients in this study was histology of the original tumor, supplemented by follow-up assessments

(clinical and radiological) of peritoneal lesions, if such data were accessible. Lesions were considered to be positive if they had increased FDG absorption as judged by ocular assessment.

On follow-up PET/CT scan, lesions were considered true-positive if they exhibited resolution or improvement in terms of size, number, and/or FDG uptake subsequent to chemotherapy treatment.

Lesions that yielded false-positive results were deemed as such if they persisted in the follow-up PET/CT examination subsequent to the administration of therapy.

Lesions were classified as negative if they had low grade FDG uptake as determined through visual assessment.

Lesions that exhibited no changes in terms of size, number, and/or FDG uptake on the following PET/CT scan were classified as true-negative.

False-negative lesions were evaluated if follow-up PET/CT scan revealed an increase in FDG uptake or disease progression.

Statistical analysis: The statistical analysis was conducted using the 22nd version of SPSS.

The categorical variables were presented in terms of frequency and percentage, and their comparison was conducted via the chi-square test.

Measures including the mean, standard deviation, and range were incorporated in the display of continuous variables. To assess the differences between computed tomography (CT) and the use of positron emission tomography/computed tomography (PET/CT), a comparative research was carried out.

The Friedman test was used for this objective. Furthermore, a paired comparison was conducted with the **McNemara** test to assess the concordance between the ultimate diagnoses derived from CT and PET scans and the ultimate diagnosis of peritoneal nodules. 2x2 contingency tables were used to compute the diagnostic indices.

RESULTS:

We enrolled 31 patients with intestinal malignancy affecting any site from ileocecal valve till anus, the patient's mean age was 57.9±11.5 years, ranging from 32-78 years. Males were the largest proportion of the included patients accounting for 64.5% versus 35.5% females. Regarding lines of management, 64.5% of the included patients underwent surgical intervention, 9.7% received radiation therapy and 48.4% received chemotherapy. Tumor markers were positive in 10 (32.3%) patients of the enrolled group.

Baseline demographic and clinical characteristics

Table 1. Baseline demographic and clinical characteristics among the included patients.

		Mean SD	Range
Age	Years	57.9±11.5	32-78
		N	**%**
Sex	Male	20	64.5%
	Female	11	35.5%
Surgical intervention	No	11	35.5%
	Yes	20	64.5%
Radiotherapy	No	28	90.3%
	Yes	3	9.7%
Chemotherapy	No	16	51.6%
	Yes	15	48.4%
Type of colon cancer	Adenocarcinoma	29	93.5%
	Poorly differentiated carcinoma	2	6.5%
Tumor markers	Negative	21	67.7%
	Positive	10	32.3%

Computed tomography findings:

1-According to number:

In the present study CT scan showed that 15 (48.4%) patients were negative for peritoneal nodules (as they were not seen in CT images either when read alone or when correlated to PET/CT images). while 32.3% had one lesion, and 19.4% of the included patients had <5 peritoneal lesions.

2-According to pattern:

The presence of nodules was the commonest finding, accounting for 38.7% of the included patients followed by ascites in 19.4%.

3-According to size:

The size of the lesions were mainly >2 cm accounting for 25.8% followed by 0.5-2 cm accounting for 22.6%.

4-According to site:

Thirteen patients had equal of less than 2 regions affected by peritoneal lesions while only 3 patients had >2 affected regions.

Table 2. Peritoneal disease assessment by CT.

		N	%
CT findings number	Negative	15	48.4%
	One lesion	10	32.3%
	<5 lesions	6	19.4%
	>5 lesions	0	0.0%
Pattern	Negative	9	29.0%
	Sheets	1	3.2%
	Sheets and ascites	1	3.2%
	Nodules	12	38.7%
	Mass	2	6.5%
	Ascites	6	19.4%
Size	Negative	15	48.4%
	<0.5 cm	1	3.2%
	0.5-2 cm	7	22.6%
	>2 cm	8	25.8%
Site	Negative	15	48.4%
	<=2 region	13	41.9%
	>2 region	3	9.7%

5-According to activity:

Twenty-five (80.6%) patients showed active FDG uptake of the peritoneal lesions with mean SUV 6.8± 6.6 with maximum SUV 29.

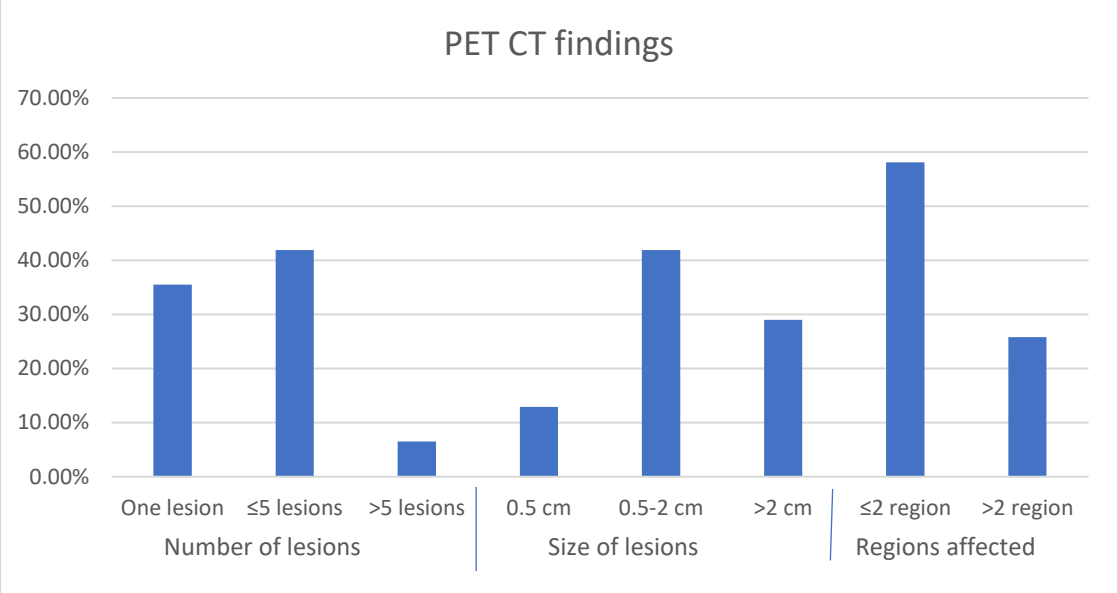

***Figure 1**, bar chart showing PET-CT findings of size, site and regions affected by peritoneal lesions.*

Table 3. Peritoneal disease assessment by PET/CT.

		N	%
PET CT findings number	Negative	5	16.1%
	One lesion	11	35.5%
	≤5 lesions	13	41.9%
	>5 lesions	2	6.5%
Pattern	Negative	4	12.9%
	Sheets	2	6.5%
	Sheet and Nodules	3	9.7%
	Sheets and ascites	6	19.4%
	Nodules	13	41.9%
	Nodules and mass	1	3.2%
	Mass	1	3.2%
	Ascites	1	3.2%
Size	Negative	5	16.1%
	<0.5 cm	4	12.9%
	0.5-2 cm	13	41.9%
	>2 cm	9	29.0%
Site	Negative	5	16.1%
	≤2 region	18	58.1%
	>2 region	8	25.8%
Activity	Not active	6	19.4%
	Active	25	80.6%
SUV		6.8± 6.6	0-29

Peritoneal nodules activity and imaging

Correlation between CT and PET/CT findings with regards to peritoneal lesions activity showed that size of the lesion >0.5 cm was significantly associated with metabolic activity with p value 0.022, while CT number of lesions and site didn't show the same significance.

According to PET/CT findings, the number, size and site of lesions were significantly associated with the number of affected regions and size of the lesions, as patients with large lesions >0.5 cm accounting for 84% was significantly more active compared to smaller lesions, and patients with regions affection were more active than <2 regions with p values <0.001, and <0.001 respectively.

(A significance level of 0.05 was used to determine statistical significance. A p-value greater than 0.05 was deemed to be statistically insignificant.).

Table 4: correlation of PET and CT findings of peritoneal nodules in correlation with disease activity.

		Activity				
		Not active		Active		
		N	%	N	%	p value
CT findings; number	Negative	5	83.3%	10	40.0%	0.144
	One lesion	1	16.7%	9	36.0%	
	<5 lesions	0	0.0%	6	24.0%	
	>5 lesions	0	0.0%	0	0.0%	
size	Negative	5	83.3%	10	40.0%	0.022
	0.5 cm	1	16.7%	0	0.0%	
	0.5-2 cm	0	0.0%	7	28.0%	
	>2 cm	0	0.0%	8	32.0%	
site	Negative	5	83.3%	10	40.0%	0.155
	<=2 region	1	16.7%	12	48.0%	
	>2 region	0	0.0%	3	12.0%	
PET CT findings number	Negative	5	83.3%	0	0.0%	<0.001
	One lesion	1	16.7%	10	40.0%	
	<5 lesions	0	0.0%	13	52.0%	
	>5 lesions	0	0.0%	2	8.0%	
size	Negative	5	83.3%	0	0.0%	<0.001
	<0.5 cm	0	0.0%	4	16.0%	
	0.5-2 cm	1	16.7%	12	48.0%	
	>2 cm	0	0.0%	9	36.0%	
site	Negative	5	83.3%	0	0.0%	<0.001
	<=2 region	1	16.7%	17	68.0%	
	>2 region	0	0.0%	8	32.0%	

Imaging and tumor markers

our study showed positive tumor markers was not significantly correlated to site, number, size or pattern of peritoneal disease according to both CT and PET/CT.

Table 5: comparison of PET and CT findings of peritoneal nodules in correlation with tumor markers.

		Tumor markers				
		Negative		**Positive**		
		N	%	N	%	p value
CT findings; number	Negative	11	52.4%	4	40.0%	0.782
	One lesion	6	28.6%	4	40.0%	
	<5 lesions	4	19.0%	2	20.0%	
	>5 lesions	0	0.0%	0	0.0%	
size	Negative	11	52.4%	4	40.0%	0.765
	0.5 cm	1	4.8%	0	0.0%	
	0.5-2 cm	4	19.0%	3	30.0%	
	>2 cm	5	23.8%	3	30.0%	
site	Negative	11	52.4%	4	40.0%	0.800
	<=2 region	8	38.1%	5	50.0%	
	>2 region	2	9.5%	1	10.0%	
PET CT findings number	Negative	5	23.8%	0	0.0%	0.268
	One lesion	8	38.1%	3	30.0%	
	<5 lesions	7	33.3%	6	60.0%	
	>5 lesions	1	4.8%	1	10.0%	
size	Negative	5	23.8%	0	0.0%	0.310
	<0.5 cm	2	9.5%	2	20.0%	
	0.5-2 cm	9	42.9%	4	40.0%	
	>2 cm	5	23.8%	4	40.0%	
site	Negative	5	23.8%	0	0.0%	0.170
	<=2 region	12	57.1%	6	60.0%	
	>2 region	4	19.0%	4	40.0%	

Paired comparison.

Paired comparison of CT and PET/CT findings showed that both modalities were significantly different in terms of number of lesions, size and site of lesions with p values <0.001, 0.001 and <0.001.

Table 6: Paired comparison of PET and CT findings of peritoneal nodules.

		CT		**PET-CT**		
		N	%	N	%	p value
Findings	Negative	15	48.40%	5	16.10%	<0.001
	One lesion	10	32.30%	11	35.50%	
	<5 lesions	6	19.40%	13	41.90%	
	>5 lesions	0	0.00%	2	6.50%	
size	Negative	15	48.40%	5	16.10%	0.001
	<0.5 cm	1	3.20%	4	12.90%	
	0.5-2 cm	7	22.60%	13	41.90%	
	>2 cm	8	25.80%	9	29.00%	
site	Negative	15	48.40%	5	16.10%	<0.001
	<=2 region	13	41.90%	18	58.10%	
	>2 region	3	9.70%	8	25.80%	

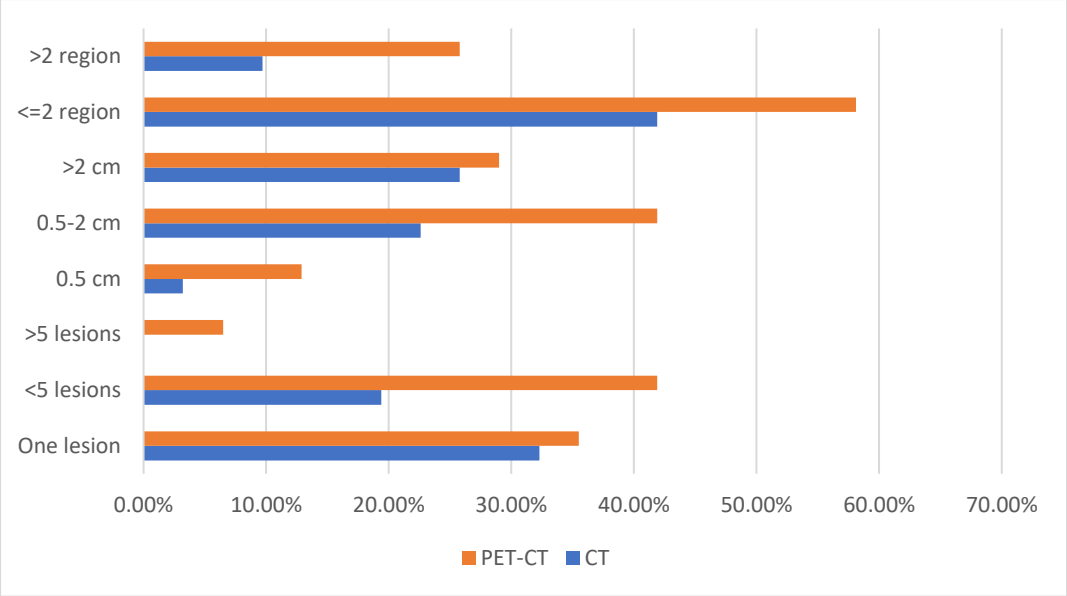

***Figure 2**, bar chart showing site, size and number of lesions detection by both imaging modalities.*

Diagnostic indices of imaging

Correlation of CT findings and PET/CT findings versus the definitive nature of peritoneal nodules showed that CT had a sensitivity 60%, specificity 83.3% and overall diagnostic accuracy 64.5%, while PET/CT showed sensitivity 100%, specificity 83.3% and overall diagnostic accuracy 96.8% for detection of malignant peritoneal nodules.

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Table 7. Comparison of CT and PET CT findings versus definitive peritoneal nodules nature.

		Peritoneal nodules			
		Negative		Positive	
		N	%	N	%
CT	Negative	5	33.30%	10	66.70%
	Positive	1	6.30%	15	93.80%
PET	Negative	5	100.00%	0	0.00%
	Positive	1	3.80%	25	96.20%

Table 8. Diagnostic indices of CT in detection of peritoneal nodules.

CT		
Statistic	Value	95% CI
Sensitivity	60.00%	38.67% to 78.87%
Specificity	83.33%	35.88% to 99.58%
Positive Likelihood Ratio	3.6	0.58 to 22.17
Negative Likelihood Ratio	0.48	0.26 to 0.87
Disease prevalence	80.65%	62.53% to 92.55%
Positive Predictive Value	93.75%	70.90% to 98.93%
Negative Predictive Value	33.33%	21.55% to 47.64%
Accuracy	64.52%	45.37% to 80.77%

Table 9. Diagnostic indices of PET-CT in detection of peritoneal nodules.

PET-CT		
Statistic	Value	95% CI
Sensitivity	100.00%	86.28% to 100.00%
Specificity	83.33%	35.88% to 99.58%
Positive Likelihood Ratio	6	1.00 to 35.91
Negative Likelihood Ratio	0	
Disease prevalence	80.65%	62.53% to 92.55%
Positive Predictive Value	96.15%	80.68% to 99.34%
Negative Predictive Value	100.00%	
Accuracy	96.77%	83.30% to 99.92%

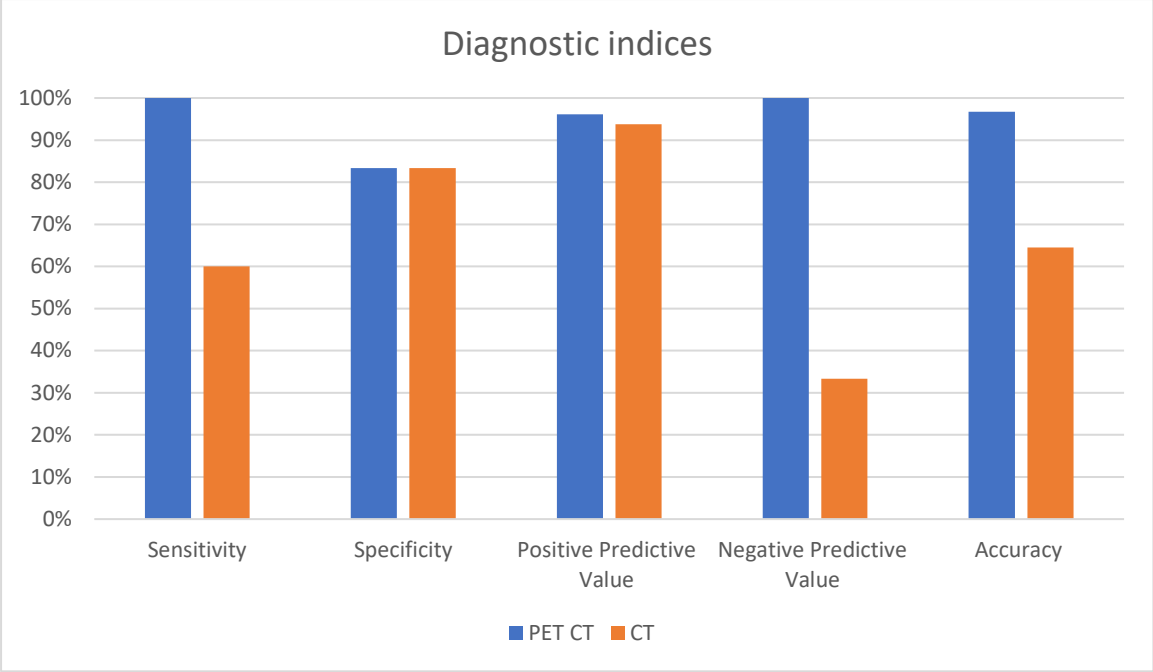
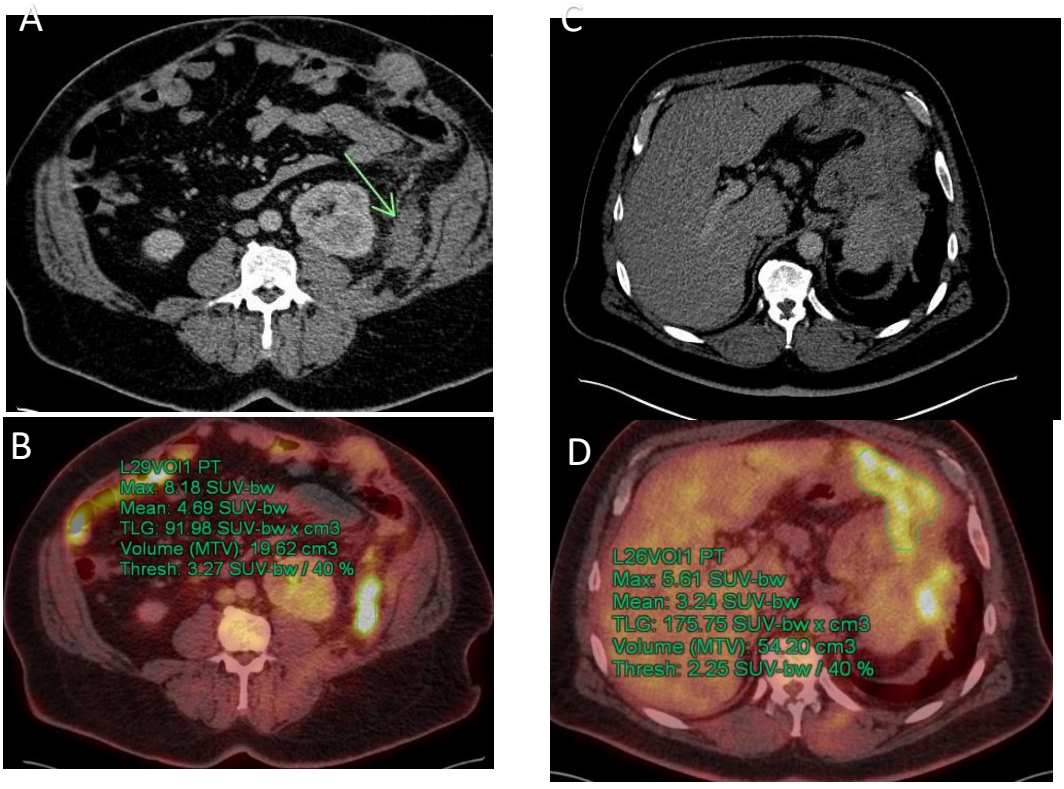


***Figure 3**, bar chart showing diagnostic indices of CT and PET-CT in detection of peritoneal nodules.*



Figures **(4)** A 54yr-old male, with rectal adenocarcinoma underwent surgical excision followed by chemotherapy. (**A).** CT images showed left sub-phrenic and lumbar regions ill-defined faintly enhancing peritoneal soft tissue thickening (**B)**. Fused PETCT images showed metabolically FDG avid peritoneal nodular thickening at left sub phrenic region 2.2cm in max. thickness with max. SUV=5.61. **(C, D)**. CT& Fused PETCT images showed other lesions at peri-splenic and left lumbar regions, measuring about 1.9cm achieving max SUV=8.18.

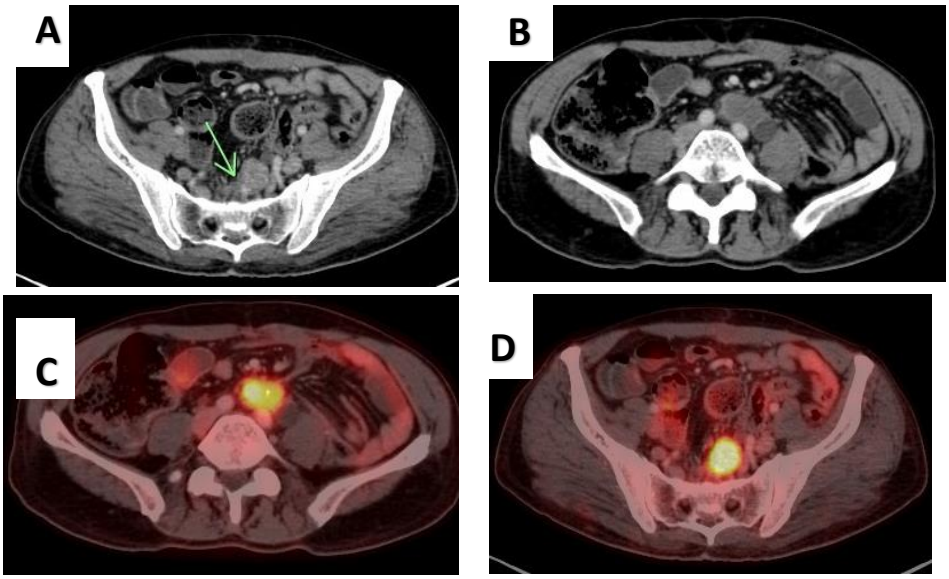


Figure **(5)**: A 50-yr-old male, with ano-rectal adenocarcinoma, received chemotherapy. (A, B) CT images showed enhancing peritoneal soft tissue nodules seen at left deep pelvic and presacral regions as well as just below the aortic bifurcation measuring about 2.5 & 3.5cm respectively showing faint enhancement. (C, D) Fused PETCT images showed metabolically FDG avid peritoneal nodules at the left deep pelvic and presacral (para rectal) lesion measuring about 2.5 cm in width and 6.3 cm in length with SUV max 9.1 as well as at the aortic bifurcation and along the course of the left common iliac artery, the lesion is measuring about 3.5 x 4.4 cm at its max. dimensions with SUV max 8.87. It s encroaching upon / entangling the left ureter with subsequent proximal hydronephrosis.

DISCUSION:

Peritoneal Carcinomatosis (PC) refers to an advanced manifestation of gastrointestinal cancer, encompassing malignancies originating from the appendix, colon, and stomach. Tumors originating from the pancreas have the ability to spread and disseminate into the peritoneal surface, hence limiting patients to palliative therapeutic options. [(8)].

Colorectal cancer (CRC) is recognized as the third most prevalent form of malignancy globally and is considered a significant contributor to the incidence of PC. The prevalence of synchronous isolated peritoneal carcinomatosis in persons diagnosed with colorectal cancer varies between 4% and 18% in the literature with metachronous PC described in 5-19% of patients after final therapy[(9,10,11)].

Colorectal PC has a median survival of around five months, which palliative systemic treatment can prolong to about 12 months. Early PC identification while tumor load is low may improve the efficacy of existing treatment approaches [(12)].

Diagnosis of PC is quite challenging, although CT scan is the commonest modality to assess disease progression or relapse among patients with CRC, it only shows 11-48% sensitivity for tumors less than 5 mm [13].

Positron emission tomography scanning is a type of imaging that is commonly used in oncology. It employs radiotracers to measure metabolic processes that occur in various parts of the body. It detects changes in metabolism, blood flow, and regional chemical composition by the injection of radiotracers, which are subsequently retained in various tissues throughout the body based on their affinity for glucose metabolism. Images demonstrate increased absorption and brighter patches in areas with higher metabolic activity and glucose intake [14].

Numerous studies have been undertaken to assess the sensitivity and significance of positron emission tomography-computed tomography (PET-CT) in the early identification and diagnosis of pancreatic cancer (PC). Nevertheless, the existing body of literature presents divergent findings about the incremental benefits of PET-CT compared to conventional computed tomography (CT) or magnetic resonance imaging (MRI). A cross-sectional research was undertaken to evaluate the diagnostic precision of positron emission tomography / computed tomography (PET/CT) in the identification of peritoneal carcinomatosis originating from colorectal sources.

Our study involved 31 patients with intestinal malignancy affecting any site from ileocecal valve till anus, the included patients had a mean age of 57.9±11.5 (SD) years, ranging from 32-78 years. Males were the largest proportion of the included patients accounting for 64.5% versus 35.5% females.

The findings of this research are consistent with the risk variables that have previously been established for the development of colorectal cancer (CRC) at a worldwide level. Research findings indicate that there exists a disparity in the susceptibility to colorectal cancer (CRC) between men and females, with males exhibiting a greater propensity for acquiring the disease. In 2014, within the United Kingdom, the age-standardized rates (ASRs) for colorectal cancer (CRC) were recorded as 86.1 per 100,000 males and 56.9 per 100,000 women. According to available data, an estimated 22,844 new cases of colorectal cancer (CRC) occur year in men, whereas around 18,421 new cases are reported in females. The user did not provide any text to rewrite.

In the present study, CT showed that the commonest finding was nodules in 38.7% of the included patients followed by ascites in 19.4%. PET/CT showed that peritoneal nodules were the commonest pattern of

peritoneal lesions accounting for 45.1% followed by sheets in 36.6% of the included patients.

Similarly, **Darweesh** et al., discovered that the most frequently observed peritoneal lesion detected by CT and PET/CT was nodules, followed by sheets of metabolic uptake and diffuse affection [16].

PET/CT showed nodular uptake in 47 (75%) patients out of the 62 nodules reported at surgery, and the diffuse patterns were seen in seven scans (70%) out of the ten reported at surgery. This supports the findings of Funicelli et al., who found that nodules were the most common form of peritoneal carcinomatosis detected by SDCT, MDCT, and PET/CT. [17]

The number of lesions, lesion size, and lesion location were all shown to be substantially different between CT and PET/CT in our investigation, with p values of 0.001, 0.001, and 0.001 for each comparison, respectively.

When comparing CT and PET/CT findings to the definitive nature of peritoneal nodules, we discovered that CT had a sensitivity of 60%, specificity of 83.3%, and overall diagnostic accuracy of 64.5%, while PET/CT had a sensitivity of 100%, specificity of 83.3%, and overall diagnostic accuracy of 96.8%.

Diagnostic accuracy of PET/CT for the detection of peritoneal carcinomatosis was found to be 76.2%, 88.9%, and 80%, respectively, according to research by **Darweesh** et al. [15].

Dirisamer et al., analysed 31 patients with confirmed PC using CT and PET/CT, they observed that CT demonstrated peritoneal seeding in 26/31 patients vs 25/31 patients for 18F-FDG-PET with sensitivity of 88%, and 88%, with specificity of 97%, 94%, respectively [18].

Similar results were reported by **Soussan** et al., who also found that PET/CT was very effective in the diagnosis of peritoneal carcinomatosis, with a sensitivity of 84%, specificity of 84%, and accuracy of 80%.[17]

On a per-patient basis a large meta-analysis of 21 trials found that the combined sensitivity of PET/CT was 84%, compared to 60% for PET alone, while the combined specificity of PET was 98%, compared to 94% for PET/CT. These results demonstrate the complementary nature of CT and PET, given that PET alone exhibited lower sensitivity and greater specificity. [19]

FDG-PET/CT exhibited a sensitivity and specificity of 85% (22/26) and 88% (23/26), respectively, and a diagnostic accuracy of 87% for PC diagnosis, according to an analysis by **Liberale** et al [20].

The diagnostic accuracy of PET/CT for PC was evaluated by Dubreuil et al. and found to

be 87%, with a sensitivity of 86% and a specificity of 89%.[21]

Seven studies' worth of data (n=513patients) were pooled together for a meta-analysis. Diagnostic accuracy was 87.8% and sensitivity was 72.4% (95% CI, 64.4%-79.5%) and specificity was 96.7% (95% CI, 94.4%-98.3%) for FDG PET/CT scans in the detection of peritoneal carcinomatosis. [22]

In the preoperative staging of peritoneal carcinomatosis, contrast-enhanced (CT) shows sensitivities between 25% and 100% and specificities between 78% and 100%. Consequently, it continues to be the favored imaging modality in this setting owing to its broad availability, cost-effectiveness, and capacity to deliver rapid data that can be effectively communicated [23, 24, 25].

A comparison of CT scan and PET/CT for the identification of PC found that the former had a higher sensitivity (76.5% vs. 35.3%) and specificity (91.6 percent vs. 98.9 percent) than the latter [26]. The exclusive focus on patients with stomach malignancies explains this finding.

Other studies had shown poor correlation between PET/CT findings and surgical extent of PC, as **Elekonawo** et al., concluded that PET/CT tends to underestimate the extent of PC during surgery especially for both mucinous and non-mucinous CRC [4].

Dromain et al., has also found that CT and PET/CT are poorly correlated with surgical findings among patients diagnosed with PC, as both tend to under-stage >90% of patients, and downstage a very minor proportion [27].

Our study demonstrated that PET/CT is a highly sensitive and effective modality for the diagnosis of PC. However, a significant limitation of PET/CT is the potential misregistration caused by patient and bowel movements that occur during the relatively prolonged acquisition phase of PET, which lasts around 4 minutes per bed position. Misregistration resulting from physiological bladder activity can manifest in positron emission tomography (PET) scans as pelvic activity that is positioned above the actual site of the bladder, as shown in the corresponding (CT) scans. This observation might potentially hide pathological pelvic activity, leading to the possibility of lesions being overlooked due to overlap with bladder activity. One potential challenge pertains to the gastrointestinal tract, wherein routine physiological processes may be erroneously seen as pathological or vice versa, particularly when the processes are localized [28].

LIMITATIONS:

Limitations faced in the current study were mainly the small sample size, lack of assessment to extent of peritoneal affection and its correlation with surgical findings.

CONCLUSIONS:

CT can be performed as a primary method of diagnosis in suspected cases, however, further PET/CT imaging is required to early detect the peritoneal carcinomatosis and in management of CRC.

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