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The Diagnostic Accuracy of Contrast-Enhanced Computed Tomography in Detecting Colorectal Cancer in Saudi Patients

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Abstract— In Saudi Arabia, colorectal carcinoma is the second most common type of cancer. According to the Saudi Health Council, 1,659 colorectal cancer cases were diagnosed in Saudi nationals in 2016, accounting for 12.6% of all newly diagnosed colorectal cancer (CRC). This study aimed to detect colorectal cancer in Saudi patients by determining the diagnostic accuracy of contrast enhanced computed tomography (CECT). Thisretrospective study was conducted in King Fahad medical city, computed tomography (CT) department during the period from February to May 2019. 54 patients were scanned using a convenience sampling technique, contrast-enhanced CT was performed, Sensitivity and Specificity of (CECT) were calculated to evaluate detection of colorectal cancer. A social science statistical package (SPSS) was used to analyze the data .The study found that there were 54 patients with colorectal cancer,57.4%were males, while 42.6% were females. . The patients' average age was 54.28±13.171 years. Contrast enhanced computed tomography demonstrated an 87% accuracy of diagnosis, with a sensitivity of 89.36% and a specificity of 50% (P<05). The study concluded that CECT (contrast enhanced computed tomography) is a non-invasive imaging modality that used to diagnose and differentiate colorectal lesions., with a sensitivity of 89.36% and a specificity of 50%.

Keywords: Computed Tomography, Colorectal cancer , Saudi patients

1. Introduction

Colorectal cancer is the second most prevalent cancer in Saudi Arabia (1). According to the Saudi Health Council in 2016, there were 1,659 colorectal cancer cases accounting for 12.6% of all newly diagnosed colorectal cancer (CRC) among Saudi nationals, which is the cancer with highest prevalence among males and third among females that affected 955 (57.6%) males and 704 (42.4%) females (2).

In 2018, there were an estimated 18 million cancer cases worldwide (3). According to incidence rates, colorectal cancer ranks third among all cancers in the world about 1,849,518 (10.2%). In men, colorectal cancer is the third most prevalent type of cancer, accounting for 1,026,215 cases (10.9%). It is the second most common cancer in females, accounting for 823,303 (9.5%) cases (4).

Colorectal cancer is the most common type of malignant tumor of the digestive system (5). It is found in the epithelial cells that line the large bowel (6). Numerous symptoms, such as changes in intestinal habitus, diarrhea, bleeding from the anal area, weakness, and lethargy, unexpected weight loss, cramping, and abdomen ache, could point to colorectal cancer (CRC) (7). Inflammatory bowel disorderis indeed one of the main reasons for colorectal cancer (8). A high red meat diet (beef, lamb, or liver) and a low fiber diet can both increase the risk of colorectal carcinoma (7).

Contrast enhanced computed tomography (CECT) is a non-invasive imaging technique that, with higher diagnostic accuracy, aids in the detection and Colorectal tumor distinction through detailed investigation of the lesion features with higher diagnostic precision (9).
The CECT abdomen's accuracy is satisfactory with the detection of colorectal carcinoma in patients who are suspected clinically in having the disease, using histopathology as the gold standard (9). This enabled us to provide an excellent evaluation of extraintestinal abnormalities, besides bowel disease assessment, leading to an increase in specificity of diagnoses of the lesions (9 ,10). Colonoscopy is still the most important and sensitive screening test tool available today. Despite its limitations, this method is still regarded as a powerful diagnostic and treatment procedure (11).

2. Methodology

2.1 study design and place of the study

A retrospective study design.This study was approved by institutional review broad (IRB:Princess Nourah bint Abdulrahman University (IRB number: 20-0050). Suspected patients of colorectal cancer came to the Radiology department to perform a CT of the abdomen and pelvis, with contrast and referred to histopathology lab at King Fahad Medical City in Riyadh, Saudi Arabia. Included in this study were Saudi patients diagnosed with colorectal cancer (CRC).Non-Saudi patients, whom of which have irritable bowel syndrome, internal and external hemorrhoids, anal fissure, perianal abscess, diverticular disease, polyps and colitis were excluded. Due to the limited time, 54 patients were scanned using a convenience sampling technique. A statistical package for social science (SPSS) version 26 was used to analyze the data. People were categorized into one of the four cells in table 1 with the letters a through d based on their reference standard and screening test outcomes.It depended on whether the screening test produced a positive result (the person appears to have the disorder) or a negative result (the person was not considered to have the target condition based on the reference standard) (the person appears not to have the disorder).The numbers of individuals in each of the four cells can then be used to calculate the sensitivity, specificity, and predictive values, which, when demonstrated as percentages, are based on the following (Equation 1) (10)

	Disorder	No disorder
Positive test result	a True positive	b False positive
Negative test result	c False negative	d True negative
	Sensitivity	**Specificity**

Table (1):sensitivity and specificity calculation

2.1 CTProtocol and Technique:

Abdomen and pelvic CT scan were performed with intravenous contrast with the use of 64 Slice multidetector computed tomography MDCT Philip/GE Scanner. Images were taken in axial plane

from the xiphoid process until the pubic symphysis, then reformatted in the sagittal and coronal planes for more details.

3. Results

This study included 54 patients with colorectal cancer .

Table (1): Incidence distribution of patient's gender-based (n=54)

	Frequency	Percent
Male	31	57.4
Female	23	42.6
Total	54	100.0

The table describes the frequency of males 31 (57.4%) and females 23 (42.6%).

Table (2): Frequency distribution of patients according to age (n=54)

	No of patients	Minimum	Maximum	Average	STDEV
Age	54 54	19	75	54.28	13.171

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Table (3): Cross tabulation shows Diagnostic accuracy of CECT abdomen and sensitivity & specificity

			Histopathology test		
			Positive	Negative	Total
CECT test	Positive	Count	42	5	47
		% within Outcome	95.5%	50.0%	87.0%
	Negative	Count	2	5	7
		% within Outcome	4.5%	50.0%	13.0%
Total		Count	44	10	54
		% within Outcome	100.0%	100.0%	100.0%

Sensitivity=42% (42+5) *100= 89.36%
specificity =5% (5+5)*100=50%

Positive predictive value (PPV) = 42%(42+5)*100=89.36%
Negative predictive value (NPV) = 5%(2+5)*100=71.42%
Accuracy = 42+5% (42+5+5+2)*100 = 87%

4.Discussion

In this study, out of the fifty four patients, (57.4%) were men and (42.6%)were women table[(1)]. Our findings were concordant with the study done by and Sahito Abid Ali et al 2015 and Alsanea N et al 2015 (9,14) .They found that males were more commonly affected than females. The mean age in our study was 54.28±13.171 years [table (2)] which was higher than that found by Sahito Abid Ali et al 2015 (9).

This study presented that the sensitivity was 89.36% of CECT abdomen, which was higher than Nørgaard et al 2014 (13) and lower than what Sahito Abid Ali et al 2015 92.0% ,Dirisamer Albert et al 2010 91% an Richie et al 2016 100%, were deduced (9.12.26) it was also considerably higher than Sivesgaard Kim et al 2018 69% (18) ,Man Shuqian et al 2016 73% (16) as well as Qing Yu, Jie Liu 2016 74% (15) demonstrated. We observed low specificity 50% which was less than what Sahito Abid Ali et al 2015 were found 65% (9) ,Nørgaard et al 2014 (13) and specificity of 88.90%,by Richie et al 2016(17).

Our study showed a positive predictive value (PPV) of 89.36% which was slightly less than Sahito Abid Ali et al 2015 value 96.7% and higher than Nørgaard et al 2014 and our negative predictive value (NPV) was 71.42% which was significantly higher than what which was observed by Sahito Abid Ali et al 2015 41.9% and Nørgaard et al 2014 66% (13).[table (3)]

Most previous studies yielded mixed results,however, CECT abdomen seemed to have a maximum specificity value for distinguishing colon and rectal lesions (9). Although in the present study, specificity was only 50%, which would imply over-staging happened. This may be because of the threat about under staging the malignant lesion and/or misinterpreting the benign desmoplastic response by minimal peri-colonic marooning as tumor invasion. Additionally, it may also be because of differences in sample size of this study, gender, age, and geography differences. Therefore, regardless of the excellent accuracy, sensitivity, positive predictive value, and The CECT abdomen's negative predictive validity for malignancy remains to be revealed by histopathological examination. Moreover, there must have been several constraints to this research due to the shortage of time.

5. Conclusion and Recommendation

This study concluded that Contrast Enhanced Computed Tomography (CECT) plays a major role in diagnosing and differentiating of colorectal lesions with sensitivity 89.36%, specificity 50%, Positive Predictive Value was 89.36%, negative predictive value was 71.42% and accuracy was 89.9%.
We recommended another study with a larger sample size for more precise results.

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