Local Staging Characteristics (T2, T3) of Colorectal Cancer In Multislice Computerized Tomography (MSCT) Imaging

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Abstract

Background: Early determination of the local staging of colorectal cancer is very important to determine the prognostic and optimal management of therapy. The purpose of this study was to determine the local staging characteristics (T2, T3) of colorectal cancer on MSCT imaging.

Method: a descriptive design with a retrospective analytical observation approach, namely by evaluating the results of a local staging CT scan (T2, T3) of colorectal cancer. The sample size was 34 cases of colorectal cancer that met the inclusion criteria.

Results: 8 cases (23.5%) of colorectal cancer were found with local T2 staging and 26 cases (76.5%) with local T3 staging. The characteristics of local staging T2 are the majority of 100% solid components, 100% clear boundaries, 100% homogeneous enhancement patterns, and 100% not invading surrounding organs. While the characteristics of the local staging of T3 are mostly solid components 61.53%, unclear boundaries 73.07%, irregular margins 96.15%, mass morphology 88.46%, homogeneous enhancement patterns 61.53% and heterogeneous 38.46%, does not invade the surrounding organs 100%.

Conclusion: The differences in the characteristics of local T2 and T3 staging lie in the tumor boundaries, tumor shape, and patterns of enhancement.

Keywords: MSCT, Colorectal cancer, Local Staging

Introduction

Colorectal cancer is one of the leading causes of death from cancer worldwide (1). The incidence of colorectal cancer worldwide is expected to increase to 2.5 million new cases by 2035 (1). Colorectal cancer is the fourth most common type of cancer in men after prostate, lung, and bronchial cancer, and the third most common type of cancer in women after breast, lung, or bronchial cancer (Anthonysamy et al., 2020).

Colorectal cancer is diagnosed based on clinical, radiological, and histopathological findings. Multislice Computerized Tomography (MSCT) or CT Scan is an excellent radiological modality for the local staging of colorectal cancer (3). Early determination of the local staging of colorectal cancer is very important to determine the initial prognostic and appropriate neoadjuvant therapy is given before resection is carried out (Fleming et al., 2012). The purpose of this study was to describe the local staging characteristics (T2, T3) of colorectal cancer on MSCT imaging.

Method

The research design was descriptive with a retrospective analytical observation approach, namely evaluating images from MSCT local staging (T2, T3) colorectal cancer examination results. The sample size was 34 cases of colorectal cancer that met the inclusion criteria, namely having been operated on and proven to have colorectal cancer with local staging (T2, T3). Exclusion criteria were MSCT images with intra-abdominal infection and intra-abdominal ascites.

Abdominal MSCT examination images with axial, coronal, and sagittal sections were taken in this study to assess tumor invasion into the muscularis propria layer (T2) and tumor invasion through the muscularis layer into the subserosal/perirectal tissue (T3). The MSCT examination instruments that have been used are Siemens SOMATOM Emotion 16-slice CT scan machine, Hitachi 3.5 to 5.0 MHU 16-slice, Philips MRC-880 128 slice. This study was conducted at RSUD Dr. Soetomo Surabaya in August–September 2022. Research data were analyzed and presented descriptively.

Results

Table 1. Distribution of local staging (T2, T3) of colorectal cancer based on Multislice Computerized Tomography (MSCT) imaging (n=34)

No	Local Staging	f	%
1	T1	0	0
2	T2	8	23.5
3	T3	26	76.5
4	T4	0	0
	Total	34	100.0

Table 1 shows that most of the cases (76.5%) were colorectal cancer with local T3 staging

Table 2. Distribution of local staging characteristics (T2, T3) of colorectal cancer based on Multislice Computerized Tomography (MSCT) imaging (n=34)

No	Local staging characteristics	T2 (n=8)		T3 (n=26)	
		f	%	f	%
1	Component				
	solid	8	100	16	61,53
	cystic	0	0	0	0
	necrotic	0	0	0	0
	Solid + Necrotic	0	0	10	38,46
2	Tumor border				

		8	100	7	26,92
	clear boundaries	8	100	7	26,92
	unclear boundaries	0	0	19	73,07
3	Tumor shape				
	Regular	2	25	1	3,84
	Irregular	6	75	25	96,15
4	Tumor morphology				
	Mass	6	75	23	88,46
	Asymmetrical wall thickening	2	25	3	11,53
5	Tumor size				
	<2 cm	2	25	3	11,53
	2-5 cm	2	25	4	15,38
	5-10 cm	4	50	15	57,69
	>10 cm	0	0	4	15,38
6	Location of the tumor				
	Caecum	0	0	2	7,69
	ascending	0	0	6	23,07
	Transverse	1	12,5	3	11,53
	Descendants	0	0	3	11,53
	Sigmoid	1	12,5	4	15,38
	Rectosigmoid	4	50	6	23,07
	rectum	2	25	2	7,69
7	Enhancement Pattern				
	Homogeneous	8	100	16	61,53
	Heterogeneous	0	0	10	38,46
8	Invade surrounding organs				
	Yes	0	0	0	0
	No	8	100	26	100

Table 2 shows that most of the characteristics of local staging T2 are 100% solid components, 100% clear boundaries, 100% homogeneous enhancement patterns, and 100% do not invade surrounding organs. While the characteristics of the local staging of T3 are mostly solid components 61.53%, unclear boundaries 73.07%, irregular margins 96.15%, mass morphology 88.46%, homogeneous enhancement patterns 61.53% and some are found to be heterogeneous 38 .46%, not invade nearby organs 100%.

Discussion

MSCT or CT Scan was the first "local staging" modality to be evaluated with a high degree of accuracy ranging from 85% to 90%. CT scanning has become an excellent preoperative staging tool with the ability to delineate primary tumors and metastases (5). MSCT has become one of the mainstay modalities in the diagnosis and staging of colorectal cancer which is useful for assessing the location and extent of the primary tumor, involvement of adjacent organs, enlargement of regional and distant lymph nodes, and the presence or absence of metastatic disease (6).

The characteristics of colorectal cancer on MSCT examination are when the results show eccentric bowel wall thickening of more than 2 cm, intratumoral calcifications, and heterogeneous enhancement seen together with large areas of hypoattenuation. This feature is the hallmark of colorectal cancer of the mucinous adenocarcinomas or adenocarcinoma type. However, if the MSCT findings show long intestinal wall thickening and target signs, especially in the rectum or in young patients, then signet-ring cell carcinomas are considered (7).

Local T2 staging means that the growing tumor has invaded the muscularis propria, while T3 local staging means that the growing tumor has invaded the subserosal layer or into the nonperitoneal pericolic or perirectal tissue (TNM 2018). The striking difference in the characteristics of the local T2 and T3 staging found in this study lies in the tumor boundaries, where all local T2 staging of colorectal cancer are characterized by well-defined tumor boundaries, while the majority of local T3 staging has indistinct tumor boundaries. Another difference is the margins and enhancement patterns where local Staging T3 is larger, irregular margins are found and heterogeneous enhancement patterns are found. While T2 all local staging T2 have a homogeneous enhancement pattern. Figures 1 and 2 below are examples that will provide an overview of the local staging characteristics of T2 and T3 on Multislice Computerized Tomography (MSCT) imaging.

Figure 1. A 61-year-old man with a histologically staged T2 tumor (well-differentiated Adenocarcinoma). Abdominal venous phase MSCT axial, coronal, and sagittal (A–C) sections show the tumor is located in the rectum with well-defined borders surrounding the entire intestinal lumen with a regular outer border of the rectal wall and looks homogeneous on contrast administration, no fat stranding shows yet showing staging T2.

Figure 1. Female, 45 years old. The abdominal venous phase MSCT image shows a solid intraluminal mass, indistinct boundaries, and irregular edges, in the rectum with homogenous contrast enhancement

and fat stranding (arrows) showing T3 Radiological staging. The patient was shown to have a histological T3 stage with moderate Adenocarcinoma features

Conclusion

MSCT is an important radiological modality to determine the local staging of colorectal cancer. Tumor boundaries, margins, and pattern of enhancement are MSCT findings of concern for differentiating local T2 and T3 staging in colorectal cancer.

Conflict of interest

The authors declare no conflicts of interest in this work.

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