



Imaging A Boon in Renal Masses –A Surgical Perspective at A Tertiary Care Center

KEYWORDS

Renal Cell Carcinoma, Multi-Detector Computed Tomography

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ABSTRACT *In today's world, where minimally invasive and best treatment is the preferred choice imaging like Multi-detector computed tomography can help the urologist as to whether a renal mass needs to be operated or not. So we intended to evaluate the diagnostic accuracy of Multi-Detector Computed Tomography in staging of renal malignancy in comparison with surgical staging.*

METHODS: *The data for study was collected from patients with clinically suspected renal mass and in patients with incidentally detected renal mass referred for imaging. A total of 65 patients were analyzed prospectively for a period of from august 2012 to June 2015 with Multi-Detector Computed Tomography imaging (MDCT). The diagnosis and findings were compared with intra-operative and/or histopathology findings. Descriptive statistical analysis was carried out in the study. Chi square test /Fisher Exact test were used to check the significance of association*

RESULTS: *In our study of total of 65 cases, consisting of 38(58%) males and 27(42%) females age ranging from 5 to 83 years 43 (66%) were malignant and 22 (34%) were benign renal masses. Renal cell carcinoma (n=34) accounted for 52% of all renal masses. There was significant association in imaging helping to differentiate benign and malignant masses based on various imaging characteristics.*

CONCLUSION: *Multi-detector computed tomography is an accurate and reliable investigation for detection and preoperative staging of renal cell carcinoma.*

INTRODUCTION

Renal cell carcinoma (RCC) accounts for 85% of all malignant tumors of the kidney and is the fifth most common cancer in adults representing 3% of all male and 2% of female cancers. ¹ With incidence of RCC being 6.0 – 8.0 per 100,000 of the population, surgery is the primary form of treatment in localized masses.² Multi-Detector Computed Tomography is the most sensitive imaging technique for diagnosis and characterization of renal mass lesions staging, prognostic evaluation of malignant renal mass lesions because of its high spatial resolution and faster image acquisition. Multi-detector computed tomography provides the imaging to evaluate tumour size, location, organ involvement; to predict the presence and extent of inferior vena cava thrombus; invasion of adjacent organs, lymph nodes and metastasis. In today's world, where minimally invasive and best treatment is the preferred choice imaging like Multi-detector computed tomography can help the urologist as to whether a renal mass needs to be operated or not. So in this study we planned to evaluate the diagnostic accuracy of Multi-Detector Computed Tomography in staging of renal cell carcinoma by comparison with the surgical staging.

MATERIALS & METHODS

The data for study was collected from patients with clinically suspected renal mass and in patients with incidentally detected renal mass referred to the department of Urology and Andrology of our hospital for imaging.

A total of 65 patients with clinically suspected or incidentally detected renal mass were analyzed prospectively for a period of from august 2012 to June 2015 with imaging in the form of Multi-Detector Computed Tomography. The diagnosis and findings after the Multi-Detector Computed Tomography examination were compared with intra-operative and/or histopathology findings as applicable.

Inclusion criteria

- Patients with suspected renal mass

Exclusion criteria

- Simple renal cysts
- Patients in whom histopathological findings are not available
- Extra renal mass invading the renal parenchyma

Tumor staging of 34 patients who were diagnosed with renal cell carcinoma (RCC) On Multi-Detector Computed Tomography in our institution were compared with intra operative staging ;

The Multi-Detector Computed Tomography images obtained at preoperative assessment were analyzed in the unenhanced, corticomedullary, nephrographic, and excretory phases after administration of intravenous contrast.

The extent of the lesion T, nodal status N, and distant metastasis M were assessed and compared with surgical findings.

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Statistical Analysis

The descriptive statistical analysis was carried out in the study. Using the following continuous measurements

- Mean ± SD (Min-Max)
- categorical measurements -Number (%)

Significance is assessed at 5 % level of significance.

Chi square test /Fisher Exact test were used to check the significance of association of Multi-Detector Computed Tomography findings with final diagnosis,

RESULTS

In our study of total of 65 cases, consisting of 38(58%) males and 27(42%) females age ranging from 5 to 83 years 43 (66%) were malignant and 22 (34%) were benign renal masses. Renal cell carcinoma (n=34) accounted for 52% of all renal masses.

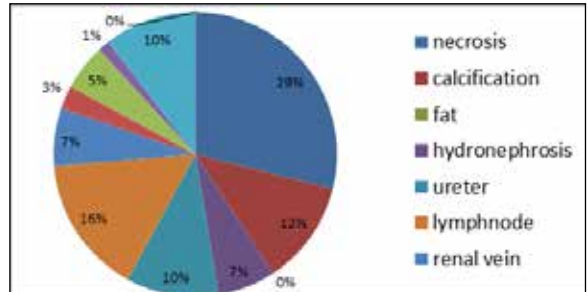


Fig 1. Features of malignant renal mass on CT

	True positive	False positive	True negative	False negative	Total
RCC(34)	32	2	31	0	65
TCC(2)	2	0	63	0	65
Lymphoma(2)	1	0	63	1	65
Metastasis(3)	2	0	62	1	65
Wilms tumour(2)	2	0	63	0	65
MLCN(1)	1	0	64	0	65
AML (3)	3	0	62	0	65
Oncocytoma(1)	1	0	64	0	65
Myelolipoma(1)	1	0	64	0	65
Renal abscess / pyelonephritis(5)	5	0	60	0	65
Complex cyst(7)	7	0	58	0	65
PCKD(4)	4	0	61	0	65

Table 1. Sensitivity and specificity of Multi-Detector Computed Tomography for differentiation of malignant versus benign renal masses

			CT				Total
			Stage 1	Stage 2	Stage 3	Stage 4	
Operative	Stage 1	Count	9	0	0	0	9
		% within Operative	100.0%	.0%	.0%	.0%	100.0%
	Stage 2	Count	0	5	1	0	6
		% within Operative	.0%	83.3%	16.7%	.0%	100.0%
	Stage 3	Count	0	2	5	1	8
		% within Operative	.0%	25.0%	62.5%	12.5%	100.0%
	Stage 4	Count	0	0	0	11	11
		% within Operative	.0%	.0%	.0%	100.0%	100.0%
Total		Count	9	7	6	12	34
% within Operative			26.5%	20.6%	17.6%	35.3%	100.0%

Table 2. Agreement between Multi-Detector Computed Tomography and Operative Diagnosis in classifying the stages of Renal cell carcinoma

Initial Stages		CT		Total
		Final Stages		
Operative	Initial Stages	14 93.3%	1 6.7%	15 100.0%
	Final Stages	2 10.5%	17 89.5%	19 100.0%
Total		16 47.1%	18 52.9%	34 100.0%

Table 3. Agreement between multi-detector computed tomography and operative diagnosis in classifying the initial and final stages of renal cell carcinoma

In classification of initial(stage 1,2) versus final(stage3,4) stages of renal cell carcinoma by using the multi-detector computed tomography showed a significant sensitivity of 89.47%, specificity of 93.33%, PPV of 94.44% and NPV of 87.50%.

Statistically significant association was noted between Multi-Detector Computed Tomography staging and the histopathological / intra operative staging. The value of Kappa = 0.841 with a p-value < 0.001 was obtained.

DISCUSSION

Detection of renal masses and differentiation of malignant from benign masses is important especially in smaller lesions. Despite recent advances in medicine treatment of malignant renal masses are difficult with most renal adenocarcinomas unresponsive to chemotherapy and radiotherapy. Surgical treatment of early lesions remains the only curative option.

MDCT has many potential advantages over conventional CT. Continuous and rapid scanning allows the entire sequence to be acquired in a single breath hold preventing misregistrations, motion artifacts and eliminating the possibility of failure to image part of the kidney

Recent advances in MDCT technology help us achieve fast, multiphase, and high resolution imaging of kidneys.

In the study of Turkvatan et al preoperative staging of renal cell carcinoma was done using Multi-Detector Computed Tomography and compared with surgical histopathological findings. Fifty-one of 57 tumors were correctly staged, five overstaged one understaged overall accuracy of 89%. Multi-detector computed tomography was able to correctly identify and localize the extension of the tumor thrombus in all 10 patients.³

In the study by Zagoria et al the CT appearances of 78 pathologically proven RCCs were reviewed. Of the 61 renal cell cancers larger than 50 mm (78%) intratumoral necrosis (61%), extrarenal spread (87%) differential growth rates within the tumor (64%). Tumors measuring 50 mm or smaller often had a "benign" appearance with homogeneous density (65%), sharp, rounded margins (88%), and distinct interface with the kidney (82%).⁴

Bajwa et al⁵ scanned 70 patients (males: females = 44:26) with suspected renal masses with the age range of 4 to 84 years. 39 cases (55.7%) were neoplastic and 23(32.9%) were inflammatory. Of the neoplastic lesions 32 were RCC.

Gudbjartson et al⁶ who studied the incidence and distribution of RCC in a large population and found that the incidence of RCC maximum from 6th to 8th decade with male: female ratio of 2.5:1.

A study by Nazim et al found that significant difference in the mean maximum radiological and maximum pathological diameter of the tumor with radiological diameter being greater of the 98 subjects studied with 27 tumors being down staged and only 1 was up staged, with the specificity of CT for capsular invasion and nodal invasion was 85 and 82% respectively. The specificity was higher tumor thrombus in renal vein and IVC being 97% and adrenal involvement being 98%.⁷

In our study of total of 65 cases, 43 (66%) were malignant and 22 (34%) were benign renal masses. Renal cell carcinoma (n=34) accounted for 52% of all renal masses. There was significant association in imaging helping to differentiate benign and malignant masses based on various imaging characteristics. So we conclude that Multi-detector Computed Tomography is an accurate and reliable investigation for detection and preoperative staging of renal cell carcinoma

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