IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 19, Issue 8 Ser.7 (August. 2020), PP 20-25
www.iosrjournals.org

Role of multiphasic multidetector computed tomography (MDCT) in the diagnosis and staging of solid neoplastic renal masses

Dr. Nirav Patel[1], Dr. Asutosh Dave [2], Dr. Sanjana Doshi[3], Dr. Chirag Prajapati[4], Dr. Nilesh Parkar[5]

[1](3rd year Resident in GCS medical college,Ahmedabad)
[2](Professor & Head of Radio-diagnosis Department , GCS Medical College, Hospital and Research Centre , Ahmedabad)
[3](3rd year Resident in GCS medical college, Ahmedabad)
[4](3rd year Resident in GCS medical college, Ahmedabad)
[5](3rd year Resident in GCS medical college, Ahmedabad)

Abstract
Aims & Objectives: *The aim of this study was to assess the role of multi detector computed tomography (MDCT) in diagnosis and preoperative staging of solid renal masses.*
Material and Methods: *Study was conducted in GCS medical college, Ahmedabad and includes 28 patients(15 males and 13 females patients) over a period of 6 months from April 2019 to September 2019. Multiphasic MDCT was done by using 16 slice Siemens CT scanner machine including standard scan protocol include unenhanced, cortico-medullary phase, nephrogenic phase and excretory phase.*
Result: *A total 31 masses were detected in 28 patients, 25 patients had unilateral mass and 3 patients had bilateral renal masses. The different pathologies including RCC (64.5%), Wilms tumor(6.5%) , Lymphoma (12.9) , Angiomyolipoma(9.6%) and TCC (6.5%) were detected. Local spread ,lymphnode metastasis , vascular involvement and distant metastasis were assessed in different pathologies. In RCC cases, Rapid enhancement was seen in CMP (Average HU 80 +/- 50), rapid decrease of enhancement was observed in NP (Average HU 70 +/- 20) & rapid washout of contrast in EP (Average HU 50 +/- 20) compared to TCC cases in which faint enhancement was observed in CMP (Average HU 40 +/- 25),then increase enhancement in NP (Average HU 60 +/- 10) & then washout of contrast in EP(Average HU 35 +/- 15).Clear cell RCC are Hypervascular lesions so it shows rapid enhancement in CMP (Average HU 100 +/- 45) & washout in EP (Average HU 60 +/- 25) while papillary and chromophobe RCC are homogenously hypo vascular with average HU 50 and 75 respectively.*
Conclusion: *MDCT is one of the most effective modality in diagnosis of primary renal mass lesions, its extension, vascular involvement, staging & grading.*

Date of Submission: 30-07-2020 Date of Acceptance: 15-08-2020

I. Introduction:

MDCT has wide role in diagnosis, staging, local and lymphnodes spreading in solid renal masses. As 20-25% renal tumors are found accidently, MDCT useful in differentiation of benign and malignant renal lesion. The aim of study was to assess the role of MDCT in diagnosis and preoperative staging of solid renal masses.

II. Material And Methods:

Study was conducted in GCS medical college, Ahmedabad over a period of 6 month from April 2019 to September 2019. Multiphasic MDCT was done by using 16 slice Siemens CT scanner machine including standard scan protocol include unenhanced, cortico-medullary phase, nephrogenic phase and excretory phase.Study was included 28 patients (15 males and 13 femalespatients) with age ranging from 4 years to 68 years.

III. Results:

In our study, 31 solid renal masses were detected in 28 patients - 25 patients had unilateral masses & 3 patients had bilateral renal masses. Out of these 3 patients, one patient had RCC and two patients had lymphoma.

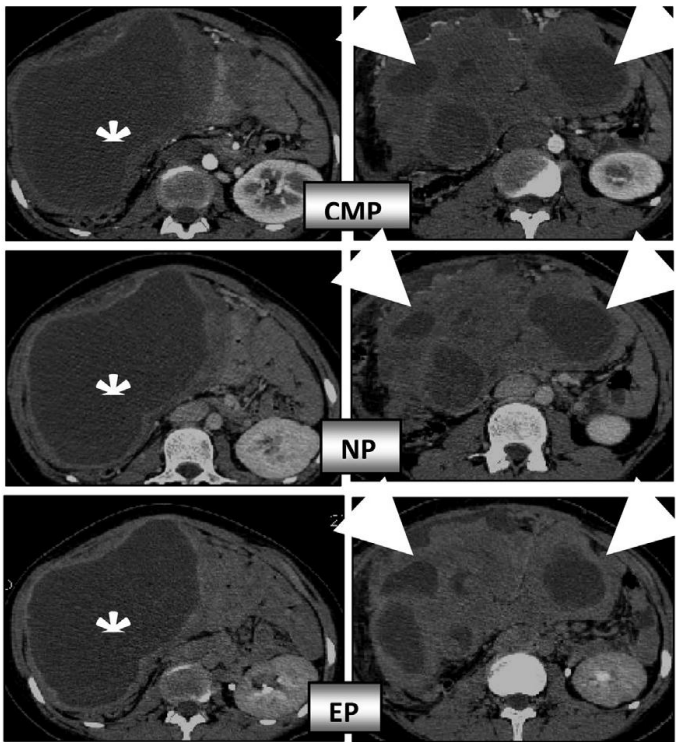

Fig 1.Presence of large ill-defined heterogeneously enhancing soft tissue density mass with internal non enhancing cystic areas and tumor crossing mid line without foci of calcification.
Diagnosis: wilms tumor

Out of 31 masses 28 masses were malignant & 3 masses were benign-angiomyolipoma (AML).Out of these 28 masses, 20 cases of RCC, 2 cases of Wilmstumor, 2 cases of TCC and 4 cases of lymphoma.

TABLE 1:

PATHOLOGY	NO. OF PATIENTS	NO. OF CASES	PERCENTAGES (%)
RENAL CELL CARCINOMA (RCC)	19	20	64.5%
WILMS TUMOR	2	2	6.5%
TRANSITIONAL CELL CARCINOMA (TCC)	2	2	6.5%
ANGIOMYOLIPOMA(AML)	3	3	9.6%
LYMPHOMA	2	4	12.9%
	28	**31**	**100%**

TABLE 2:

PATHOLOGY	LYMPHNODE METASTASIS	PERINEPHRIC EXTENSION	DISTANT METASTASIS
RCC	7/20 (35%)	6/20 (30%)	4/20 (20%)
WILMS TUMOR	2/2 (100%)	2/2 (100%)	2/2 (100%)
TCC	0/2 (0%)	0/2 (0%)	0/2 (0%)
LYMPHOMA	4/4 (100%)	4/4 (100%)	4/4 (100%)

Out of 20 cases of RCC , Lymphnodes metastasis were seen in 7 cases , perinephric extension were seen in 6 cases & distant metastasis were seen in 4 cases (2 lung metastasis & 2 liver metastasis).
Lymphnodes metastasis, perinephric extension & distant metastasis were seen in all cases of wilms tumor and lymphoma.

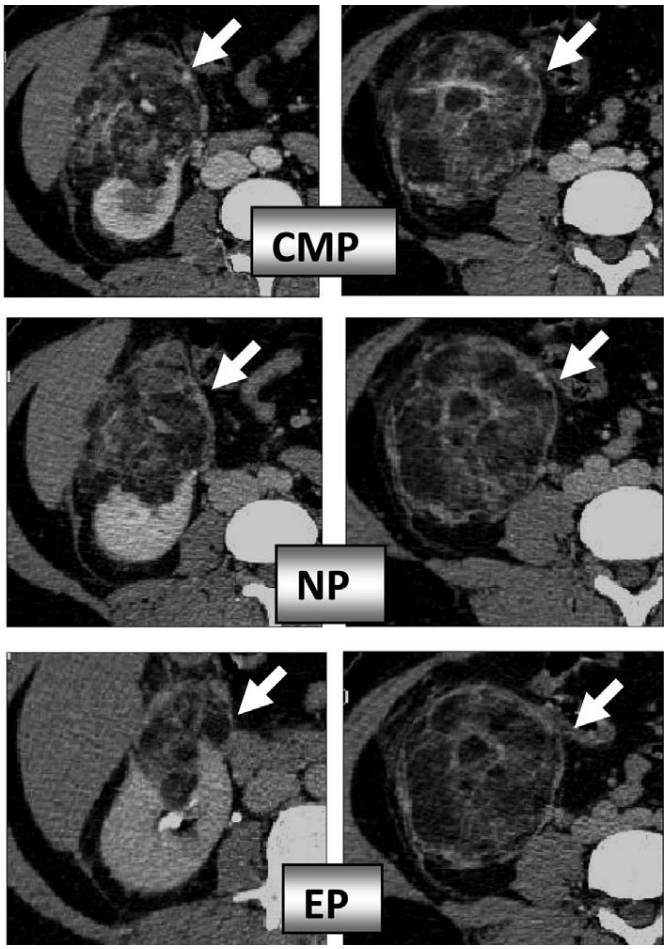

Fig 2 Presence of large well defined heterogeneously enhancing soft tissue density lesion with fatty attenuation areas involving right kidney.
Diagnosis: Angiomyolipoma

According to TNM staging of RCC , out of 20 cases , 6 cases had masses measuring <4 cm in diameter , so staged as T1a & 4 cases were staged as T1b because of masses measuring 4-7 cm.In 4 cases tumor size were >7 cm, so stages as T2. Extension to perirenal fat was observed in 1 case so it was staged as T3a while in 1 case renal vein thrombosis with involvement of IVC was observed so stages as T3c.In 4 cases, local infiltration & distant metastasis beyond renal fascia were observed so they were diagnosed as stage T4.

Regional lymph node involvement limited to one group of lymphnodes was detected in 5 cases and more than one group of lymphnodes were seen in 2 cases.

Distant metastasis was seen in 4 cases (2 cases in liver & 2 cases in lung metastasis).

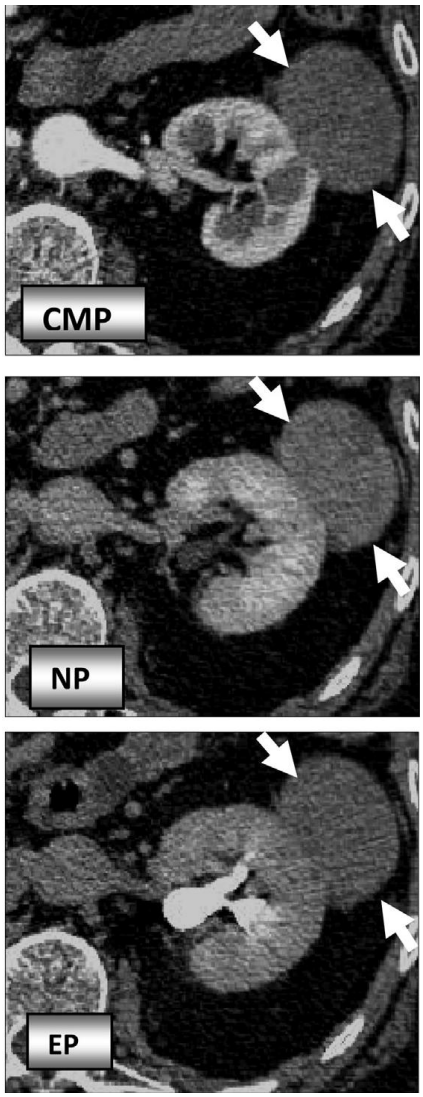

Fig 3 Presence of large well defined hypo dense lesion arising from outer cortical surface of left kidney which shows minimal enhancement on CMP (HU: 55), well enhance on NP (HU: 75) and wash out in EP (HU: 57).There is no surrounding lymphadenopathy or calcification within.
Diagnosis: RCC (Papillary variety).

TABLE 3: TNM staging in 20 RCC cases

TNM STAGING	NO. OF CASES	PERCENTAGES (%)
T1a	6	30(%)
T1b	4	20(%)
T2	4	20(%)
T3a	1	5(%)
T3c	1	5(%)
T4	4	20(%)
N0	13	65(%)
N1	5	25(%)
N2	2	10(%)
M0	16	80(%)
M1	4	20(%)

Measurement of HU in cortico-medullary phase (CMP), nephrogenic phase (NP) and excretory phase (EP) in all cases of RCC and TCC was done.In RCC cases, Rapid enhancement was seen in CMP(Average HU 80 +/- 50), rapid decrease of enhancement was observed in NP (Average HU 70 +/- 20) & rapid washout of contrast in EP (Average HU 50 +/- 20). Whereas in TCC cases , faint enhancement was observed in CMP (Average HU 40 +/- 25),then increase enhancement in NP (Average HU 60 +/- 10) & then washout of contrast in EP(Average HU 35 +/- 15).

Clear cell RCC are Hypervascular lesions so it shows rapid enhancement in CMP (Average HU 100 +/- 45) & washout in EP (Average HU 60 +/- 25) while papillary and chromophobe RCC are homogenously hypo vascular with average HU 50 and 75 respectively.

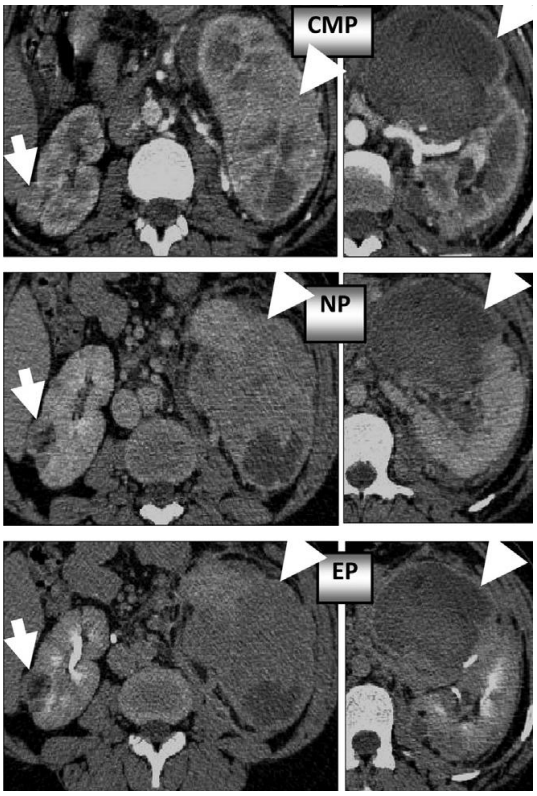

Fig 4 Presence of large ill-defined hypo dense lesion involving left kidney which shows intense enhancement on CMP (HU: 105) and gradually washout in subsequent phase (HU: 78 in NP & HU: 62 in EP).There is also small well defined cortical based lesion involving right renal lower pole which shows intense enhancement on CMP and gradually washout in subsequent phase.
Diagnosis: Bilateral RCC (Clear cell variety)

IV. Discussion

MDCT remains the single most effective imaging modality in diagnosis and staging of solid renal lesions. Treatment of solid renal lesions depends on primary diagnosis,grading,extension, vascular involvement and staging. MDCT has great impact in diagnosis of primary tumor extension &staging, so helpful in management purpose.

In our prospective study, 31 solid renal lesions were identified in 28 patients. Among 31solid renal lesions, 20 cases were renal cell carcinoma. Out of 20 cases of RCC, 6 cases (30%) staged as T1a, 4 cases (20%)T1b, 4 cases (20%) T2, 2 cases (10%) T3 & 4 cases (20%) T4staging compared to Zhang et al study in which 60 % cases T1a, 12% cases T1b, 8% cases T2, 13% cases T3 & 1% case T4.these thing clearly demonstrate, our patients population had of RCC of relatively delayed stages.

According to sheth et al study, involvement of renal vein observed in 23 % cases & IVC involvement in 4-10% patients. In our study renal vein and IVC involvement observed in 5% cases.

In RCC cases, Rapid enhancement was seen in CMP (Average HU 80 +/- 50), rapid decrease of enhancement was observed in NP (Average HU 70 +/- 20) & rapid washout of contrast in EP (Average HU 50 +/- 20). Whereas in TCC cases, faint enhancement was observed in CMP (Average HU 40 +/- 25), then increase enhancement in NP (Average HU 60 +/- 10) & then washout of contrast in EP (Average HU 35 +/- 15).

Clear cell RCC are Hypervascular lesions so it shows rapid enhancement in CMP (Average HU 100 +/- 45)& washout in EP (Average HU 60 +/- 25) while papillary and chromophobe RCC are homogenously hypo vascular with average HU 50 and 75 respectively.

Whereas in TCC cases, faint enhancement was observed in CMP (Average HU 40 +/- 25), then increase enhancement in NP (Average HU 60 +/- 10) & then washout of contrast in EP(Average HU 35 +/- 15).

V. Conclusion:

MDCT is one of the most effective modality in diagnosis of primary renal mass lesions, its extension, vascular involvement, staging & grading.

References

[1]. Catalano C , Fraioli F, Laghi A , et al.MDCT in pre-operative evaluation of patients with RCC.AJR 2003:140:87-94
[2]. Ng chaan S, Wood Christopher, Silverman paul, et al. RCC: Diagnosis, staging and surveillance. AJR 2008:191:1220-32
[3]. Jinzaki M, tanimoto A, Mukai M, et al.Doubke phase helical CT of small renal parenchymal neoplasm:correlation with pathological findings and tumor angiogenesis.Tomoger 2000:24:835-42
[4]. Ruppert-KohlmayrAJ,Uggowitzer M, Meissnitzer T, Differentiation of renal clear cell carcinoma and renal papillary carcinoma using CT enhancement parameters.AJR 2004:183:1387-91.
[5]. Sheth S, Scatarige J, Horton K,Fishman E. Current concept in diagnosis & management of RCC: role of multidetector CT abd three dimentional CT.Radiographics 2001 :21:S237-54
[6]. Sheth S, Fishman E.Multi detector row CT of kidneys & urinary tract: technique and applications in diagnosis of benign disease.Radiographics:2004;24:e20
[7]. Zagoria R.Imaging of small renal masses.AJR:2000;175:945-55.

Dr. Nirav Patel, et. al. "Role of multiphasic multidetector computed tomography (MDCT) in the diagnosis and staging of solid neoplastic renal masses." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(8), 2020, pp. 20-25.