Original Research Paper

Radiology

ROLE OF MDCT IN DIAGNOSIS OF DIFFERENT RETROPERITONEAL MASSES.

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ABSTRACT

BACKGROUND : MDCT play an important role in characterization and the assessment of the extent of the disease and involvement of adjacent and distant structures. It is widely available in most emergency centres. It provides multiplanar (2D) and volumetric (3D) reformation and also better perceives pathologic conditions and anatomic relationships helping in surgical treatment planning.

AIM : The aim of this study was to evaluate the role of MDCT in detection and characterization of lesions involving retro-peritoneum & its correlation with histopathological findings.

PATIENTS AND METHODS : This prospective study was performed on 60 patients aiming to determine the role of MDCT imaging in detection and characterization of retro-peritoneal masses. Each case was correlated with histopathological findings following open surgical biopsy, surgical excision, or image-guided biopsy by CT or USG.

RESULTS : The calculated incidence of benign lesions were 8.3 %, of maliganant lesions were 61.7 % and for metastases were 30% in the studied cases.This was helpful in narrowing the differential diagnosis and thus in treatment planning.

CONCLUSION : MDCT play an important role in characterization (size, shape, wall thickness, septa, calcification and fat content) and the assessment of the extent of the disease and involvement of adjacent and distant structures. It is better for assesing calcification, vascular invasion, enhancement patterns & specific pattern of spread. Its coronal and sagittal reformations fully delineate the peritoneal anatomy and extent of disease.

KEYWORDS : MDCT, Retroperitoneal Masses, Standard Of Reference, Sarcoma.

INTRODUCTION

MDCT plays an important role in characterization (size, shape, wall thickness, septa, calcification and fat content) and the assessment of the extent of the disease and involvement of adjacent and distant structures. It is best for assessing calcification as well as for vascular invasion. The differential diagnosis of retroperitoneal masses can be narrowed down to a certain extent on the basis of imaging characteristics, patterns of involvement, and demographics; however there is a substantial overlap of imaging findings, and the purpose is to know the imaging features of various uncommon retroperitoneal masses with emphasis on MDCT. The solid & cystic both masses are divided into neoplastic and non-neoplastic masses. The advantages of MDCT include quick and accurate diagnosis with availability in most emergency centres. In addition, with multiplanar (2D) and volumetric (3D) reformation, pathologic conditions and anatomic relationships are better perceived. This information is crucial for surgical treatment and planning.

ANATOMY OF RETROPERITONEUM

Lies between transversalis fascia posteriorly and posterior parietal peritoneum anteriorly. It contains mainly fat and fibrous tissue and is limited cranially by the diaphragm and caudally by pelvic brim. It is divided into the anterior and posterior pararenal, perirenal, and great vessel spaces.

ANTERIOR PARARENAL SPACE:

It is bordered anteriorly by the posterior parietal peritoneum, posteriorly by the anterior renal fascia (Gerota fascia), and laterally by the lateroconal fascia.

IT IS SUBDIVIDED INTO THE:-

- Pancreaticoduodenal space, which contains the pancreas (except for pancreatic tail) and 2nd and 3rd parts of duodenum, proximal part of SMA and SMV, hepatic and splenic veins.
- Pericolonic space, which contains the ascending and descending colon.

POSTERIOR PARARENAL SPACE:

It lies between the posterior perirenal fascia (Zuckerkandal fascia) and fascia covering the quadratus lumborum and psoas muscle. It contains no solid organs. It communicates with pre-peritoneal space antero-laterally and caudally it communicates with posterior pelvis. It may also communicate with anterior pararenal space near pelvic brim.

PERIRENAL SPACE:

It is located between the anterior renal fascia and the posterior renal fascia and contains the *kidneys, adrenal gland and proximal ureter.*

It is the fat containing region that surrounds the aorta and the IVC and lies anterior to the vertebral bodies and psoas muscles.

Below the level of the kidneys, the anterior and posterior pararenal spaces merge to form the infrarenal retroperitoneal space, which communicates inferiorly with the prevesical space and extraperitoneal compartments of the pelvis.
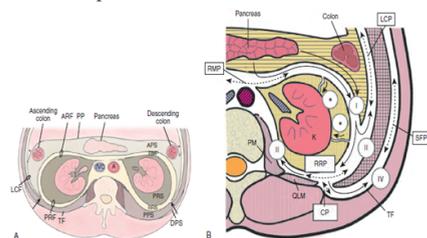
Line drawing at the level of the renal hila shows that the perirenal and lateroconal fasciae are laminated planes composed of apposed layers of embryonic mesentery. The perirenal spaces are closed medially. The anterior interfascial retromesenteric plane is continuous across the midline. The anterior interfascial retromesenteric plane, posterior interfascial retrorenal space, and lateroconal space communicate at the fascial trifurcation *(arrows)*. The dorsal pleural sinus may extend inferior to lie posterolateral to the posterior pararenal space and

transversalis fascia.

A, aorta; APS, anterior pararenal space; ARF, anterior renal fascia; DPS, dorsal pleural sinus; IVC, inferior vena cava; LCF, lateroconal fascia; PP, parietal peritoneum; PPS, posterior pararenal space; PRF, posterior renal fascia; PRS, perirenal space; RMP, retromesenteric plane; RRS, retrorenal space; TF, transversalis fascia. The *asterisks* indicate the posterior peritoneal recess.
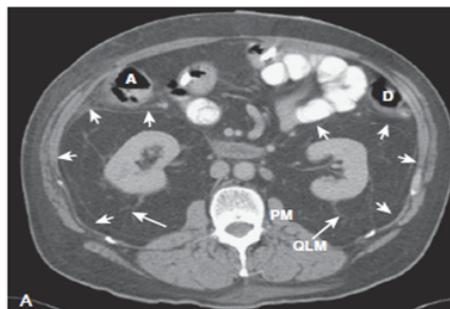
Materials And Methods

This prospective study was conducted in the Department of Radiology at Smt. S.C.L. General Hospital, Ahmedabad from September 2017 to May 2019 and informed consents were given by all patients. The Study was conducted on 60 patients (39 Male & 21 Female and highest age range 50-60 years).

INCLUSION CRITERIA:
- Patients presented with clinical symptoms and signs pertaining to retroperitoneal pathology.
- Patients who had suspected retroperitoneal neoplastic lesions on Ultrasound.

EXCLUSION CRITERIA:
- Pregnant patients.
- Patients with unstable general condition.
- Patients allergic to or had past history of adverse reaction to iodinated contrast media.
- Patients with impaired renal function (creatinine level > 2 mg/dl)

PATIENT PREPARATION:
- MInimum 6 hr nil by mouth.
- Bowel preparation is done by giving two tablets of Lactulose over night.
- 20/ 22 G IV cannula was placed in the anterior cubital vein for giving IV contrast under personal observation by Anasthetist.

MDCT Abdomen and pelvis study was done with Philips MX16 CT Scan.

The study was done with oral and intravenous contrast using the following parameters: 80 mA, 120 kV, 0.5 s tube rotation time, slice thickness 5 mm, 8 mm table feed, and 3 mm incremental reconstruction. Noncontrast CT was performed in patients with impaired renal function (creatinine level>2 mg/dl) and/or with a history of hypersensitivity for contrast media.

On CT, we first confirmed site as retroperitoneal with exclusion of other organs of origin following which assessment of definition, consistency, composition of the lesion (fat, calcium, and necrosis), pattern of enhancement (nonenhancing, homogeneous, or heterogeneous), and average CT attenuation [by measuring Hounsfield unit (HU) in five different locations and calculating the average HU].

Results were checked by two radiologist (Resident and Consultant) and final reports were generated which were correlated with pathological analysis following open surgical biopsy, surgical excision, or image-guided biopsy by CT or USG.

RESULTS

A total of 60 patients presented with abdominal or pelvic swelling detected by clinical examination or ultrasound;

AGE INCIDENCE

The incidence of retroperitoneal pathology was highest in age range 50- 60 yrs> 40-50 yrs.

Sr no	Age	No. Of cases	Percentage (%)
1	0-10	1	1.6
2	10-20	1	1.6
3	20-30	5	8.3
4	30-40	5	8.3
5	40-50	14	23.3
6	**50-60**	**17**	**28.3**
7	60-70	7	11.6
8	70-80	7	11.6
9	80-90	3	5
	Total	60	100

Gender Incidence
Male> Female were found with male: female ratio was 1.8:1.

Sex	No. Of cases	Percentage (%)
Male	39	65
Female	21	35
Total	**60**	**100**

DISTRIBUTION OF BENIGN, MALIGNANT AND METASTATIC LESIONS

In our study malignant lesions were most common retroperitoneal lesions observed, in approx. 58 %.

	No. Of cases	Percentage (%)
Benign	5	8.3
Malignant	37	61.7
Metastasis	18	30
Total	60	100

Most common organ involved with benign lesions was Adrenals & with malignant lesions was Pancreas.

Most common site of metastasis was Lymph nodes.

Organ of involvement	Benign		Malignant		Metastasis	
	No. Of cases	Percentage (%)	No. Of cases	Percentage (%)	No. Of cases	Percentage (%)
Adrenals	2	2.7	3	4	10	13.5
Pancreas	1	1.3	9	12.1	4	5.4
Kidney	1	1.3	8	10.8	6	8.1
Ascending colon	0	0	2	2.7	0	0
Descending colon	0	0	2	2.7	0	0
Duodenum (2nd and 3rd part)	0	0	2	2.7	0	0
Lymphnodes	0	0	7	9.5	12	16.2
Primary retroperitoneum	1	1.3	4	5.4	0	0
Total	5	6.6	37	49.9	32	43.2

The lesions most commonly invaded Renal vein> Aorta> IVC, Portal vein, SMV, Splenic artery.

Most common lesions with vascular invasions were Lymphoma> Metastasis.

Most common primary for retroperitoneal metastasis was Lung Mass with approx. 45 %.

DIstribution of Involvement of Retroperitoneal Spaces in Retroperitoneal Neoplasm

Retroperitoneal Space	No. Of cases	Percentage (%)
Anterior pararenal	24	40
Posterior pararenal	3	5
Peri-renal	18	30
Great vessel	15	25
Total	**60**	**100**

Our study showed that all of benign lesions were regularly marginated (100%) and majority of maliganant lesions were irregularly marginated (83.7%).

Majority of maligant lesions showed following characteristics:-
Showing extension (56.7%)

Associated with lymphadenopathy (51.4 %)

COMPARISON OF CECT FINDINGS VS. PATHOLOGICAL FINDINGS

There was one pathological malignant lesion which was misdiagnosed as benign lesion on CECT.
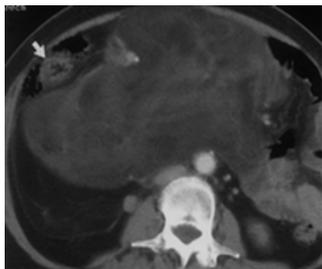
In our study, - 5 (13.6 %) out of 60 patients were diagnosed having cysts/ cystic necrosis.

-6 (10%) out of 60 patients were diagnosed having calcification. (Benign lesions showed more percentage of calcification than malignant lesions)

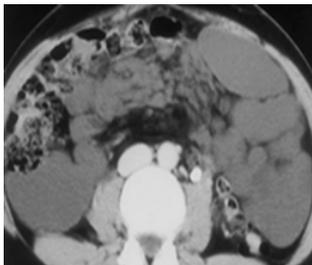-14 (23.3%) vascular invasion was detected.

CASES
(1)

Anterior displacement of the ascending colon. CT scan shows a bulkyheterogenous predominantly fatty mass in retroperitoneal space. The mass proved to be liposarcoma.
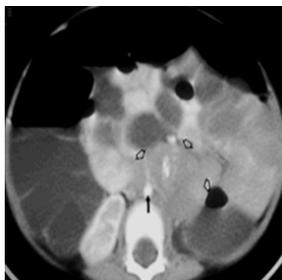
(2)

Lymphangioma in a 47yr woman- CECT abdomin shows a multiloculated, low-attenuation cystic mass that extends between normal anatomic structures in the peritoneal cavity and retroperitoneum.

(3)
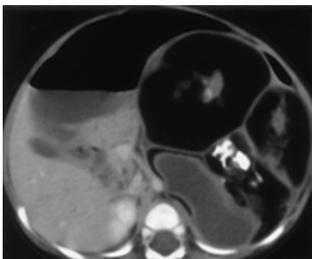
Mature cystic teratoma in a female infant. axial CT scan - fat-containing cystic mass with calcifications.

(4)

Neuroblastoma

CONCLUSION

60 cases of retroperitoneal neoplastic lesions were evaluated in relation to the clinico-pathological profile & previous imaging studies. Attempts were made to correlate these findings with each other pathological and surgical findings.

MDCT plays an important role in characterization (size, shape, wall thickness, septa, calcification and fat content) and the assessment of the extent of the disease and involvement of adjacent and distant structures. It is best for assessing calcification as well as for vascular invasion. Although a specific diagnosis might be difficult to determine because of overlappting imaging appearances, the identification of certain characteristic imaging features, along with clinical and demographic information, may help in narrowing the differential diagnosis.

For a suspected hyperfunctioning neoplasm on CT, appropriate biochemical correlations were done to aid us to a conclusion.

Enhancement characteristics on CT aids us to know the nature of neoplasm, like hypervascular lesions show intense enhancement. Heterogeneous and high enhancement is mostly seen in malignant neoplasm.

On CT we can very well know the shape and contour of the neoplasm and this helps us in very well differentiating the neoplasms. For example, the ball vs. Bean strategy is a useful framework for analyzing the imaging characteristics of renal masses. When faced with the bewildering array of pathological conditions that can avail the kidney, ball vs. Bean offers a starting point.

CT is excellent modality for initial detection as well as the characterization of cystic pancreatic lesions. The classification of cystic pancreatic lesions on the basis of their imaging morphologic features can simplify the differential diagnosis and be of value in management.

MDCT performed with coronal and sagittal reformations fully delineate the peritoneal anatomy and extent of disease. Since understanding the anatomic relationships and pathologic processes of the peritoneum is essential to provide accurate diagnosis.

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