



Original Research Article

A clinical study to evaluate the role of CT in the detection, localization and characterization of retroperitoneal masses

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ARTICLE INFO

Article history:

Received 27-08-2021

Accepted 17-12-2021

Available online 07-04-2023

Keywords:

Retroperitoneal masses

Renal cell carcinoma

Pancreatic adenocarcinoma

ABSTRACT

Background: Retroperitoneal masses constitute a heterogeneous group of uncommon lesions and represent a challenge due to overlapping imaging findings. Most are malignant lesions.**Aims:** To evaluate the role of CT in the detection, localization and characterization of retroperitoneal masses and to compare and correlate with post-surgical evaluation and histological evaluation whenever possible.**Materials and Methods:** The cross-sectional study carried out in the Department of Radiodiagnosis for a period of 2 years. Present study involved 50 patients of either sex belonging to various age groups. The CT scan findings were correlated with the findings at surgery and histopathological examination.**Results:** Renal masses were the most common retroperitoneal mass (48%). Renal cell carcinoma was the most common renal tumour (66.6%) and pancreatic adenocarcinoma was the most common pancreatic tumour (68.7%). Majority of cases of retroperitoneal mass were in the age group 51-70 years. Males were affected more than females in a ratio of 1.94: 1. Mass in the abdomen was the most common clinical presenting feature (40%). CT accuracy in the diagnosis of retroperitoneal tumours was 96%.**Conclusions:** CT is an essential diagnostic modality in diagnosing and characterizing retroperitoneal masses. It establishes the location of such masses and shows in great detail the associated findings.

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1. Introduction

Retroperitoneum is that portion of the abdomen located posterior to the peritoneal cavity. It is divided into three spaces by the anterior and posterior renal fascia. The anterior pararenal space is bordered anteriorly by the parietal peritoneum, posteriorly by the anterior renal fascia and posterolateral by the lateral continuation of the renal fasciae and the lateroconal fascia. This space contains the pancreas, retroperitoneal portion of the duodenum, and ascending and descending colons.

The perirenal space lies within the anterior and posterior renal fasciae and contains the kidneys, adrenals, proximal

collecting systems and renal hilar vessels. The posterior pararenal space is the smallest of the three retroperitoneal spaces. It is located posterior to the posterior renal fascia and contains only a small amount of fat. The psoas compartment, sometimes considered a fourth retroperitoneal space is located within and immediately adjacent to the psoas muscles.

Since its introduction in the 1970s, CT has become the primary imaging modality for imaging of the retroperitoneal structures because of its superior spatial resolution, its widespread availability and the speed in which examination can be performed. Much faster acquisition capability of current CT units strongly favour their use in patients who are critically ill or medically unstable.¹

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2. Materials and Methods

The cross sectional study was carried out in the department of Radio Diagnosis, M.K.C.G Medical College, BERHAMPUR 50cases of retroperitoneal MASSES belonging to different age group referred from General Surgery, Urology, Gastroenterology, Medicine and Paediatrics IPD and OPD between the period from October2018 to OCTOBER 2020 have been included in the study.

Detailed clinical history was recorded in each case as per the proforma attached in appendix. Routine investigations like hemogram, blood urea/creatinine, blood sugar, chest X-ray done in these patients have also been recorded.

Ultrasound and CT scan (both NECT, CECT) were done in all suspected cases. The radiological features were correlated with surgical and postoperative histopathological findings. Diagnosis of lesion with respect to its anatomical location and characterization and find out incidence of different retroperitoneal masses in southern belt of Orissa.

Ultrasound was used to complement and supplement CT in the diagnosis of retroperitoneal tumours. Ultrasound was done using SHIMADZU 450 XL located in the Department of Radio diagnosis, M.K.C.G Medical College, Berhampur. Probe frequency varied from 2.5 to 5 MHz CT scan was done by SIEMENS SOMATOM ESPRIT located in the Department of Radiodiagnosis M.K.C.G Medical College, Berhampur. KODAK LASER/ DRY VIEW CAMERA and KODAK 14"x 17"films were used for prints. Non contrast and contrast enhanced axial scans were done in all the cases.

The patients were kept supine in the CT table with head properly positioned in the head rest. CT was performed in transverse axis 5 mm thick slices were taken from top of diaphragm to pubic symphysis level. If required further thin slices were taken for better characterization of lesion and to eliminate partial volume averaging. Non contrast CT is especially helpful for detection of intralesional haemorrhage and calcification.

After non contrast CT, 75 ml of 76% non-ionic contrast was administered intravenously as bolus. Scanning was then repeated and enhancement pattern of the lesion studied. Coronal and sagittal reconstruction were done wherever required to better appreciate the three dimensional anatomy of the lesions. The results obtained from clinical examination, ultrasound and CT scan were correlated with postoperative surgical and histopathological findings. Available literature was reviewed and compared with present findings.

3. Results

This section deals with the observation part of the study. Variables of both clinical and imaging parameters have been compiled, collated and analysed below.

Table 1: Age and sex distribution

Age in Years	Male	Female	Total
0-10	5	2	7
11-30	0	2	2
31-50	4	2	6
51-70	22	11	33
71-90	2	0	2
Total	33	17	50

From the table above, it can be found that majority of cases (66%) are found in the ages group of 51-70 years. Further, it can be noted that males outnumber females in a ratio of 1.94:1.

Table 2: Clinical presentation in descending order of frequency

	Number of Cases	Percentage
Mass abdomen	20	40
Pain	10	20
Jaundice Haematuria	8	16
Jaundice	7	14
Weight Loss	5	10

Figures from the above table point to the fact that mass in the abdomen is the most common presenting feature seen in 40% of cases.

Table 3: Site and compartment of origin

Site	Number of Cases	Percentage
Renal	24	48
Pancreatic	16	32
Adrenal	6	12
Primary Retroperitoneal	4	8
Retroperitoneal Spaces		
Anterior Para Renal Space	16	32
Perinephric Space	30	60
Posterior Para Renal Space	4	8

It can be observed that renal masses are the most common retroperitoneal mass (48%) followed by pancreatic mass (32%). It can be averaged from the above table that retroperitoneal masses are most commonly found in the perinephric space (60%).

The above tables shows that renal cell carcinoma is the most common renal mass (66.6%). pancreatic adenocarcinoma is the most common pancreatic mass 68.7%. It is clear from the above table that neuroblastoma was the most common suprarenal mass (40%).

It can be inferred that all the above mentioned masses have equal incidence (20%).

CT in diagnosing retroperitoneal masses has 96% accuracy of evaluating the cause of retroperitoneal masses. In the series, histopathological correlation was done in all the cases. Diagnostic discrepancy was noted in one case

Table 4: Types of masses in studied

	Number of Cases	Percentage
Suprarenal Mass		
Renal cell carcinoma	16	66.6
Wilms tumour	3	12.5
Renal Lymphoma	1	4.16
Renal abscess	1	4.16
Transitional carcinoma	1	4.16
polycystic kidney	1	4.16
Mesoblastic nephroma	1	4.16
Pancreatic mass		
Pancreatic adenocarcinoma	11	68.7%
Mucinous cystic neoplasm	2	12.5%
Pancreatic pseudocyst	3	18.7%
Suprarenal Mass		
Neuroblastoma	2	40%
Adrenal Adenoma	1	20%
Adrenal Carcinoma	1	20%
Adrenal Metastasis	1	20%
Primary Retroperitoneal Mass		
Psoas Abscess	1	20%
Retroperitoneal Teratoma	1	20%
Retroperitoneal Gist	1	20%
Liposarcoma	1	20%
Perinephric Haematoma	1	20%

Table 5: CT findings in retroperitoneal masses

Retroperitoneal masses	Total No. of Cases	Attenuation			Enhancement			Calcification	Cystic areas/ Necro	Fat
		Hypo	ISO	Hyper	None	Mild to Mod.	Strong			
Renal cell carcinoma	16	6	3	3	0	10	0	2	6	0
Lymphoma	1	2	0	0	0	1	0	0	0	0
Wilms tumour	3	6	0	0	0	1	0	0	0	0
Pancreatic adenocarcinoma	11	2	6	0	0	2	0	0	0	0
Pancreatic pseudocyst	3	2	0	0	0	2	0	0	2	0
Neuroblastoma	3	5	0	0	0	5	0	4	0	0
Adrenal metastasis	1	1	0	0	0	1	0	0	0	0
Adrenal carcinoma	1	3	0	0	0	3	0	1	1	0
Retroperitoneal teratoma	1	1	0	0	0	1	0	1	2	1
Transitional cell carcinoma	2	2	0	0	0	1	0	0	1	0
Adrenal adenoma	1	5	0	1	0	6	0	0	3	0
Retroperitoneal GIST	2	2	0	0	0	2	0	0	0	0
Psoas abscess	1	1	0	0	0	1	0	0	1	0
Polycystic kidney	1	0	1	0	0	1	0	0	1	0
Renal abscess	1	1	0	0	0	2	0	0	1	0
Mucinous cystic neoplasm	2	2	0	0	0	2	0	0	0	0
Mesoblastic Nephroma	1	1	0	0		1	0	0	0	0
Liposarcoma	1	1	0	0		1	0	0	0	1

of adrenal metastasis which was later confirmed as adrenal adenoma

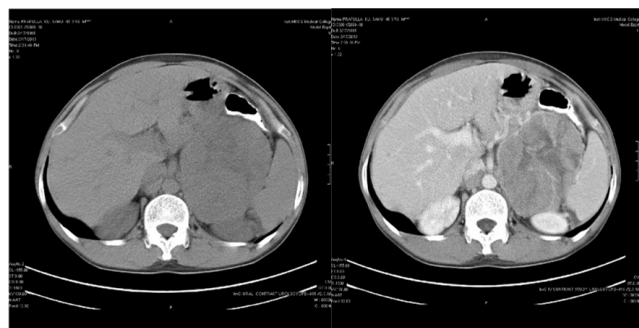


Fig. 1: NCCT, CECT of Abdomen Shows Left Suprarenal mass showing Homogenous enhancement, Thin Rim Like capsule with posterior Displacement of Left Kidney Diagnosis: Left adrenal carcinoma.

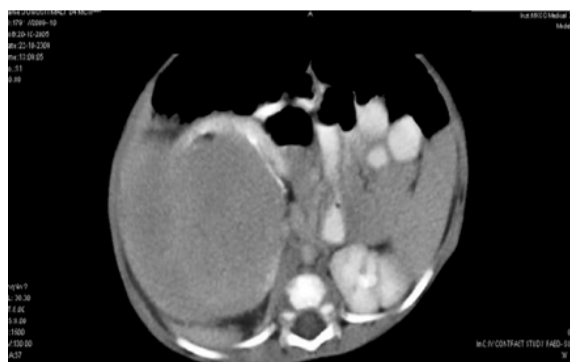


Fig. 2: RAL, IV Contrast Study of abdomen shows minimally enhancing right intrarenal solid mass Diagnosis- mesoblastic nephroma



Fig. 3: ORAL and IV contrast study of abdomen shows heterogeneous left suprarenal mass displacing left kidney posterolaterally, crossing midline Diagnosis- Neuroblastoma

4. Discussion

In this study conducted over a period of 2 years (Oct 2018 to Oct 2020) in the Department of Radiology, M.K.C.G Medical College & Hospital Berhampur, the clinical and CT features of retroperitoneal masses in 50 patients have been analysed. Age and sex distribution of 50 cases included in the study. There were 33 male patients and 17 female patients with a male to female ratio of 1.94:1. Male to female ratio in renal mass was 3 :2, which correlates well with the studies of Coulange et al.² who studied 970 patients of renal cell carcinoma and found the male to female ratio to be 2 :1 and Yoneda et al.³ who studied 132 patients and found the male to female ratio to be 2.07:1.

Maximum number of cases were seen in the age group 51 -70 years. Majority of renal cell carcinoma patients were in the age group 51 - 70yrs (66%) which correlates well with the study of Delahunt et al.⁴ who studied 1308 patients and found the majority of patients to be in 51 - 70 years age group (72%).

The most common clinical presentation in retroperitoneal masses was mass abdomen (Table 1). In renal cell carcinoma, the most common clinical feature was haematuria (60%). This is in accordance with the study of Yoneda et al.³ who studied 132 patients of renal cell carcinoma and found the most common clinical symptom to be haematuria (55.4%). The classic triad of gross haematuria, flank pain and palpable flank mass was found in 10% of patients. This correlates well with the study of Yoneda et al.³ in which the classic triad of gross haematuria, flank pain and palpable flank mass was found in 12% of patients.

Jaundice was seen in 80% of cases of pancreatic adenocarcinoma arising in the head/peripapillary region. This was in accordance with the study of Balthazar et al.⁵ in which jaundice was a presenting feature in 83% of patients with pancreatic adenocarcinoma.

Renal cell carcinoma was the most common retroperitoneal tumour followed by pancreatic adenocarcinoma (Table 2). Renal cell carcinoma was the most common renal mass (Table 3). Pancreatic adenocarcinoma was the most common pancreatic mass constituted 68.7% of pancreatic tumours which correlates with the study of Lin Y et.al in which pancreatic adenocarcinoma constituted 70% of pancreatic tumours.⁶

VII shows the CT features of retroperitoneal tumours. Calcification was found in 20% of cases of renal cell carcinoma. This correlates with the study of Zagoria et al.⁷ in which calcification was found in 25% of cases of renal cell carcinoma.

In all cases of pancreatic adenocarcinoma, mild contrast enhancement was seen. This was in accordance with the study of Balthazar et al.⁵ in which all cases of pancreatic adenocarcinoma showed mild contrast enhancement 62% of cases of pancreatic adenocarcinoma were located in the

head and 37.5% were located in the body and tail, this correlates with the study of Becker AE et al.⁸ in which 60% of cases of pancreatic ductal adenocarcinoma were located in the head and 35% were located in the body and tail. Abrupt termination of pancreatic duct and/or common bile duct was present in all cases of pancreatic adenocarcinoma. This correlates with the study of Baron et al.,⁹ in which all cases of pancreatic adenocarcinoma had abrupt termination of pancreatic duct and/or common bile duct.

5. Conclusion

It is concluded from the above study that CT is an essential diagnostic modality in diagnosing and characterizing retroperitoneal masses. It establishes the location of such masses (anterior pararenal space, perinephric space, posterior pararenal space) and shows in great detail the associated findings such as cystic mass lesion, tumoral calcification, haemorrhage, invasion of contiguous structures, vascular encasement and distant metastasis. It helps clinician to plan the treatment properly before any surgery is contemplated.

6. Conflict of Interest

None.

7. Source of Funding

None.

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Cite this article: Nayak PK, Rao MVK, Jena SK, Kumar BA. A clinical study to evaluate the role of CT in the detection, localization and characterization of retroperitoneal masses. *Panacea J Med Sci* 2023;13(1):222–226.