Role Of Multidetector Computed Tomography In Evaluation Of Retroperitoneal Masses

Author

Abstract –

Background: Diagnostic imaging plays an important role in the evaluation of abdominal masses. Many imaging modalities are available ranging from conventional modalities to the cross-sectional modalities like USG, CT and MRI. The main principles of imaging are to determine the origin of mass, its measurement, extent, characterisation and assessment of its effect on contiguous organs.

Methods: A Cross-sectional observational study was done in 30 patients. Patients of either sex of any age group who had presented with involvement of retroperitoneal organs detected by routine ultrasound and postoperative patients with recurrence were included in our study.

Results: Ultrasound is the initial imaging modality of choice since it is inexpensive, easy to perform and no radiation exposure. They cannot be characterized by ultrasound alone and hence need further evaluation.

Conclusions: Multidetector computed tomography is the imaging modality of choice for evaluation and characterization. CT protocol for evaluation of the retroperitoneum consisted of both plain and contrast scans for localisation and characterisation of the masses. Multiplanar reconstructions allowed the images to be viewed in any plane chosen including a curved plane thus helping in defining the exact location and extent of the lesion. With MIP and volume rendered images, the relationship of the vessels with the mass lesions was clearly visualized.

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I.   Introduction –

The retroperitoneum represents a complex potential space containing multiple vital structures limited anteriorly by the peritoneum, posteriorly by the posterior abdominal wall, Diagnostic imaging plays an important role in the evaluation of abdominal masses. Many imaging modalities are available ranging from conventional modalities to the cross-sectional modalities like USG, CT and MRI. The main principles of imaging are to determine the origin of mass, its measurement, extent, characterisation and assessment of its effect on contiguous organs which provides early and accurate pre-operative diagnosis resulting in a higher rate of surgical resection and improvement of survival.

Boundries of retroperitoneum -
Anterior Boundary:
• Posterior wall of peritoneum
Posterior Boundary:
• Transversalis fascia
• Vertebral bodies and muscles of the posterior abdominal wall:
Superior Boundary:
• Diaphragm
Inferior Boundary:
• Pelvic inlet
Lateral Boundary:
• Lateral borders of the quadratus lumborum muscles
Structures located here include:
• Kidneys and adrenal glands
• Ureters
• Pancreas (except tail)
• Aorta and inferior vena cava
• Parts of the duodenum (2nd and 3rd segments)
• Ascending and descending colon
• Lymph nodes and nerves

The diagnosis of tumours arising from retroperitoneal tissue can be readily accomplished with CT even when they are relatively small. Retroperitoneal masses can be broadly categorized as [1] :
1. Primary retroperitoneal masses.
They are mass which does not originate from any major organ.
2. Arising from major retroperitoneal organs.

Tumors arising from retroperitoneal organs -
• Pancreatic tumour: Carcinoma of pancreas, islet cell tumours, cystadenoma and cystadenocarcinoma.
• Renal tumours: Renal cell carcinoma, Wilm's tumor, Angiomyolipoma.
• Adrenal tumours: A denomas, A drenal carcinoma, Adrenal metastasis.

Primary retroperitoneal masses –
1) Neoplastic lesions-
• Lymphoma
• Liposarcoma
• Germ cell tumor
• Neurogenic tumor
• Lymphangioma

2) Non-Neoplastic retroperitoneal lesions -
• Renal hematoma.
• Renal abscess.
• Lymphocele.
• Retroperitoneal fibrosis
• Urinoma

II.   Material And Method –

The study comprised of 30 patients referred to the department of Radio-diagnosis at a tertiary care hospital who had presented with involvement of retroperitoneal organs detected by routine ultrasound and postoperative patients with recurrence were included in our study.

Study was performed on SIEMENS 16 Slice CT SCAN mahine at GCS Hospital, Ahmedabad over a period of 24 months from January 2023 to December 2024.

Inclusion criteria:
-Patients referred for imaging due to signs and symptoms consistent with the clinical suspicion of retroperitoneal mass, patient who had presented with involvement of retroperitoneal organs detected by routine ultrasound and postoperative patients with recurrence.
-All age group.
-Both males and females.

Exclusion Criteria –
- Lactating or pregnant mothers.
- Patients with history of contrast allergies

Patient Preparation –
Patient laboratory data were initially revised with a specific interest within the results of the renal function tests. We instruct all patients to prevent solid food intake for 4-6 h before examination and to continue adequate simple fluid intake up to three hours former to examination to make sure adequate hydration

Technique –
CT abdomen and pelvis was done with oral and IV contrast to the patients using the subsequent parameters; (350 mA, 120 KV, 0.5 second tube rotation time, slice thickness 5 mm, 8 mm table feed &3 mm incremental reconstruction, scan area extend from diaphragm to the pubic symphysis with the patient lying supine).
Ethical considerations were strictly adhered to. All patients or their legal guardians provided informed written consent prior to participation.

III.   Results –

1) Age Group Wise Distribution –

DISTRIBUTION	NUMBER
0-20	5
21-30	2
31-40	3
41-50	6
50-60	9
>60	6

2) Diagnosis of studied patients -

| Pathological diagnosis	Studied patients	
Pancreatic Pseudocyst-	6	20
Ca Pancreas	5	16.67
Renal cell carcinoma	5	16.67
Lymphoma	4	13.33
WIlms Tumor	3	10
Liposarcoma	3	10
Renal hematoma	2	0.67
Lymphangioma	2	0.67

3) Out of 30 cases, in 19 cases lesion originated from the retroperitoneal organs which represent 63.33 % cases while 36.67 % (11 cases) were primary retroperitoneal masses.

4) Out of 19 lesions which originated from retroperitoneal organ 13 cases were of malignant origin and only 6 cases were benign.

5) Out of 11 primary retroperitoneal masses 7 cases were malignant and only 4 cases were benign.
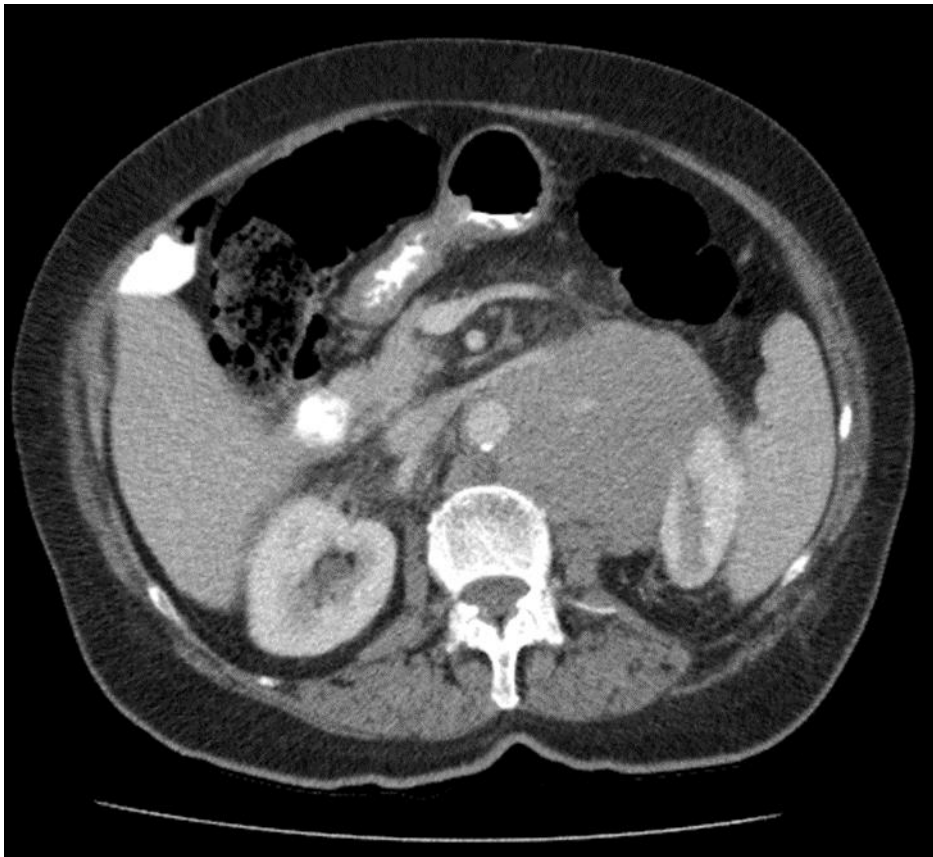
6) Out of total 30 cases, there were 20 malignant lesion representing 66.66 % cases and 10 benign lesions (33.33 % cases).

FIGURE – 1
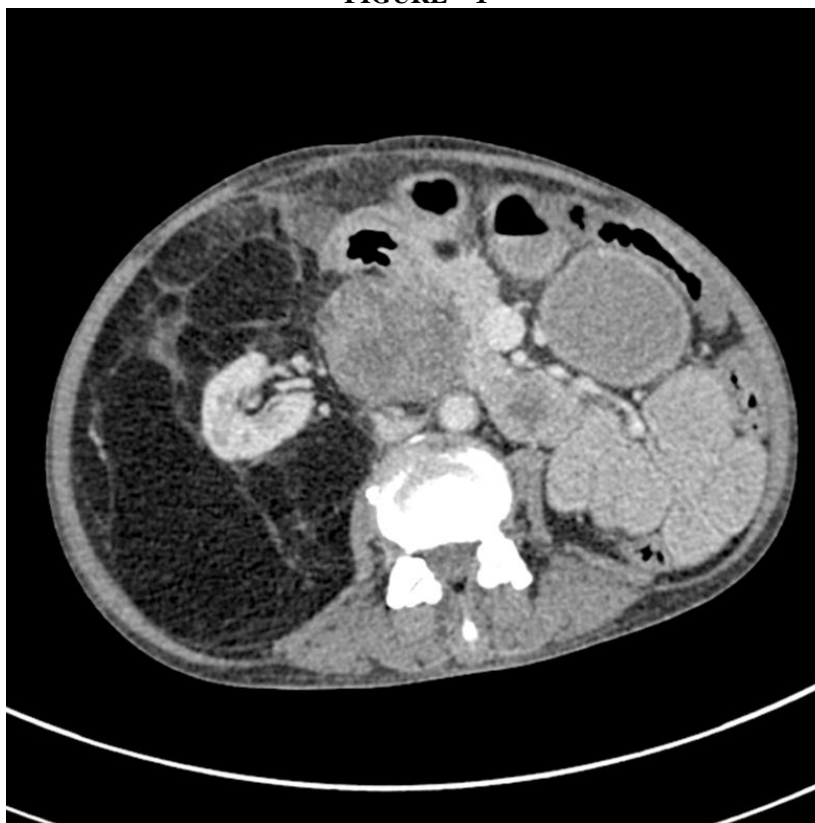
Axial CT shows fat density area involving posterior right peri-renal region- Liposarcoma was diagnosed on histopathology.

FIGURE – 2

Axial CT shows presence of soft tissue density in left peri-renal space with homogenous enhancement - Lymphoma was diagnosed on histopathology.

IV. Discussion -

Early management and treatment planning of the patients with various retroperitoneal masses need early detection and accurate diagnosis. Benign and malignant masses should be distinguished whenever possible to avoid unnecessary surgical procedures. The bulk of retroperitoneal masses are malignant with non-specific clinical presentations because the symptoms appear quite late within the clinical course. These tumors are often rather large at the time of diagnosis [2].

MDCT is the preferred method for the diagnosis of retroperitoneal tumors, because of its availability, reduced cost, high resolution, and short time required for the scan. A contrast-enhanced MDCT scan can detect the precise tumor location, nature, and components of the mass, the extension to the adjacent organs and relation to the blood vessels. It may also detect if there is a lymph node involvement or distant metastasis in cases of malignant tumors and thus staging of the malignant disease [3].

In our study most common age group involved is between 50-60 year, which was in alignment with study done by Tapadia and Gajakos et al. [4] which also showed that most common age group affected by retroperitoneal masses were between 50-60 years.

This study included 30 patients who had retroperitoneal masses, their age ranged from 1 year to 80 years old. In our study, we found that the retroperitoneal masses arised from retroperitoneal organs were more common and more frequent than the primary retroperitoneal masses. This was in agreement with Scali et al. [5] who reported that the majority of retroperitoneal masses arises from retroperitoneal organs and are therefore not considered primary retroperitoneal mass.

In our study, the bulk of the retroperitoneal masses were malignant constituted 66.66 % of all cases (n=20), followed by the benign lesions constituted 33.33 % (n=10). These results were in agreement with Jo &Fletcher [6] who reported that malignant tumors of the retroperitoneum are roughly four folds more frequent than benign lesions, in contrast to neoplastic disease occurring elsewhere in the body, where benign disease predominates and Khalifa [7] who found that the malignant masses represented 70% of the whole retroperitoneal masses with malignant to benign masses ratio 2.3:1 as well as Neville et al. [8] who stated that seventy-eighty percent of all primary retroperitoneal tumors are malignant and these tumors cover 0.1–0.2% of all malignancies.

In our study, the foremost common malignant retroperitoneal masses were Ca pancreas and Renal Cell Carcinoma, each one constituted 16.67% (n=5 cases) of malignant lesions. This was in contrast with Kamel [9] who found that lymphomas were the foremost frequent type 3 cases from 32 cases (9.4%) and retroperitoneal liposarcoma was the second foremost common type 3 cases (9.4%).

V.   Conclusion –

Our results indicate that that MDCT has high accuracy in diagnosis and detection of the different retroperitoneal masses. MDCT is the most accurate radiological modality for early diagnosis, charactervization and differentiation of retroperitoneal masses, and early and proper management.
MDCT is the modality of choice for pre-treatment staging and post treatment follow-up.

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