Original Research Article

# Study of the incidence of various retroperitoneal masses and accuracy of MDCT in detection of retroperitoneal masses

**Jyoti Tapadia[1*], Anand Shrikant Gajakos[2]**

*[1]Professor, Department of Radiology, Ashwini Rural Medical College, Hospital and Research Centre, Kumbhari,India*

*[2] Associate Professor, Department of Radiology, Ashwini Rural Medical College, Hospital and Research Centre, Kumbhari,India*

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## Abstract

**Background:** Recognizing specific features of various retroperitoneal tumors is the next agenda on the list which includes evaluating the tumor components, vascularity and variable behaviour on imaging followed after intravenous injection of contrast media. Evaluation of all these features is made quite easy by the high contrast resolution provided by CT. Therefore, the present study was undertaken to study the incidence of various retroperitoneal masses and accuracy of MDCT in detection of retroperitoneal masses. **Method**: The present prospective study was carried out in the Department of Radiology, Ashwini Rural Medical College, Hospital and Research Centre, Kumbhari,India from 1.10.19 to 30.09.2020. The study consists of 50 patients referred to computed tomography with clinical and sonological suspicion of retroperitoneal mass who fulfills selection criteria.**Result:** Out of 50 cases, 42(84%) were malignant while 8(16%) were benign neoplasms. Among 50 patients, 28(56%) were males while 22(44%) were females. Commonest age group was 51-60years (26%) followed by 41-50 years (20%). Among malignant retroperitoneal neoplastic masses, most common were retroperitoneal neoplastic lymph nodal masses 24(42%) followed by STS 17(34%). Malignant lesions were more common in males 25(60%). Among the benign lesions, 2 were each of schwannoma, neurofibroma and paraganglioma while one each of lipoma and teratoma. Benign lesions were more common in females (62%). With female to male ratio of 5:3. **Conclusion**: CT is highly accurate/high efficacy in the detection of RP masses However differentiation of various malignant lesions from each other is difficult on CT features alone. CT is the modality of choice for pretreatment staging and post treatment follow-up of RP tumors.

**Keywords:** Retroperitoneal masses, Malignant, Benign, CECT, NECT



## Introduction

For years, retroperitoneum has been a difficult region to image radiologically. With the advent of ultrasonography, some hope was generated for retroperitoneal assessment; however, air being one of the enemies of ultrasound, in some cases; ultrasound failed in evaluating retroperitoneum satisfactorily. An important historic achievement occurred in 1972 with theintroduction of Computed Tomography (CT)[1].From then, till today, CT has over shadowed ultrasonography and conventional imaging in solving innumerable mysteries carried along for years by the magic box called abdomen. Retroperitoneum had been one such mystery solved effortlessly by computed tomography. Evolution of computed tomography portrays one of the most spectacular journeys of the recent scientific boom.

The development of spiral CT in the past few yearshas allowed a shorter examination time and thinner sections,with the capability of three-dimensional reconstruction makes it one of the favourite modality among the radiologists. Today, for most reasons, CT is the diagnostic modality of choice for imaging the retroperitoneum and various pathologies that it harbours.'Retroperitoneal neoplastic masses' is one such category which, in our study, comprised of neoplasms (benign / malignant and primary / metastatic) arising in the retroperitoneum and the lymph nodes confined to the retroperitoneum. Recognizing specific features of various retroperitoneal tumors is the next agenda on the list which includes evaluating the tumor components, vascularity and variable behaviour on imaging followed after intravenous injection of contrast media. Evaluation of all these features is made quite easy by the high contrast resolution provided by CT. Therefore, the present study was undertaken to study the incidence of various retroperitoneal masses and accuracy of MDCT in detection of retroperitoneal masses.

**Correspondence*
**Dr. Jyoti Tapadia**
Professor,Department of Radiology, Ashwini Rural Medical College, Hospital and Research Centre, Kumbhari,India
**E-mail:** drgajakos@gmail.com

**Material and Methods**

The present prospective study was carried out in the Department of Radiology, Department of Radiology, Ashwini Rural Medical College, Hospital and Research Centre, Kumbhari,India from 1.10.19 to 30.09.2020. The study consists of 50 patients referred to computed tomography with clinical and sonological suspicion of retroperitoneal mass who fulfills selection criteria.

**Inclusion criteria**

1. Clinically suspected and USG detected abdominal neoplasms of all age and sex which are confirmed as having retroperitoneal neoplasm on CT or histopathology (FNAC / biopsy).
2. Lymph nodal (primary and Metastatic) and primary retroperitoneal neoplastic masses only.
3. Only those retroperitoneal neoplasms that were detected during the study tenure are included in study

**Exclusion criteria**

1. Neoplasms of the retroperitoneal viscera and vessels.
2. Retroperitoneal neoplasms that were not detected during the tenure of study.

3. All patients that were suspected to have neoplastic masses on CT;however, turned out to be non-neoplastic in histopathological study (FNAC / biopsy) were excluded from the study.
4. Patients lost to follow-up without confirmation of diagnosis.

**Data collection procedure:**All patients recruited in the study were examined in detail with complete history and physical examination and sonological examination where ever possible. Routine hematological tests and other relevant investigations were obtained in all patients.The conventional CT scanning protocol in this study consists of scanning of the abdomen after oral and intravenous contrast administration.All patients, when possible, received oral 1000 ml of (2%) diluted sodium amidotrizoate and meglumine amidotrizoate mixture (Gastrografin; Schering, Germany). The total oral contrast (1000ml) was divided in four parts and given:1st part to be taken 1hour before examination.2nd to 4th portions given subsequently at 15 minutes intervals.Examination is started 5 minutes after consumption of last portion.Pre contrast scan was done in supine position using 8mm slice thickness and 4mm collimation (Kv: 130, Effective mAs : 80) from the domes of diaphragm to the symphysis pubis. 2ml / kg of non-ionic water soluble iodinated contrast medium iopamidol (iopamiro 300mg/ml, BRACCO) was intravenously injected at the rate of 2.5ml/sec through a 20G intravenous catheter by using pressure injector. Post contrast scanning was done in arterial phase (delay of 20 sec) and venous phase (delay of 50 sec.)CT scan of retroperitoneum requires imaging of the abdomen in axial planes. Coronal and sagittal reformation of the images was done using multiplanar reformation (MPR) and volume rendering technique (VRT).Diagnostic images were stored on computer in JPEG version after converting the DICOM file to JPEG file using an e-film software. Whenever possible, the diagnosis was confirmed by FNAC / Biopsy and operative findings**.** In cases where no further evaluation was advised by the clinician, response to therapy was taken as confirmatory.

**Result**

Total number of patients studied was 54. All were shown to have retroperitoneal neoplastic masses on CT scan; however, only 50 were confirmed to be neoplastic in histopathology (FNAC / Biopsy). Only those patients with histopathologically confirmed neoplastic retroperitoneal masses were included in the study.

Out of these, 28 were males and 22 females. Patients of all age groups were included. 84% of the lesions were malignant and 16% benign.Computed tomographic examinations using oral and intravenous contrast was done in all patients.

**Table 1: Positive predictive value of CT in detecting a retroperitoneal mass as neoplastic or non-neoplastic (n = 54)**

| Modalities used | Diagnosis of retroperitoneal mass | | Total |
|---|---|---|---|
| | Neoplastic | Non Neoplastic | |
| CT | 54 | 00 | 54 |
| FNAC / Biopsy | 50 | 04 | 54 |

Sensitivity in detecting a retroperitoneal neoplasm = 100%.Positive predictive value in detecting a retroperitoneal mass as neoplastic = 92.66%

CT could detect all the masses in the retroperitoneum satisfactorily (100%).CT could satisfactorily differentiate between neoplastic and non-neoplastic masses (92.6%).

**Table 2: Age and Sex distribution of retroperitoneal neoplastic masses.**

| Age (years) | Males | Females | Total |
|---|---|---|---|
| 1-10 | 0 | 3 | 3 |
| 11-20 | 4 | 2 | 6 |
| 21-30 | 4 | 2 | 6 |
| 31-40 | 2 | 3 | 5 |
| 41-50 | 6 | 3 | 9 |
| 51-60 | 4 | 9 | 13 |
| 61-70 | 6 | -- | 6 |
| 71-80 | 2 | -- | 2 |
| **Total** | 28 | 22 | 50 |

Males (28 i.e. 56%) were found to be affected more than females (22 i.e. 44%). Not a single female aged above 60 years and having retroperitoneal neoplastic mass was found in the study. Majority of patients were seen in the age group of 41- 60 (22 i.e. 44%). Most common affected age group was 51-60 years comprising 13 (26%) patients.

**Table 3: Sex wise distribution of retroperitoneal neoplastic masses (Benign and Malignant)**

| Retroperitoneal Neoplastic Masses (n=50) | Males | Females | Total |
|---|---|---|---|
| Malignant | 25 | 17 | 42 |
| Benign | 3 | 5 | 8 |
| Total | 28 | 22 | 50 |

Overall, males (56%) were affected more than females (44%). Majority of retroperitoneal neoplastic masses are malignant (84%) whereas, only few are benign (16%). Out of 42 malignant neoplasms, 25(60%) were found in males while 17(40%) in females. Out of 8 Benign neoplasms, 5 (62%) were found in females while 3(38%) were in males.

**Table 4: Sex wise distribution of Malignant retroperitoneal neoplastic masses**

| Malignant retroperitoneal neoplasms | Males | Females | Total |
|---|---|---|---|
| 1. Primary RP neoplasms | | | |
| Retroperitoneal STS | 9 | 8 | 17 (34%) |
| Germ cell tumour | 1 | 0 | 1 (2%) |
| 2. Lymphomas | 7 | 3 | 10 (20%) |
| 3. Metastatic lymph nodemasses | 8 | 6 | 14 (28%) |
| Total | 25 (50%) | 17 (34%) | 42 (84%) |

Out of 50 patients, 42(84%) had malignant RP neoplastic masses. Males formed the major chunk, 25(50%) whereas; only 17 (34%) females were affected. Of all (50) retroperitoneal neoplastic masses, 18 (36%) were primary retroperitoneal neoplasms [17 (34%) were soft tissue sarcomas and one(2%) was germ cell tumour]. Out of total patients, 10 (20%) were lymphomas while 14(28%) were metastatic

nodal masses. Males were affected more compared to females in all categories of malignant RP neoplastic masses with Male : Female ratio of 1:0.88. Overall, lymph nodal masses (metastatic nodal masses and lymphomas taken together) were more common than RP soft tissue sarcomas (STS). RP STS were the most commonly found malignant RP neoplastic masses followed by metastatic nodal masses. Lymphomas were distributed over all age groups with male predominance (7:3).

**Table 5: Sex wise distribution of Benign retroperitoneal neoplastic masses**

| Benign retroperitoneal neoplastic masses | Males | Females | Total |
|---|---|---|---|
| | No. of cases | No. of cases | |
| Schwannoma | -- | 2 | 2 |
| Neurofibroma | -- | 2 | 2 |
| Paraganglioma | 1 | 1 | 2 |
| Teratoma | 1 | -- | 1 |
| Lipoma | 1 | -- | 1 |
| Total | 3 | 5 | 8 |

Females were more commonly affected than males. M: F ratio of 0.6: 1. Both, schwannoma and neurofibroma were found exclusively in females while teratoma and lipomas were seen only in males. Paragangliomas were shared equally.

**Table 6: Features of Malignant and Benign retroperitoneal neoplasms on contrast enhanced CT (CECT)**

| Retroperitoneal Neoplastic Masses | CECT Features | | | | |
|---|---|---|---|---|---|
| | Pattern | | Enhancement | | |
| | Homogeneous | Heterogeneous | Mild (10-20HU) | Moderate (20-40HU) | Intense (>40HU) |
| Benignn=8 | 7 | 1 | 5 | 2 | -- |
| Malignantn=42 | 15 | 27 | 16 | 26 | -- |
| Total | 22 | 28 | 22 | 28 | -- |

Majority of benign neoplasms showed mild (63%) and homogeneous (89%) enhancement;whereas, malignant neoplasms showed moderate (62%) and heterogeneous (64%) enhancement. Lipoma did not enhance.

**Table 7: CT features of Primary retroperitoneal neoplasms (PRPN)**

| Primary RP Neoplasms | CT Features | | | | | |
|---|---|---|---|---|---|---|
| | NECT | | CECT | | | |
| | Density | | Pattern | | Enhancement | |
| | Hypo. | Iso. | Homo | Hetero | Mild (10-20HU) | Mod (20-40HU) |
| Soft Tissue Sarcomas (n=17) | 2 | 15 | -- | 17 | 6 | 11 |
| Primary Germ cell tumor (n=1) | 1 | -- | -- | 1 | 1 | -- |
| Total | 3 | 15 | 00 | 18 | 7 | 11 |

Majority of primary RP neoplasms (83%) showed attenuation values similar to soft tissue and / or muscles (isodense i.e. 30-50HU). Germ cell tumour was hypo attenuating. All (100%) STS were isodense (30-50HU) and heterogeneous. All primary RP neoplasms were heterogeneous. 61% of primary RP neoplasms showed moderate enhancement while 39% showed mild enhancement.

**Discussion**

On the preliminary basis, 54 patients diagnosed as having retroperitoneal neoplastic masses on CT alone were collected; however, out of these, 4 were found to be non-neoplastic in histopathological (FNAC / Biopsy) study. This reduced the sample size to 50. CT was found to detect all retroperitoneal neoplasms irrespective of size (sensitivity of 100%) whereas it failed on four occasions and diagnosed non-neoplastic masses as neoplastic (positive predictive value of 92.6% in detecting a retroperitoneal mass as neoplastic).Similar results were found in the study evaluating the value of computed tomography in retroperitoneal space occupying extrarenal and extrapancreatic lesions and concluded that, CT has an overall diagnostic accuracy of 90%[2].In the study conducted in 96 patients with infiltrating retroperitoneal lymph nodes by using CT, echography and lymphography. Sensitivity of CT was found to be 92% while specificity was 89%[3].And in another study, it was stated the ability of CT in identification (100%) and characterization (98%)[4].

Patients with retroperitoneal masses seldom present with any complaints until the mass grows to a very large size[5,6].

Due to the large size of RP neoplasms, abdominal anatomy is grossly altered making it difficult on imaging to ascertain the exactorigin of the mass(intra or retroperitoneal). Displacement of normal anatomic structuresof the retroperitoneum is helpful in this regard[7,8].

Anterior displacement of retroperitoneal organs strongly suggests that the tumor arises in the retroperitoneum. Displacement of major RP vessels can be helpful as well. For tumorsthat are located within the retroperitoneum, the next step isto identify the organ of origin. When there is no definitesign that suggests the organ of origin, the diagnosis of a primary retroperitoneal tumor becomes likely[8].

Once it was confirmed that the neoplasm was primarily of retroperitoneal origin, further characterization commenced.

**Age and Sex Distributions**

In the present study, we found male dominance. Males (28 i.e. 56%) were found to be affected compared to that of females (22 i.e. 44%). Majority of patients were seen in the age group of 41- 60 (22 i.e. 44%).with more specific rise in 51-60 years comprising 13 (26%) patients.In another study it was reported that, most commonly affected age group was 60 to 79 years of age in both the sexes[9].This disparity in age related incidence goes with the difference in the sample composition. Majority of patients were above 60 years of age whereas in the present study, majority of patient were below 60 years of age. Only 6 (12%) patients with retroperitoneal neoplastic masses were reported above the age of 60 years. Not a single female aged above 60 years was found in the present study. Youngest patient was a 6 years old male child (lymphoma) and eldest was a 75years old male (RCC with RP lymphadenopathy)[9].12(70%) of all primary malignant retroperitoneal neoplasms were found in the age range of 51 to 70 years. It was stated that, the incidence range of primary

retroperitoneal neoplasms to be between 60 to 70 years;whereas benign lesions are observed in more younger population[10].In present study, all the benign lesions were seen in patients below 50 years of age. Majority of primary retroperitoneal malignant neoplasms (70%) were found beyond 50 years of age whereas all (100%) benign lesions were found below 50 years of age. lesions, incidence of benign lesions is more in younger population Richard H Lane.In present study, 100% of the patients with retroperitoneal Metastatic masses of testicular primary were in the age group of 17 to 37years. Further, benign neoplasms were found to be more common in females (62%) than in males (32%). Similar findings were noted by Richard H Lane[10].In the study of paragangliomas by WendelinS. Hayes et al, 28 patients were collected retrospectively and found 55% (n=16) were males and 12(45%) were females[11]. Similar proportion was found in present study.

**Characterization of Neoplasms**

According to Thijs Van Dalen et al, 80% (n =566) of all non visceral retroperitoneal neoplasms are malignant. While 20 % are benign. Malignant lesions were further classified in three groups as primary soft tissue sarcoma 34% (n=192), lymphomas 21% (n=154) and carcinoma of unknown primary (metastatic retrperitoneal masses) 24% (n=172). They stated that, retroperitoneal lymph nodal masses together (primary-lymphoma and Metastatic) are the most commonly found group. Among the individual malignancies, soft tissue sarcomas are far ahead.In present study, 84% (n=42) retroperitoneal neoplasms were found to be malignant, soft tissue sarcomas were 34% (n=17), lymphomas 20% (n=10) and Metastatic nodal masses while 16% (n=8) were benign. Of the malignant neoplasms, Soft tissue sarcomas (n=17)34%, lymphomas (n=10) 20% and Metastatic nodal masses (n=14) 28%. For soft tissue sarcomas, Male: Female ratio is 1: 0.73[9] . In present study, Male: Female ratio was 1 : 0.7.

**Pathologies**

Retroperitoneal lymph nodal masses taken together(primary-lymphoma and Metastatic)are the most commonly found retroperitoneal neoplasms;whereas, if individual groups are considered, soft tissue sarcomas are far ahead[9].In the present study, 26 (52%) primary retroperitoneal neoplasms and 24 (48%) lymph nodal neoplasms are found.

**Primary Retroperitoneal Neoplasms:**

**Soft Tissue Sarcomas**

According to Lauretti S et al,retroperitoneal soft tissue sarcomas had a peak incidence in fifth decade of life. They accounted for 0.1 to 0.2 % of all the solid tumours and 15% of all sarcomas. 80% of the tumours in retroperitoneum are malignant and about 1/3$^{rd}$ of these are soft tissue sarcomas[12].Another study reviewed that, retroperitoneal soft tissue sarcomas were locally invasive tumours that remain occult for long periods and grow quite large due to the abdominal cavity's remarkable ability to accommodate those slowly expanding masses with a paucity of attendant symptoms. They concluded that, an aggressive operative approach was necessary for these tumours as more than 90% recurred locally and resulted in death of patients[5]. Similar conclusions are also drawn by Denis Leung[13].The most common histological subtype, liposarcoma is associated with local recurrence but metastasis is rare. Malignant fibrous histiocytoma and liposarcoma were the most common malignant tumours amongst the retroperitoneal sarcomas; however, the differentiation is difficult on the basis of CT features alone**.** No primary retroperitoneal malignant neoplasm had CT characteristics specific enough to differentiate it from others[14].In present study, total of 17 (34%) patients had soft tissue sarcomas. 15 were detected for the first time; whereas 2 had recurrence. All (100%) were heterogeneous while 15 (83%) were of soft tissue-musle density (30-50 HU)

**Liposarcoma**

They are the most commonly found retroperitoneal STS along with malignant fibrous histiocytoma[10,14].More than one third of liposarcomas originate in perirenal fat. Liposarcomas may be classified histologically into 4 varieties, namely, well-differentiated, myxoid, pleomorphic and round cell.Fat within the tumour may lead to the diagnosis of liposarcoma. With tumour grading being dependant on the amount of fat. In the study of 58 patients, 31(53%) cases showed lipomatous features. In present study, only one (17%) case showed foci of fat within[15].In a study of 6 patients with retroperitoneal liposarcoma, mean age were 58 to 66yrs. 4 (66%) were males and 2 (33%) females. Computed tomography showed large mass with soft tissue density. Distant metastases were not documented. Most common variety found was myxoid. Local relapse was frequent and survival was poor[16].In present study, Out of 17 STS, 6 (35%) were liposarcoma. Mean age was 55years. 4 (66%) were males and 2(33%) females.

**CT features**

On NECT, these are huge, ill-defined, heterogeneous, masses of soft tissue density. Foci of fat detected in only one case (17%), a pleomorphic liposarcoma.According to Lee JK, myxoidliposarcomas are devoid of fat[17]. In present study, all 3 (100%) myxoid liposarcomas were devoid of fat. Necrosis was present in 3 (50%) whereas Calcifications were absent. 5(83%) showed invasion in the surround structures while 4(66%) displaced the aorta.On CECT, they show heterogeneous, moderate enhancement. Local invasion, vascular encasement were well delineated on CECT.We have six cases of liposarcomas, Youngest was a 35 year female and eldest was a 63 year old male. 5 cases were primary malignancies, while 1 was recurrence. Out of these 6, three (50%) were pleomorphic and three (50%) myxoid.CT was not able to differentiate between these histological types. Distant metastasis was not observed. Myxoidtype of liposarcomas are the most common type[18].

**Malignant Fibrous Histiocytoma:**Along with liposarcomas malignant fibrous histiocytoma (MFH) are the most common soft tissue sarcomas found. It is a high grade tumour, originating from undifferentiated mesenchymal cells. Male to female ratio is slightly less than 2:1. More than 70% tumours occur in 5$^{th}$ and 7$^{th}$ decade, but can occur at any age. Dystrophic calcification is present in 25% of cases.

**CT appearance:**On NECT, a large, soft tissue density lesion with few low attenuation areas of necrosis and calcifications may be seen. On CECT, it shows moderate, heterogeneous enhancement with areas of necrosis. The local invasion and vascular displacement is well delineated.In present study, 6 patients with MFH were detected. 4(66%) males and 2(33%) females. 5 cases were detected for the first time whereas 1 was recurrence. Dystrophic calcifications were present in two cases.In the study byRichard H Lane, calcifications were noted in 25% and necrosis in 57% cases. 66% were Males while 33% were female[10].

**In the study done by Pablo R Ros,** CT revealed malignant fibrous histiocytoma to have a predominantly muscle density pattern that was homogeneous in 45% of cases and contained hypodense areas representing necrosis within the tumour in 55% cases. Calcifications were found in 20% cases[19]. Distant metastasis was noted in 1 and lymphadenopathy in 2.

**Leiomyosarcoma**

One of the commonly found tumour after MFH and liposarcoma (both were seen to show same incidence). More common in females they may demonstrate intra or extra-vascular growth. Necrosis is a prominent feature and seen more extensively compared to other STS. Intraluminal growth is most commonly seen involving the inferior vena cava. Typically, these lesions appear hypodense on CT due to necrosis.

**CT appearance**

Large ill-defined predominantly hypodense lesion showing mild to moderate enhancement on contrast enhanced CT. Invasion into the surround noted in few. Large hypodense non-enhancing areas noted within representing necrosis.

In present study, 100% of the masses showed extensive necrosis. while female (66%) were affected more.

**Fibrosarcoma**

In our study, we found one case of fibrosarcoma, a 17 year old female.

**CT appearance:**On CECT it showed a heterogeneously enhancing ill -defined lesion infiltrating the adjacent structures seen in the retroperitoneum on right side. Non-enhancing areas of necrosis were noted within the mass.

**Primary Germ Cell Tumour:**Extragonadal germ cell tumours are thought to arise from abnormally migrated primordial germ cells. Most extragonadal germ cell tumours occur in the midline. Retroperitoneum is the second most common site after mediastinum [20].Over 90% of germ cell tumoursoccur in men**.** Evaluation of serum markers will help in establishing the diagnosis.

**CT appearance**

An ill-defined, hypodense, mass lesion in the paraaortic region of the retroperitoneum encasing the aorta and displacing the superior mesenteric artery superiorly. The mass shows mild enhancement. Few discrete areas of necrosis also noted.In present study, a single case of extragonadal germ cell tumour was found. He was a middle aged male. No other specific features were found.

**Primary Retroperitoneal Neoplastic Masses of Neural Origin**

These are retroperitoneal tumours arising from ganglion cells, paraganglionic system or nerve sheath.

**Schwannoma**

Schwannomas or neurilemmomas or neurinomas are encapsulated tumours arising from peripheral nerve sheath schwann cells. They are usually seen in young middle aged adults. It is more common in females with female to male ratio of 2;1.Nerve fibers do not traverse neurilemmomas, instead, are usually confined to the capsule of these tumours. 1% of these tumours occur in retroperitoneum. These are located in presacral pelvic retroperitoneum or are adjacent to kidneys.

**CT appearance**

NECT shows well defined, rounded / oval isodense mass in right para aortic location adjacent to right kidney. CECT shows mild contrast enhancement with low attenuation areas of cystic degeneration. Calcification was found in one (50%).We had encountered 2 cases of schwannomas; both females (100%) aged in the range of 21-30years. Schwannoma in both cases were smaller than 5cm (100%) with average diameter of 3cm.Characterized the CT features of RP schwannoma in 7 patients and found that, all the tumours were well demarcated, round or oval masses. There was cyst formation in 3 cases and calcifications in 3(43%)[21]

SeungHyup Kimcarried out a study of6 women and concluded that CT findings of a round mass with prominent cystic degeneration may be helpful in pre-operative diagnosis of retroperitoneal neurilemmomas[22].

In present study, both the lesions were well defined and round to oval in shape.

**Paraganglioma**

Retroperitoneal paragangliomas arise from paraganglia, collections of specialized neural crest cells symmetrically distributed along the aorta in close association with the sympathetic chain. This tissue either aggregates in the adrenal medulla, where it gives rise to intraadrenalparaganglioma, also known as pheochromocytoma, or remains in its paraaortic sites, where it may develop into extraadrenal, retroperitoneal paragangliomas.

**CT features**

We have two cases of paragangliomas. NECT shows well defined, soft tissue density masses in the immediate para-aortic region. CECT shows moderate enhancement, as most of the paragangliomas are hypervascular.Correlation of symptoms and laboratory values of catecholamines is the most efficacious way of identifying a soft-tissue retroperitoneal mass detected by CT as an extraadrenal retropentoneal paraganglioma[11].Excess of catecholamines asoociated with a paraaortic soft tissue mass on ct can be labelled as paragangliom[10].

**Neurofibroma**

These are benign tumours of nerve sheath, more common in women with mean age incidence of 40 years. High association is noted with neurofibromatosis.On NECT, a well defined, homogeneously hypodenseparaaortic mass noted. Average size was 4 cm. calcification was noted in one. It shows mild enhancement on contrast enhanced CT. In present study, 2 cases were found, both females.

**Teratoma**

These are congenital neoplasms containing elements of three germ layers. 90% are benign and 6-10% are malignant. Male to female ratio is 1:3.4. 50% occur in childhood with first peak in first 6 months of life whereas second peak occurs in early childhood. It is more common on left side.Cystic teratoma may be adherent to adjacent structures and still it can be benign. CT is more specific than sonography in the diagnosis of fatty tumours and is superior in delineating bone and tooth fragments. Malignancy tends to occur in dermoid plug with greater risk being in patients above the age of 40 years and in women of postmenopausal age.

**CT appearance**

NECT shows large cystic mass with globular calcifications in or near septations or wall with foci of fat. CECT shows heterogeneous lesion with fatty component, calcifications, and mildly enhancing septae. In present study, we had a single case of mature teratoma, a 16 years old male.He had a mature teratoma (benign). CT showed multilobular fat containing mass with globular calcifications and septations in the retroperitoneum on left side. These findings correlate with the study done by Arnold C Friedman et al[23]

The mass displaced the left kidney inferolaterally. It was a benign mature teratoma. It was later resected completely without recurrence.

**Cystic teratomas**

Teratoma showed fat density in 78%, water density in 100% and calcifications in 89%[24]. In present study we found all.

**Lipoma**

In our study, we found single case of lipomas. CT appearance : Well defined fat density mass in right retroperitoneum displacing kidney and ascending colon anteriorly. Soft tissue component was absent. Enhancement was absent.

**Conclusion**

CT is highly accurate/high efficacy in the detection of RP masses However differentiation of various malignant lesions from each other is difficult on CT features alone. CT is the modality of choice for pretreatment staging and post treatment follow-up of RP tumors.

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