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ORIGINALARTICLE

Role of Spiral Computed Tomography Scan in Evaluation of Retroperitoneal Pathologies

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Abstract

The study role of Spiral Computed Tomography Scan in evaluation of Retroperitoneal Pathologies was done in 50 patients with clinically suspected retroperitoneal mass in the Department of Radiodiagnosis and Imaging of Govt. Medical College, Amritsar during the year 2012-2013. All patients underwent routine investigations followed by CT examination of the abdomen. Final diagnosis was achieved by operative findings / FNAC / histopathology or by other investigations. The sensitivity of CT to detect presence / Absence of mass was 100%, to identify organ of origin the sensitivity was 98% and for characterization of mass sensitivity was 82%.

Key Words

Spiral Computed Tomography, Retroperitoneal Pathologies

Introduction

Retro peritoneum is the potential space between transversalis fascia of the posterior abdominal wall and posterior parietal peritoneum. It extends from diaphragm to the pelvic brim in its supero-inferior aspect. Retroperitoneal space is sub divided into 3 areas by fascial planes-Anterior renal and posterior renal fascia, which join together lateral to kidneys on either side to form later conal fascia. Anterior para renal space: Limited anteriorly by posterior parietal peritoneum and posteriorly by anterior renal fascia and laterally by latero-conal fascia. It consists of Pancreas, Duodenum, Ascending colon and Descending colon. Peri-renal space: Limited by anterior and posterior renal fascia. It includes kidneys, Adrenals, Renal vessel and major blood vessels. Posterior para renal space- Only fat. There are studies available evaluating role of spiral computed tomography scan in evaluation of retroperitoneal pathologies. (1-20) But similar study has not been carried out in our setup.

Aim & Objective

To make probable computed tomography diagnosis in retroperitoneal pathologies. To determine the sensitivity and specificity of Computed Tomography in diagnosing retroperitoneal pathologies.

Material and Methods

The prospective study included indoor and outdoor patients being sent for Computed Tomography examination. Examination was carried out in all the patients on Philips brilliance 190P, Dunlee 6-slice whole body Computed Tomography scanner after giving oral and intravenous contrast as and when required. The scan was done with 5 and 10 mm. thick slices. The axial scans along with coronal and sagittal reformatting was done as and when required.

Results

Table 1 shows the provisional CT diagnosis which was compared with the final diagnosis and diagnostic accuracy was also determined. The results of this study were summarized as follows: Out of 50 patients maximum cases were in the age group of 50-59 years (26%), followed by 22% in 30-39 years age group with oldest 75 years and youngest 4 years. Male and female was 72% and 28% of cases, male to female ratio 2:5:1. 76% presented with abdominal mass, 64% with pain abdomen, 40% with fever, 20% with urinary symptoms and 12% with jaundice. Masses of renal and pancreatic origin were maximum in number i.e.13 (26%) and 15 (30%) cases respectively, 8 (16%) lymph node masses .5 (10%) had primary retroperitoneal mass. Adrenal and psoas masses were seen in 3 patients (6%) each. 2 cases (4%) of aortic aneurysm were detected and 1 patient (2%) had a colonic mass. Correct organ of origin of the mass was diagnosed in 49 cases (98%). Out of 50 cases, 60% patients had

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solid masses and 40% had cystic masses. In solid masses, 76.6% had heterogenous attenuation, 23.4% showed homogenous attenuation. Enhancement of contrast was observed in 84%, calcification in 12% and fat was seen in 4% of the cases. 58% cases showed well defined margins and in 42% the margins were ill defined.

The associated CT findings were lymphadenopathy in 9(18%), hepatobiliary lesions 7(14%), pleural effusion 5 (10%), ascites and psoas lesions 4 (8%) each, splenic and chest lesions 3 patients each (6%), renal lesions in 2 (4%) and retroperitoneal hematoma in 1(2%). The incidental findings were cholelithiasis 4 (8%), hepatic lesions 2 (4%), renal lesions 5 (10%) and prostatic enlargement 2 (4%). Ultrasound was done in 44 patients prior to CT and masses were detected only in 35 cases. While 9 patients ultrasound failed to detect the mass which was later detected on CT. In all of these 44 patients CT provided some additional diagnostic information. Out of 35 detected masses by ultrasound 19 (54%) masses demonstrated solid character while 16 masses (46%) showed cystic character.26 patients had benign tumors (52%) and 24 masses were malignant (48%). The final diagnosis achieved by surgery and histopathology in 17 (34%) patients, by FNAC 4 (8%) patients and laparoscopic biopsy in 2 (4%) patients. The final diagnosis confirmed by surgery alone in 11 (22%) patients, ultrasound guided aspiration provided the diagnosis in 7 (14%) patients, CT examination alone considered diagnostic in 5 patients (10%). In 4 (8%) patients the diagnosis was confirmed by other investigations. The provisional CT diagnosis was then correlated with the final diagnosis and the study was found to be diagnostic in 41 (82%) patients. Diagnostic errors in the form of false negatively were seen in 9 patients. The correct organ of origin was identified in 49 (98%) patients. Thus the sensitivity of CT to detect presence /Absence of mass was 100%, to identify organ of origin the sensitivity was 98% and for characterization of mass sensitivity was 82%.

The diagnostic error was observed in 9 (18%) patients; 1 was reported as RCC and proved to be benign hemorrhagic cyst. A pancreatic abscess was misdiagnosed as pancreatic pseudo cyst. A pheochromocytoma was provisionally misdiagnosed as adrenal cyst. In 1 patient in whom a provisional diagnosis of psoas abscess was made, proved to be a sarcoma. One patient diagnosed as myelolipoma turned out to be schwanoma on histopathology. One patient diagnosed as primary retroperitoneal tumor proved to be a liposarcoma. Another patient diagnosed as primary retroperitoneal tumor was proved to be NHL. In 1 patient metastatic lymphadenopathy was falsely diagnosed as NHL. Lastly tubercular lymphadenopathy was misdiagnosed as NHL on CT scan.

Discussion

CT is a rapid, easily performed and safe, diagnostic imaging technique and is highly accurate in determining the organ of origin, extent and characterization of the mass. Tumor identification CT accuracy is 98 % (1). In the present study the organ of origin of the mass was suggested in all the 50 cases and it was correct in 49 cases (98%).The origin of schwanoma was wrongly diagnosed as Myelolipoma. In another study found that CT evaluation was largely superior in most situations and organs of the body which CT showed an accuracy of 83% (2).

Pancreatic pathologies: Provisional diagnosis of pancreatic carcinoma was made in 3 cases. The authors assessed the accuracy of CT in the diagnosis of ductal adenocarcinoma of pancreas and a correct diagnosis based on the CT findings was made in 91% of patients (3). In our study correct CT diagnosis was made in 100% patients with carcinoma pancreas. A provisional diagnosis of pancreatic pseudo cyst was made in 8 cases. One of these turned out to be a pancreatic abscess. Pseudo cysts are typically located in the pancreas and the immediate peri pancreatic region, omental bursa, gastro splenic recess etc (4). In our study all cysts were present in the pancreatic and in the Peri-pancreatic region (*Fig.1*).

Solid papillary fibroma occurs chiefly in young women with a mean age of 27 years and is well encapsulated round or lobulated masses with cystic and solid areas and may contain calcification (5). In our study a single case of solid papillary fibroma was diagnosed in a 22 years female patient and a well-defined heterogeneous mass with solid and cystic areas in the tail of pancreas.

Renal pathologies: Helical Computed Tomography is highly sensitive in characterization of renal masses (6). In the present study out of 13 renal masses 4 had hydronephromas, 3 patients complicated cysts, 1 patient perinephric abscess. 1 patient each had Hydatid cyst (*Fig.2*), wilm's tumor and angiomyolipoma diagnosed on CT. Flank pain and macroscopic hematuria are most common symptoms of ADPKD. Cyst hemorrhage is a common cause of pain and can be detected by CT in 69% of patients (7). In present study the symptoms were present in 2 out of 3 patients. Cyst hemorrhage was detected in both cases. In another study 36% patients had renal stones (8). In the present series 33% patients with ADPKD showed renal stones.

Complicated cysts were seen in 2 patients. These



Final diagnosis	Diagnostic	False Negative
Kidney(13)		-
ADPKD	3	
Complicated cyst	1	1
Hydatid cyst	1	
Perinephric abscess	1	
Wilm's tumor	1	
Angiomyolipoma	1	
RCC	4	
Pancreas(15)		
Pseudo cyst	7	
Abscess	2	1
Solid papillary fibroma	1	
Mucinous adenoma	1	
Adenocarcinoma	3	
Adrenal(3)		
Adenoma	1	
Pheoch romocytoma	0	1
Adrenal carcinoma	1	
Psoas (3)		
Abscess	2	
sarcoma	0	1
Aortic aneurysm	2	
CA colon	1	
Lymph nodes (8)		
Metastasis	4	
Lymphoma	1	1
Tuberculosis	0	1
CLL	1	
Primary retroperitoneal		
tumors (5)	1	
Lymphangiomas	1	
Neuroblastoma	1	
MFH	0	1
Schwanoma	0	1
Liposarcoma		

Table 1.	. Correlation of Provisional CT Diagnosis and Fin	nal
	Diagnosis of 50 Retroperitoneal Pathologies (n=	5 0)

patients showed large multiloculated cysts with thick irregular septations with enhancement of walls. One of the cysts showed solid component and a possibility of cystic RCC was kept, but it turned out to be benign hemorrhagic cyst.

Wilm's tumor is the most common primary renal neoplasm in the childhood.90% of patients present with abdominal mass and 90% occurs below the age of 5 years. It appears on CT as large heterogeneous mass with low attenuation than normal renal parenchyma (9). 5-10% tumors demonstrate vascular extension into renal vein. In the present study a single case of wilm's tumor was

Vol. 16 No. 1, Jan - March 2014

Fig. 1 Well Defined Hypodense Cyst with Enhancing wall -

Pancreatic Pseudocyst

Fig. 2 Well defined cystic SOL right kidney-Hydatid Cyst



Fig. 3 Cystic Mass with Enhancing rim in right Adrenal-Adrenal mass



Fig. 4 Large Confluent Soft Tissue Mass with Calcification & Necrosis Encasing the Aorta and IVC- Neuroblastoma



Fig. 5 Well Retroperitoneal Tumor (Schwanoma) Defined Mass with Fat and Calcification-Primary





detected in a six year old child who presented with palpable mass and fever. CT scan showed a predominantly hypo dense mass in upper pole of left kidney. No calcification or vascular extension was seen.

Angiomyolipomas are usually solitary and more common in females older than 40 years. On CT these are seen as well-defined masses with intratumoral fat (10). In this study a case of Angiomyolipoma was detected in a 48 years female patient. CT scan showed a large heterogeneous mass with soft tissue and fat components.

In the present study RCC was the most common renal lesion seen in 4 patients. The patients were in the age group of 30-75 years. All 4 patients were males. Hematuria was the presenting symptom in all the patients (100%), No calcification was seen. Metastatic lung nodules were seen in 2 cases (50%).1 patients diagnosed as having RCC stage 1, 1 patient as stage 111C, 2 patients as IV b. in 1 patient a diagnosis of RCC was made on CT, but it was finally diagnosed as benign hemorrhagic cyst on histopathology. In this study CT showed an accuracy of 80% for diagnosis of RCC. An accuracy of 95% for the diagnosis of RCC. Tumor calcification occurs in as many as 31% patients (11). RCC is usually staged according to authors (12).

Adrenal pathologies: Adenoma associated with Cushing's disease are usually unilateral round or oval, smooth, sharply circumscribed masses ranging between 2-5 cm with density less than the adjacent organs. In a study of 135 adrenal masses by authors the mean diameter of adenoma was significantly lower than that of nonadenomas (2-4 vs.4-5 cm) (13) In the present study a well-defined 2.8 x 2.8 cm homogenous mass with attenuation value of 10 HU seen in left suprarenal region and showed mild enhancement on CECT. Serum cortisol was raised and a diagnosis of adrenal adenoma was made.

Adrenal pheochromocytoma appears as round or oval sharply circumscribed mass that measure 2 to 4 cm in diameter and usually have nonhomogeneous density. When I/V contrast is administered these tumors show inhomogeneous enhancement (14). In the present study a 23 year old patient presented with vague pain abdomen and there was no history of hypertension. CT scan showed a cystic SOL with small soft tissue component and showed peripheral enhancement on CECT. A diagnosis of cystic adrenal SOL was made and on histopathology it turned out to be a pheochromocytoma (*Fig.3*).

Masses arising from lymph nodes: In NHL, bulky Para aortic lymphadenopathy is common. Enlarged lymph nodes may appear as discrete masses or confluent soft tissue (15). In the present study 2 cases of lymphoma were diagnosed. Both patients showed bulky, confluent heterogeneous masses in retro peritoneum. In 1 patient the mass was infiltrating right kidney, psoas and pancreas. Metastatic lymphadenopathy was observed in 4 patients. In testicular neoplasm lymph node metastasis more commonly involves para aortic and paracaval than pelvic nodes (16).

In the present study a 60 years patient with known seminoma testis presented with mass in the abdomen. CT scan showed multiple large heterogeneous masses in retro peritoneum encasing the aorta and IVC. Metastatic retroperitoneal lymphadenopathy was seen in a patient with carcinoma stomach, in an operated case of RCC, and in a case of carcinoma ovary. Ovarian carcinoma usually metastasize to nodes without enlarging them (17)but in the present study extensive Para aortic lymphadenopathy was seen in a 40 years female patient with ovarian malignancy. Tuberculous adenopathy was observed in 21 of 24 patients with lymph node enlargement in a review (18). In the present study tuberculous retroperitoneal lymphadenopathy was detected in 33 Years old male patient. This patient had multiple mixed density nodes with enhancing rim around celiac axis, SMA, in Para aortic and paracaval region encasing the vessels.

Ilio-psoas pathologies: Inflammatory pathologies of iliopsoas account for 36 to 54 % of CT detected psoas masses and patient frequently have abdominal pain and fever (19). Provisional CT diagnosis of psoas abscess was made in three patients. On CT the psoas was bulky in all the patients and showed heterogeneous attenuation. In one patient it turned out to be a psoas sarcoma and in the other 2 cases the psoas abscess was confirmed on surgery. Psoas neoplasms may mimic abscess on CT and a definitive diagnosis of psoas neoplasm can be made only by CT guided needle biopsy or surgery (20).

Abdominal Aortic Aneurysms: The abdominal aortic aneurysms are easily visualized on CT; aortic wall is calcified in nearly every patient in whom atherosclerosis is the etiology of aneurysm. Thrombus is easily detected by CT in 90% of aneurysms.21 In the present study abdominal aortic aneurysms were detected in 2 patients. In both the patient aneurysm was seen below the origin of renal arteries, calcification and thrombus was seen in both the patients. In one patient there was a large retroperitoneal hematoma in the Para aortic region.

Primary retroperitoneal neoplasms: In the present series primary retroperitonal masses were observed in 5 out of 50 patients (10%). These cases included MHF,



lymphangiomas, Neuroblastoma (Fig.4), schwanoma (Fig.5) and liposarcoma.3 out of 5 cases were malignant (60%), consistent with the observations.22 In a review of 90 patients with primary retroperitoneal masses 59 tumors (66%) were malignant and 31 tumors (34%) were benign. Neuroblastoma was diagnosed in a 4 year old boy with large heterogenous mass with calcification, retrocrural lymph nodes. A benign cystic mass was diagnosed in 42 years old male patient. In a 57 years old female patient, a well-defined mass with areas of fat, calcification and necrosis was seen in left lumber region. On CECT enhancement of the mass was noted and a possibility of lymphangioma and Myelolipoma was given. **Conclusion**

Despite certain limitations CT is highly sensitive modality for detection of retroperitoneal masses, to detect the organ of origin and for characterization of mass. It also determines exact anatomical extent of the mass and can detect other associated findings such as lymph nodes, metastasis and ascites. So it can be used as the primary modality for evaluation of retroperitoneal pathologies.

References

- 1. Fusari M, Maurea S, Imbriaco M, *et al.* Comparison between multi slice CT and MR imaging in the diagnostic evaluation of patients with pancreatic masses. 2010; 115(3):453-61.
- 2. Das DB. CT and ultrasound in evaluation of abdominal masses: A comparative study in adults. *IJRI* 1989; 43(3): 317-9.
- Freeny PC, Marks WM, Ryan JA, Traverso LW. Pancreatic ductal adenocarcinoma: diagnosis and staging with dynamic CT. *Radiology* 1988; 166:125-33.
- 4. Siegelman SS, Copeland BE, Saba GP, Cameron JL, Sanders RC, Zerhouni EA. CT of fluid collections associated with pancreatitis. *AJR Am J Roentgenol* 1980; 134:1121-32.
- 5. Byung I. Solid and papillary epithelial neoplasms of the pancreas; CT findings. *Radilogy*1988; 166:413-6.
- Bajwa RPS, Sandhu PS, Aulakh BS, Saggar K, Ahluwalia. A Helical CT evaluation of renal mass lesions: A Prospective Study. JIACM 2007; 8(3): 262-4

- Levine E, Grantham JJ. Calcified renal stones and cyst calcification in ADPKD. Clinical and CT study in 84 patients. *AJR* 1985; 148:755-8.
- Levine E, Grantham JJ. High density renal cysts in ADPKD demonstrated by CT. *Radiology* 1995; 154:477-82.
- Riemann TA, Siegel MJ, Shackelford GD. Wilm's tumor in children: abdominal CT and US evaluation. *Radiology* 1986; 160(2):501-5.
- Bosniak MA. CT diagnosis of renal angiomyolipoma. The importance of detecting small amounts of fat. *AJR* 1988; 151:497-501.
- 11. Hricak H, Thoeni RF, Carroll PR, Demas BE, Marotti M, Tanagho EA. Detection and staging of renal neoplasms. *Radiology* 1988; 166: 643-9.
- 12. Robson CJ, Churchill BM, Anderson W. The results of radical nephrectomy for RCC. *Urology* 1969; 101: 297-301.
- 13. Melvyn Korobkin MD, Isaac R Francis MD. The incidental adrenal mass: *RCNA* 1996; 1037-54.
- 14. Raisanen J. Plasma catecholamine's in pheochromocytoma: effect of urographic contrast media. *AJR* 1984; 143:43.
- 15. Morehouse HT, Thornhill BA. Nodes or no nodes CT of adenopathy. *Crit Rev Diagn Imaging* 1986; 25(2):177-207.
- 16. Richard H, Cohan N and Dunnick H. The retroperitoneum CT and MRI of the whole body, Mosby year book 1994; .pp.1311.
- 17. Korobkin M. CT of retroperitoneal vasculature and lymphnodes. *Semin Roentgnol* 1981; 16 (4):251-67.
- Hulnick DH. Abdominal tuberculosis. CT evaluation. *Radiology* 1985; 157:199-204.
- 19. Fieldberg MA and Koehler PR. Psoas compartment disease studied by CT. *Radiology* 1983; 148:505-12.
- 20. Williams MP. Non Tuberculous psoas abscess. *Clinical Radiology* 1986; 37:253-6.
- Machida K and Tasaka A. CT patterns of mural thrombus in aortic aneurysms.*J Computer Asst Tomography* 1990;14 (2); 313-4.
- Cohan RH, Baker ME, Cooper C, Moore JO, Saeed M, Dunnick NR. Computed tomography of primary retroperitoneal malignancies. *J Computer Assist Tomogr* 1988; 12(5):804-10.