



ORIGINAL RESEARCH PAPER
ROLE OF MULTIDETECTOR COMPUTED TOMOGRAPHY IN EVALUATION OF RETROPERITONEAL MASSES AND ITS HISTOPATHOLOGICAL CORRELATION : A PROSPECTIVE STUDY

Radiodiagnosis

KEY WORDS:

Dr Ankita Pandey	Resident , Department Of Radio-Diagnosis, Gajra Raja Medical College, Gwalior, Madhya Pradesh.
Dr Akshara Gupta	Professor, head of the Department Of Radio-Diagnosis, Gajra Raja Medical College, Gwalior, Madhya Pradesh.
Dr Megha Mittal*	Associate Professor Department Of Radio-Diagnosis, Gajra Raja Medical College, Gwalior, Madhya Pradesh. *Corresponding Author

ABSTRACT

Objectives: To locate, differentiate and diagnosing the retroperitoneal mass. To recognize the nature of mass and its morphology, the extent of the lesions and its involvement with adjacent structures. **Material & Methods:** A prospective study carried out, Hundred nonconsecutive patients belonging to all ages and both sexes admitted into the various clinical departments of Jayarogya hospital GRMC, Gwalior, were examined with various MDCT protocols. Patients were included if retroperitoneal mass was suspected on USG and clinically (positive symptoms and signs) or if previous imaging studies depicted retroperitoneal mass and normal patients with abnormal imaging. **Results:** Of the 100 patients, 64(64%) patients were males and 36 (36%) were females. The age of the patients ranged from 3 to 80 years. The spectrum of diseases included in the study was: Adenocarcinoma bowel (4%), Renal cell carcinoma clear cell type (6%), Renal cell carcinoma papillary type (1%), Pyelonephritis (8%), RP lymphangioma (4%), Angiomyolipoma(3%), Willms' tumor(3%), TCC(2%), Simple cyst(12%), Pseudo cyst(6%), Abscess(8%), Hydatid cyst (4%), Pancreatic ca (2%), Pancreatic Endocrine tumor (gastrinoma)(1%), Adrenal adenoma(2%), Adrenal myolipoma(1%)Hematoma (3%), Lymphoma (6%), Lipoma (1%), Liposarcoma (2%), Sarcoma (2%), Metastasis (8%), Tubercular (11%). **Conclusions-** Among all retroperitoneal masses benign masses are more common than malignant masses. Amongst all reteroperitoneal organs most common organ involved is kidney and most common RP mass detected in our study was simple renal cyst. Even though dedicated protocols side effects of contrast material, radiation exposure are **limitations** of CT. Another **limitation** of the current study is limited number of cases evaluated.

INTRODUCTION

In the past, evaluation of retroperitoneal structures by conventional radiography had been difficult due to superimposition of various shadows, with the arrival of CT scan and MRI understanding of reteroperitonium becomes easy, and MDCT scan has become an increasingly useful imaging modality in abdominal pathology.

The retroperitoneum is the part of the abdominal cavity that lies between the posterior parietal peritoneum and anterior to the transversalis fascia. It is divided into three main spaces by the perirenal fascia and is best visualized using CT or MRI. It is C-shaped on axial cross section with convexity projecting anterior in the mid-line.

Ultrasound has the disadvantage in that it is user dependent and a good ultrasonologist is needed for good and accurate diagnosis. Ultrasound also needs good bowel preparation as the abdominal gas may obscure good visualization, especially in retroperitoneal structures. Fat in obese patients prevent ultrasound waves propagation, and hence difficulty in reaching the deep organs.

AIMS AND OBJECTIVES

- To locate, differentiate and diagnosing the retroperitoneal mass.
- To recognize the nature of mass and its morphology, the extent of the lesions and its involvement with adjacent structures.
- To study various CT patterns of retroperitoneal masses in arriving at a specific diagnosis.
- To evaluate the importance of MDCT in differentiation of benign and malignant retroperitoneal lesions.

MATERIAL AND METHODS

Hundred nonconsecutive patients belonging to all ages and both sexes admitted into the various clinical departments of Jayarogya hospital GRMC, Gwalior, were examined with

various MDCT protocols. Patients were included if retroperitoneal mass was suspected on USG and clinically (positive symptoms and signs) or if previous imaging studies depicted retroperitoneal mass and normal patients with abnormal imaging.

Inclusion Criteria –

- Clinically suspected patients presenting with symptoms of involvement of retroperitoneal structures.
- Involvement of retroperitoneal organs detected by routine ultrasonography of abdomen of referred patients.

Exclusion Criteria-

- Patients with renal failure (raised serum creatinine).
- Patients who are at risk for allergic reactions to contrast, and Pregnant patients were excluded in this study.
- Patient having blunt trauma abdomen.

OBSERVATION AND RESULTS

The study was carried out at the Department of Radiology, Jayarogya Hospital, and Gwalior.

A total of 100 patients were selected for the study between the time period of February 2019 and July 2020.

First patients were examined by USG and if RP mass is suspected then only patients were subjected for MDCT examination.

The 100 patients were subjected to Multi detector computed tomography of abdomen.

Of the 100 patients, 64(64%) patients were males and 36 (36%) were females. The age of the patients ranged from 3 to 80 years.

The spectrum of diseases included in the study was: Adenocarcinoma bowel (4%), Renal cell carcinoma clear cell

type (6%), Renal cell carcinoma papillary type (1%), Pyelonephritis (8%), RP lymphangioma (4%), Angiomyolipoma(3%), Willms' tumor(3%), TCC(2%), Simple cyst(12%), Pseudo cyst(6%), Abscess(8%), Hydatid cyst (4%), Pancreatic ca (2%), Pancreatic Endocrine tumor (gastrinoma)(1%), Adrenal adenoma(2%), Adrenal myolipoma(1%)

Hematoma (3%), Lymphoma (6%), Lipoma (1%), Liposarcoma (2%), Sarcoma (2%), Metastasis (8%), Tubercular (11%).

MDCT and HPE correlation studies are given below.

Table 1: Age Distribution Of Patients Studied

Age in Years	Number of Patients N=100	Percentage %
1-10	5	5%
11-20	1	1%
21-30	6	6%
31-40	8	8%
41-50	15	15%
51-60	21	21%
61-70	25	25%
71-80	19	19%
TOTAL	100	100.0

Table 2: Gender Distribution Of Patients Studied

Gender	Number Of Patients N=100	Percentage %
Male	64	64%
Female	36	36%
TOTAL	100	100

Table 3: MDCT Diagnosis

Radiological diagnosis	Number of patients(n=60)	% Frequency
Adenocarcinoma bowel	3	3%
Renal cell carcinoma	7	7%
Pyelonephritis	8	8%
RP lymphangioma	2	2%
Angiomyolipoma	3	3%
Willms' tumor	3	3%
TCC	2	2%
Simple Renal cyst	12	12%
Pancreatic pseudocyst	6	6%
Abscess	10	10%
Hydatid cyst	4	4%
Pancreatic ca	2	2%
Pancreatic Endocrine tumor(gastrinoma)	1	1%
Adrenocortical Carcinoma	2	2%
Adrenal myelolipoma	1	1%
Hematoma	3	3%
Lymphoma	6	6%
Lipoma	1	1%
Liposarcoma	2	2%
Sarcoma	2	2%
Metastasis	10	10%
Tubercular	10	10%
Total	100	100%

Table 4: Histopathological Diagnosis

Histopathological diagnosis	Number of patients(n=60)	% Frequency
Adenocarcinoma bowel	4	4%
Clear cell ca(RCC)	6	6%
Papillary ca(RCC)	1	1%
Pyelonephritis	8	8%
RP lymphangioma	4	4%
Angiomyolipoma	3	3%
Willms' tumor	3	3%

TCC	2	2%
Simple Renal cyst	12	12%
Pancreatic Pseudo cyst	6	6%
Abscess	8	8%%
Hydatid cyst	4	4%
Pancreatic ca	2	2%
Pancreatic Endocrine tumor(gastrinoma)	1	1%
Adrenocortical carcinoma	2	2%
Adrenal myelolipoma	1	1%
Hematoma	3	3%
Lymphoma	6	6%
Lipoma	1	1%
Liposarcoma	2	2%
Sarcoma	2	2%
Metastasis	8	8%
Tubercular	11	11%
Total	100	100%

Table5: MDCT Diagnosis - An Evaluation

	Sensitivity %	Specificity %	PPV %	NPV %	Accuracy %
Adenocarcinoma bowel	75	100	100	98.97	99
Clear cell ca(RCC)	100	100	100	100	100
Pyelonephritis	100	100	100	100	100
RP lymphangiocoele	50	100	100	97.96	98
Angiomyolipoma	100	100	100	100	100
Willms' tumor	100	100	100	100	100
TCC	100	100	100	100	100
Simple Renal cyst	100	100	100	100	100
Pancreatic Pseudo cyst	100	100	100	100	100
Abscess	100	97.83	80	100	98
Hydatid cyst	100	100	100	100	100
Pancreatic ca	100	100	100	100	100
Pancreatic Endocrine tumor(gastrinoma)	100	100	100	100	100
Adrenocortical carcinoma	100	100	100	100	100
Adrenal myelolipoma	100	100	100	100	100
Hematoma	100	100	100	100	100
Lymphoma	100	100	100	100	100
Leiomyosarcoma	100	100	100	100	100
Lipoma	100	100	100	100	100
Sarcoma	100	100	100	100	100
Metastasis	100	97.83	100	100	98
Tubercular	90.91	100	100	98.89	99.0

Table6: Histopathological Diagnosis - An Evaluation

	Sensitivity	Specificity	PPV	NPV	Accuracy
Adenocarcinoma bowel	100	100	100	100	100
Clear cell ca(RCC)	100	100	100	100	100
Papillary ca(RCC)	100	100	100	100	100
Pyelonephritis	100	100	100	100	100
RP lymphangiocoele	100	100	100	100	100
Angiomyolipoma	100	100	100	100	100
Willms' tumor	100	100	100	100	100
TCC	100	100	100	100	100
Simple Renal cyst	100	100	100	100	100
Pancreatic Pseudo cyst	100	100	100	100	100
Abscess	100	100	100	100	100
Hydatid cyst	100	100	100	100	100

Pancreatic ca	100	100	100	100	100
Pancreatic Endocrine tumor(gastrinoma)	100	100	100	100	100
Adrenocortical carcinoma	100	100	100	100	100
Adrenal myelolipoma	100	100	100	100	100
Hematoma	100	100	100	100	100
Lymphoma	100	100	100	100	100
Leiomyosarcoma	100	100	100	100	100
Lipoma	100	100	100	100	100
Sarcoma	100	100	100	100	100
Metastasis	100	100	100	100	100
Tubercular	100	100	100	100	100

DISCUSSION

Differentiating the varying masses of retro peritoneal disease can be an arduous task evenwith the help of imaging guidance. Cross-sectional imaging is key to the evaluation of retroperitoneal masses and in the pre-operative staging and treatment planning of these lesions.

Our study to assess the role of MDCT in evaluating retroperitoneal masses included a total of 100 patients.

Study was conducted in the Department of Radio diagnosis and in close association with Department of Pathology GR Medical College and Attached JAH Hospitals, Gwalior, Madhya Pradesh over a period of one years (February 2019 to August 2020) on 100 patients who fulfilled the selection criteria underwent for Ultrasonography and if RP Mass is suspected then only patients are subjected for contrast enhanced CT using a 128 Slice MDCT scanner (SOMATOM Definition AS', Siemens, Erlangen, Germany)in supine position. A provisional diagnosis was suggested after the CT examination and these findings were correlated with histopathological/fnac findings wherever applicable.

A total no of 100 patients who fulfilled the selection criteria were included in our study. Of the 100 patients, 64(64%) patients were males and 36 (36%) were females. Male predominance was noted.

The age of the patients ranged from 3 to 80 years.

Majority of the patients were in the age group of 50 to 70 years, that is 46 (46%) cases, followed by 1-10 years 5 (5%), 11-20 years 1 (1%), 21-30 years 6 (6%), 31-40 years 8 (8%),41-50 years 15 (15%), 51-60 years 21(21%), 61-70 years 25 (25%)and 71-80 years 19(19%). Oldest patient was 80 years and youngest 3 years.

The Spectrum Of Diseases Included In The Study Was:

Adenocarcinoma bowel (4%), Renal cell carcinoma clear cell type (6%), Renal cell carcinoma papillary type (1%), Pyelonephritis (8%), RP lymphangioma (4%), Angiomyolipoma(3%),Willms' tumor(3%),TCC (2%), Simple cyst(12%), Pseudo cyst (6%), Abscess(8%),Hydatid cyst (4%), Pancreatic ca (2%), Pancreatic Endocrine tumor(gastrinoma) (1%), Adrenal adenoma(2%), Adrenal myolipoma(1%), Hematoma(3%), Lymphoma(6%), Lipoma(1%), Liposarcoma (2%), Sarcoma(2%), Metastasis(8%),Tubercular(11%).

CONCLUSION

On completion of the study, analysis of the obtained radiological data was done:-

- Male predominance was seen in our study.
- Pain is seen as a most common symptom in our study.
- The advantages of MDCT include : (a) the use of contiguous single breath- hold data acquisition, thereby decreasing or eliminating respiratory motion artifacts, (b) the ability to perform thin-section scanning with small-interval reconstruction, which decreased partial volume artifacts and increased sensitivity of lesion detection and

(c) the ability to acquire images in non-contrast followed by contrast and delayed phase, and perform three-dimensional SSD, MIP, VRT and curved planar reformatting. d)CT can accurately show the exact extent of a lesion and delineate adjacent organs. e) By help of CT accurate staging of malignant RP mass can be done.

- Among all retroperitoneal masses benign masses are more common than malignant masses.
- Amongst all reteroperitoneal organs most common organ involved is kidney and most common RP mass detected in our study was simple renal cyst.
- Even though dedicated protocols side effects of contrast material, radiation exposure are **limitations** of CTE. Another **limitation** of the current study is limited number of cases evaluated.
- Contrast enhanced MDCT is highly accurate for reteroperitoneal pathologies, as also found in our study.
- Contrast enhanced MDCT is highly sensitive and specific for reteroperitoneal pathologies.
- Image guided FNAC/FNAB can confirm/dispute radiological diagnosis.
- Histopathology is more accurate than MDCT in final diagnosis of retroperitoneal masses, as also found in our study.

REFERENCES:

- [1] Gore RM, Balfe DM, Aizenstein RI, Silverman PM. The great escape: interfascial decompression planes of the retroperitoneum. *AJR Am J Roentgenol* 2000;175(2):363-70.
- [2] Raptopoulos V, Lei QF, Touloupoulos P, Vrachliotis TG, Marks Jr SC. Why perirenal disease does not extend into the pelvis: the importance of closure of the cone of the renal fasciae. *AJR Am J Roentgenol* 1995;164(5):1179-84.
- [3] AndRadioanatomy of the retroperitoneal space A. Coffin, L. Boulay-Coletta, D. Sebbag-Sfez, M. Zins Radiology department, Paris Saint-Joseph Hospitals, 185, rue Raymond-Losserand, 75014 Paris, France.
- [4] Bechtold RE, Dyer RB, Zagoria RJ, Chen MY. The perirenal space: relationship of pathologic processes to normal retroperitoneal anatomy. *Radiographics* 1996;16(4):841-54.
- [5] Yuh BI, Cohan RH. Helical CT for detection and characterization of renal mass. *semin ultrasound ct mri*. 1997;18:82-90.
- [6] Saunders HS, Dyer RB, Shifrin RJ. The ct nephrogram implication for evaluation of urinary tract disease. *Radiographics* 1995;15:1069-85.
- [7] Kang PS, Spain JW. Multidetector ct angiography of the abdomen. *Radiol Clin North Am*. 2005;43(6):963-76.
- [8] Kandpal H, Sharma R, Gamangatti S, Shrivastava DN, Vashisht S. Imaging the inferior vena cava: a road less travelled. *Radiographics*. 2008;28(3):669-89.
- [9] Glockner JF. Three dimensional gadolinium enhanced MR angiography: application for abdominal imaging. *Radiographics*. 2001;21(2):357-70.
- [10] Vesselle HJ, Miraldi FD. FDG PET of the retroperitoneum: normal anatomy, variants, pathologic conditions and strategies to avoid diagnostic pitfalls. *Radiographics*. 1998;18(4):805-23.
- [11] Rinze Reinhard, Mandy van der Zon-Conijn and Robin Smithuis. Radiology department of the Onze Lieve Vrouwe Gasthuis in Amsterdam, Medical Center Haaglanden-Bronovo in the Hague, Leiden University Medical Center in Leiden and the Alrijne hospital in Leiderdorp, the Netherlands.
- [12] Solid Renal Masses: What the numbers tell us. *AJR* 2014;1196-1206.
- [13] Simplified Imaging approach for evaluation of the solid renal mass in adults by ray dyer, MD, David J. DiSantis, MD Bruce L. McClennan, MD radiology: volume 247:2 may 2008.