Research Paper

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Role of MDCT in Urinary Tract Pathology

Medical Science

KEYWORDS :

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ABSTRACT

The urinary tract consisting of kidneys, ureter and bladder is prone to many diseases ranging from congenital to neoplastic. Commonly employed radiological investigations include X-ray, IVP, ultrasound, CT scan and MRI. Each has its own advantages and limitations. Using multidetector computed tomography (MDCT) scanner, different protocols for scanning can be applied which can be tailored according to patient's complaints and the suspected pathology and the obtained volumetric data reduces the misregistrationartifacts and respiratory artifacts. It is unsurpassed in evaluating lesions containing fat and calcium.

AIMS & OBJECTIVES

- To detect urinary tract pathologies.
- To ascertain various radiological features and categorize lesions in congenital, infective, vascular, obstructive or neoplastic conditions.
- To evaluate the extent of disease process.
- To determine the accuracy of the MDCT in diagnosis of urinary tract pathologies and assess the additional information provided by the modality over other investigations.

MATERIALS AND METHODS

- During the period from May 2010 TO October 2012, fifty patients with suspected urinary tract disease were examined using MDCT scan as prime diagnostic modality at our institution.

INCLUSION CRITERIA

- ❖ Patients with age ranging from five to seventy five years were included in the study.
- ❖ Patients presenting with either of the following complaints: abdominal pain, fever, hematuria, abdominal lump, burning micturition.
- ❖ Laboratory findings like urine examination indicative of urinary tract pathology.

EXCLUSION CRITERIA

- ❖ Patients with only urinary tract calculi.
- ❖ Patients with history of trauma.

OBSERVATION AND ANALYSIS

(A)NUMBER OF PATIENTS IN EACH AGE GROUP

AGE	FREQUENCY	Percent
>10 - 20	5	10.0%
>20 - 30	5	10.0%
>30 - 40	5	10.0%
>40 - 50	8	16.0%
>50 - 60	12	24.0%
>60 - 70	13	26.0%
>70 - 80	2	4.0%
Total	50	100.0%

- Urinary tract pathologies are commonly seen in age groups between 50 to 70 years (almost 50% patients)

(B)SEX DISTRIBUTION OF THE PATIENT POPULATION

SEX	FREQUENCY
F	26
M	24
Total	50

- No sex predilection for urinary tract pathologies in general was observed in the present study with almost equal number of males and females.

(C) NUMBER OF PATIENTS WITH SPECIFIC COMPLAINS

COMPLAINS	NO. OF PATIENTS (OUT OF 50)
ABDOMINAL PAIN	42
FEVER	7
HEMATURIA	16
BURNING MICTURITION	32
DIFFICULTY IN MICTURITION	4

- Majority of patients have complaint of abdominal pain (84%) and burning micturition(64%).

(D)SEX DISTRIBUTION OF THE BASIC UNDERLYING PATHOLOGIES

sex	CONGENITAL	CONGENITAL & OBSTRUCTIVE	INFECTIVE	MALIGNANT NEOPLASM	MISCELLANEOUS	OBSTRUCTIVE	TOTAL
F	1	0	6	3	4	12	27
M	3	2	0	2	2	15	24

- No sex predilection was noted in infective pathologies.
- More number of males had obstructive pathologies as compared to females.
- More number of females had infective pathologies as compared to males.

(E)FINDINGS ON URINE EXAMINATION

MICROSCOPY	NO.OF PATIENTS (OUT OF 50)
PUS CELLS	13
RBCS	8
EPITHELIAL CELLS	6

- The most frequent finding in urine examination is presence of pus cells.

(F)SENSITIVITY AND SPECIFICITY OF MDCT IN DIAGNOSING MALIGNANT LESIONS OF URINARY TRACT

TEST	MALIGNANT	NON MALIGNANT
POSITIVE	5(true positive)	1 (false positive)
NEGATIVE	1 (false negative)	43(true negative)

- **SENSITIVITY = (5 x 100)/ (5 + 1)**
  = 83.33%
- **SPECIFICITY = (43X 100)/ (43+1)**
  = 97.7%

DISCUSSION

In the present study:

- The maximum numbers of patients were of the age 50-70 years with almost equal number of males and females.
- The most common presenting complaint was abdominal-pain followed by fever.
- Lesions to which various basic pathologies were assigned in this study according to their MDCT appearances include:

→ **BENIGN NEOPLASM :** lipoma, Angiomyolipoma

→ **MALIGNANT NEOPLASM :** malignancies of kidney, ureter or bladder (most commonly TCC) and renal metastases

→ **CONGENITAL:** PCKD, horse shoe kidney, malrotation, ectopic kidney, renal agenesis, duplex PC sytem, PUJ obstruction

→ **VASCULAR :** renal artery stenosis, hypoplastic renal artery, renal vein thrombosis

→ **OBSTRUCTIVE:** HDN, pyonephrosis, urinoma(gen. post-obstructive)

→ **INFECTIVE:** acute pyelonephritis, emphysematous pyelonephritis, chronic pyelonephritis, cystitis, infective collections

→ **MISCELLANEOUS:** vesicovaginal fistula

- No sex predilection was noted in infective pathologies.
- More number of females had benign pathologies as compared to males.
- However in case of malignancies, the number of males were almost double the number of females.
- In all cases of malignant neoplasm, MDCT provided vital information regarding the extent, vascularity (in form of enhancement), abutments and infiltration of the pathology and hence helps in staging.

In the presentstudy , the sensitivity and specificity of MDCT for diagnosis of malignant pathologies (primary and metastatic) were 92.3% and 97.2% respectively.

- In case of " congenital" pathologies, the most common was polycystic kidney disease (3 out of 9) followed by malrotationof entire kidney or one of its pole and renal agenesis. Most patients with congenital pathologies were asymptomatic and hence detected incidentally on ultrasound or MDCT.
- In this study two cases of URINOMA were diagnosed in which ultrasound could only demonstrate evidence of collection. However, MDCT in delayed phases showed extravasation of contrast within the collection and hence we clinched the diagnosis.
- A variety of lesions can present as multiple hypoechoic areas in kidneys on ultrasound. However, MDCT aids in diagnosing renal abscesses on the basis of peripheral enhancement with or without central necrotic areas.
- MDCT plays pivotal role in differentiation of a hypoplastic kidney from one affected with chronic pyelonephritis.

CONCLUSION

Hence through this study we conclude that:

- MDCT has an important role in uroradiodiagnosis for detection of urinary tract pathologies, to ascertain various radiological features and categorize lesions in congenital, infective, vascular or neoplastic condition and evaluate extent of disease process.
- In a wide variety of pathologies, MDCT provides vital additional information that helps to clinch the final diagnosis.
- It is not affected by factors like obesity or excessive bowel gas which are a hindrance for sonographic diagnosis.
- One of the major drawbacks is the radiation exposure, and hence we need to weigh it against the advantages offered by the modality and strictly employ protocols tailored to the patients complains and the suspected pathology.

REFERENCE

→ DIAGNOSTIC RADIOLOGY (A TEXTBOOK OFMEDICAL IMAGING), FIFTH EDITION, VOLUME ONE ; edited by A.ADAM , A.K. DIXON; consulting editors R.G.GRAINGER, D.J.ALLISON | → TEXTBOOK OF RADIOLOGY AND IMAGING , SEVENTH EDITION , VOLUME ONE ; edited by DAVID SUTTON MD, FRCP, FRCR, DMRD, FCan.AR (Hon) , Consulting Radiologist , St Mary's Hospital and Medical School, London ; associate editors PHILIP J.A. ROBINSON , JEREMY P.R. JENKINS , RICHARD W. WHITEHOUSE , PAUL L. ALLAN. | → APPLIED RADIOLOGICAL ANATOMY FOR MEDICAL STUDENTS Edited by PAUL BUTLER The Royal London Hospital , ADAM W. M. MITCHELL Charing Cross Hospital , HAROLD ELLIS University of London | → Arteriographic correlation in 30 patients with renal vascular disease diagnosed with multislice CT. - AU Echevarría JJ, Miguélez JL, López-Romero et al : Medline., pubmed 2008;50(5):393. | → Multislice computed tomography urography in the diagnosis of urinary tract diseases: Volumen 68, Broj 5 by- Olivera Nikolić, Clinical Center of Vojvodina, Center of Radiology, Novi Sad, Serbia. | → Evaluation of Upper Urinary Tract Tumors With Portal Venous Phase MDCT: A Case-Control Study - Max Kupershmidt, Myles Margolis, Hyun-Jung Jang etal in the Mount Sinai Hospital and Women's College Hospital, Toronto, Canada. | → Role of MDCT in the evaluation of patients with Hematuria - Sameh Hanna, S.Abdel Rahman, N.Barsoum, HM.El Gammal; Cairo, EG. EUROPEAN SOCIETY OF URORADIOLOGY. | → Congenital renal anomalies detected in adulthood - Muttarak M*, Sriburi T Department of Radiology, Chiang Mai University, Chiang Mai, Thailand. - Biomedical Imaging and Intervention Journal. accepted 27 December 2011 | | | → Pediatric urology book duplex kidneys, Ureterocoele and ectopic ureters | AK Taghizadeh, Consultant Paediatric Urologist , Evelina Children's Hospital London SE1 7EH | → Renal Vein Thrombosis Imaging , Author: Aheed Siddiqi, MD; Chief Editor: Eugene C Lin, MD ; http://emedicine.medscape.com/article/382686-overview | → CT Evaluation of Renovascular Disease - Akira Kawashima, MD , Carl M. Sandler, MD , Randy D. Ernst, MD, Eric P. Tamm, MD, Stanford M. Goldman, MD and Elliot K. Fishman, MD ; September 2000 RadioGraphics, 20, 1321-1340. | → CT Imaging of the Kidney - Anthony Powell, HMS IV , Beth Israel Deaconess Medical Center , Gillian Lieberman, MD September 2001 ; http://eradiology.bidmc.harvard.edu/LearningLab/genito/powell.pdf | → MDCT Urography: Exploring a New Paradigm for Imaging of Bladder Cancer - Richard H. Cohan, Elaine M. Caoili,Nigel C. Cowan,Alon Z. Weizer and James H. Ellis ; doi:10.2214/AJR.09.2344AJR June 2009 vol. 192 no. 61501-1508 | → Multidetector CT urography of renal fusion anomalies - Aysel Türkvatan, Tülay Ölçer, Turhan Cumhur , From the Department of Radiology, Türkiye Yüksek İhtisas Hospital, Ankara, Turkey ; OFFICIAL JOURNAL OF TURKISH SOCIETY OF RADIOLOGY ISSN : 1305 – 3825 | → Advantages of Multidetector CT Cystoscopy in the Detection of Bladder | Tumors - Athina C. Tsili, Dimitrios Giannakis , Nikolaos Sofikitis and Konstantine Tsampoulas Department of Clinical Radiology; Department of Urology, University Hospital of Ioannina, Ioannina, Greece ; Current Medical Imaging Reviews, 2008, 4, 213-221 213 | |