

A STUDY OF MULTIDETECTOR COMPUTED TOMOGRAPHY UROGRAPHY IN URINARY TRACT ABNORMALITIES

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ABSTRACT

This prospective cross-sectional study evaluated the diagnostic accuracy and effectiveness of Multi-detector Computed Tomography Urography (MDCTU) in detecting and characterizing urinary tract abnormalities. Conducted over six months at Jain Hospital, Khanna, Punjab, the research involved 138 patients aged 10 years and above, referred for MDCTU due to clinical suspicion of urinary tract pathology. Results demonstrated a male predominance (64.5%), with the highest prevalence in the 61–70-year age group (27.5%). Right-sided involvement was most common (32.6%), followed closely by bilateral involvement (31.8%). The most frequently identified abnormality was kidney calculi (26.8%), followed by anomalies in the kidney (18.8%) and cortical cysts (15.2%). MDCTU's multiphase imaging capability allowed detailed visualization of pathologies, supporting accurate diagnosis and treatment planning. Despite concerns about radiation exposure and contrast risks, the study confirmed MDCTU as an indispensable diagnostic tool in modern urology.

INTRODUCTION

The urinary tract plays a vital role in homeostasis by filtering waste, regulating fluid balance, and maintaining electrolyte equilibrium. Disorders such as kidney calculi, hydronephrosis, congenital anomalies, and malignancies can significantly impact patient health. Traditional diagnostic tools like intravenous urography (IVU) have limitations in resolution and scope. MDCTU has emerged as a superior modality, offering rapid, high-resolution, and multiphase imaging, enabling comprehensive assessment of both structural and functional aspects of the urinary tract. This study investigates MDCTU's role in detecting and characterizing a wide spectrum of urinary tract abnormalities, with a focus on prevalence patterns, gender distribution, and specific pathological profiles [1]. This study was conducted to evaluate the effectiveness and diagnostic accuracy of MDCTU in detecting and characterizing urinary tract abnormalities.

MATERIAL AND METHODS

Study Design: Prospective cross-sectional study.

Study Period and Location: October 2024–March 2025, Department of Radiology, Jain Hospital Khanna.

Sample Size: 138 patients, calculated using a standard sample size formula at a 95% confidence interval with a 5% margin of error.

Inclusion Criteria:

- Patients ≥ 10 years with suspected urinary tract abnormalities.
- Referred for MDCTU.
- Adequate renal function ($\text{GFR} > 30 \text{ mL/min/1.73 m}^2$).

Exclusion Criteria:

- Pregnancy.
- Severe renal impairment.
- Allergy to iodinated contrast.

CT Urography Protocol:

- **Phases:** Non-contrast, corticomedullary (30–40 sec), nephrographic (80–100 sec), and excretory (10–15 min).
- **Equipment:** 128-slice Philips MDCT scanner.
- **Contrast:** Non-ionic iodinated contrast, 1.5–2 mL/kg at 3–5 mL/s.
- **Post-processing:** Multiplanar reconstruction (MPR) and 3D volume rendering.

Data Analysis was done using

descriptive statistics (mean, percentage, frequency) using SPSS and Microsoft Excel..

RESULTS

Results demonstrated a male predominance 64.5% (n=89), 35.5% female (n=49), with the highest prevalence in the 61–70-year age group (27.5%) followed by 51–60 years (17%). Right-sided involvement was most common (32.6%), followed closely by bilateral involvement (31.8%), left side (22.4%), midline (13%). The most frequently identified abnormality was kidney calculi (26.8%), followed by anomalies in the kidney (18.8%) and cortical cysts (15.2%). Other abnormalities included anomalies in urinary bladder (14.4%), Hydronephrosis (9.4%), Anomalies in ureter (10.8%), Hydronephrosis (4.3%) etc. Kidney calculi and anomalies were significantly more common in males; hydro-uretero-nephrosis showed equal distribution between genders.

CONCLUSION:

MDCTU provides a rapid, non-invasive, and comprehensive diagnostic evaluation of urinary tract abnormalities, delivering high-resolution multiphase imaging essential for accurate detection and characterization of pathologies. Its ability to simultaneously assess multiple anatomical regions reduces the need for multiple investigations, thus improving patient management efficiency. Although radiation exposure and contrast risks require careful patient selection, MDCTU remains a superior diagnostic modality, especially in older populations and male patients where prevalence is higher. Future recommendations include the development of low-dose protocols to minimize radiation risks while maintaining image quality.

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