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Incidental Findings During Plain CT KUB (kidney, Ureter, Bladder)

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Abstract

Background: To give a better elaboration of NECT KUB ability for the detection of incidental findings, rather than stones.
Material and Method: A retrospective study was conducted on a Total of 200 patients undergoing NECT KUB, including both genders (male and female), with an age range of 20 to 79 years, to evaluate the detection of incidental findings during NECT KUB at King Abdulaziz Specialist Hospital in Ta'if City, KSA. From January until last of September 2025, using a CT Siemens 128-slice scanner.
Result: A retrospective analytical study was conducted on a total of 200 patients who underwent NECT KUB at KASSH, revealing that incidental findings were seen more frequently in male patients (125, 62.5%) than in female patients (75, 37.5%), with a male-to-female ratio of 1.6. Moreover, The most affected age group was 70 to 79, with 45 (22.5%), followed by 50 to 59 with 40 (20%), then 60 to 69 with 35(17.5%), 30 to 39 with 30 (15%) 40to 49 with 27(13.5%) and 20 to 29 with 23 (11.5%) and The incidental findings was classified into the genitourinary system 155 (77.5%%). The non-genitourinary system was involved in 35 cases (17.5%), and 10 cases had involvement in both, representing 5% of the study sample. The most frequent genitourinary finding was a renal cyst 25, which was followed by an Ectopic kidney with 10 cases, Pyelonephritis, atrophic kidney, and hydrocele were also observed in 5 cases. In contrast, the most common non-genitourinary finding was cholelithiasis (40), which was followed by Hernia (35). Appendicitis and diverticulosis, as well as pleural effusion, were all represented in 20% of the study sample. Mesenteric lymph nodes, ovarian cysts, fractures, and degenerative changes represented 10% of the study sample. Adnexal cysts accounted for 5%.
Conclusion: The number of incidental findings detected by NECT during the KUB examination for possible kidney stones was significantly higher than that reported in other studies. NECT is an effective tool for identifying incidental findings and has a significant impact on how patients are managed.

Keywords: Incidental Findings, Genitourinary, NECT KUB, Non-genitourinary, Gynecological, Gastrointestinal.

Introduction

Research Background:

Urolithiasis is one of the most common and recent diseases among urologic illnesses [1,2]. Renal stones place a tremendous financial burden on both emerging and developed countries [3]. Only 3% of kidney stones are silent [4]. Nearly 8% of individuals without symptoms have urolithiasis [5]. Urolithiasis is

more common in wealthy nations and is associated with affluence than other diseases, including type 2 diabetes, hypertension, and obesity [6]. Urolithiasis is the most prevalent urologic condition in Asia.

Variations in heredity, age, weather, diet, ethnicity, and metabolic illnesses are responsible for these variations in incidence among different locations [7]. Urolithiasis is more prevalent among white individuals in hotter nations. Males typically reach their peak between the ages of 40 and 60, while females reach theirs between the ages of 30 and 50. The prevalence risk for children under 18 is up to 3% [5]. In men, urolithiasis ensues three times more frequently [8]. A typical ER indication is acute flank pain [9]. Urolithiasis is prevalent in various parts of Saudi Arabia, with a peak recorded frequency of 20% [10]. When compared to Europe (5-9%), Canada (12%), and the United States (13%), Asia (1-5%) appears to have a lower risk of kidney stone development in adults.

Furthermore, the Middle Eastern region has been indicated to have the most cases of kidney stone patients (e.g., 20% in Pakistan and Sudan, Egypt, the United Arab Emirates, and Iran). This is likely due to the region's hot weather and a greater chance of dehydration, which is a significant environmental factor in kidney stone development. Elder men are more likely to get the illness than women (2 to 1), and only 1% to 2% of patients with urinary urolithiasis are youngsters [11]. Other specialties, in addition to urologists, have been known to order CT KUB [12]. In the 1990s, unenhanced computed tomography (CT) was initially developed for stone imaging [13]. Non-enhanced computed tomography of the kidneys, ureters, and bladder (CT KUB) in an emergency setting is the gold standard for detecting urolithiasis [14]. Due to its accessibility, simplicity of use, and high sensitivity, CT KUB is the primary test for evaluating urolithiasis [15]. It was said to have a 94%–99% specificity range and a 95%–98% sensitivity range.

NCCT's broad use is limited by its high ionizing dosage, high rate of incidental findings, and high cost [3]. However, using a thinner slice thickness improves kidney stone identification on unenhanced CT [16]. About 10% of CT KUB exams reveal an additional source of the patient's pain [17]. The superiority of Unenhanced CT is attributed to its ability to detect ureteral stones regardless of size, location, or chemical composition, as well as identify extra-urinary abnormalities such as Appendicitis, diverticulitis, and gynecological abnormalities like hemorrhagic cysts or ovarian torsion that can mimic renal colic, without requiring intravenous contrast [18]. Particularly for stones less than 5 mm in size, these diagnostic performances are also noticeably superior [19]. One of the main drawbacks of CT presently is the radiation dose [20]. The ideal CT KUB dose is three times higher than the IVU dose, determined to be between 3 and 5 mSv (millisieverts) [21]. Another benefit of Unenhanced CT is that it provides a general view of the other abdominal organs and the peritoneal cavity, with the potential to detect other incidental pathological processes that may require importance for treatment, rather than the management of urinary tract stones. With rapid identification and consequently early management, this approach leads to a better prognosis.

Furthermore, guiding the management plan in the right direction [22]. The American College of Radiology and the European Association of Urology currently recommend using low-dose CT in patients with severe infections and skepticism about having urinary stones; however, the American Urological Association no longer provides any sensible recommendations [23,24]. Through this study, we aim to gain a deeper understanding of the role of Unenhanced CT in evaluating the detection of incidental findings and determining their medical significance.

Material and Method :

A retrospective study is conducted on a Total of 200 patients undergoing NECT KUB, including both genders (male and female), with an age range of 20 to 79 years old in the Radiology department of King Abdul-Aziz Specialist Hospital (KAASH) in Ta'if City, KSA on January 1, 2025, and lasted until September 30.

Included Criteria were Only patients undergoing NECT KUB for the first time , age ranging between (20-79) years old while Usage of contrast media, Patients had a previous surgery or Patients who lacked

clinical history or were younger than 20 years old were excluded .by using 128 slice CT systems (Siemens Medical System)

No specific preparation is needed because the data will be obtained from the selected hospital's Picture Archiving and Communication System (PACS) and Ethical Approval is obtained.

The examination was carried out in the supine position, both hands elevated up with the patient's full bladder through the symphysis pubis and to the lower chest. The scan's parameters were 120 kV and 250-300 mA, with a 0.5 rotation and the Standard Algorithms, a 4 mm slice thickness, and a field of view (FOV) adjusted for the patient's size.

For correct assessment, multiplanar reconstructions are collected. A soft-tissue window with 2 mm coronal and sagittal reformation was also created. In order to verify any possible distal ureteric calculi, further images were acquired with the patient lying on his back. At the picture archiving and communication system (PACS) workstations, the CT KUB scans were seen. An experienced radiology resident and a consulting radiologist with extensive expertise in radiology imaging prepared the appropriate radiological reports.

By Using Excel version 16 and the statistical program Statistical Package for the Social Sciences (SPSS) version 23, the data will be analyzed and then presented in a table and suitable charts.

Result:

A retrospective analytical study was conducted on a total of 200 patients who underwent NECT KUB at KASSH, revealing that incidental findings were more frequently observed in male patients (125, 62.5%) than in female patients (75, 37.5%), with a male-to-female ratio of 1.6. Moreover, The most affected age group was 70 to 79, with 45 (22.5%), followed by 50 to 59 with 40 (20%), then 60 to 69 with 35(17.5%), 30 to 39 with 30 (15%) 40to 49 with 27(13.5%) and 20 to 29 with 23 (11.5%)as shown in Table- 1.

The incidental finding in the current study was classified into the genitourinary system (155, 77.5%), the non-genitourinary system (35, 17.5%), and 10 had both, which represents 5% of the study sample, as shown in Figure 1. The most frequent genitourinary finding was a renal cyst 25, followed by an ectopic kidney with 10 cases ,Pyelonephritis, atrophic kidney, and hydrocele were reported in 5 cases each, as shown in Table 2. In contrast, the most common non-genitourinary finding was cholelithiasis (40), which was followed by Hernia (35). Appendicitis and diverticulosis, as well as pleural effusion, were all represented in 20% of the study sample. Mesenteric Lymph Nodes Were Represented in 15%, ovarian cysts in 10%, fractures and degenerative changes in 10%, and adnexal cysts in 5%, as mentioned in Table3.

Figure 1: incidental findings distributions

Table1. Distribution of incidental findings according to age and gender.

Variable	GENDER					
	MALE			FEMALE		
No.	125			75		
Frequency	(62.5%)			(37.5%)		
Variable	AGE					
Age ranges	20-29 y	30-39y	40-49y	50-59y	60-69y	70-79y

NO.	23	30	27	40	35	45
Frequency	11.5%	15%	13.5%	20%	(17.5%)	(22.5%)

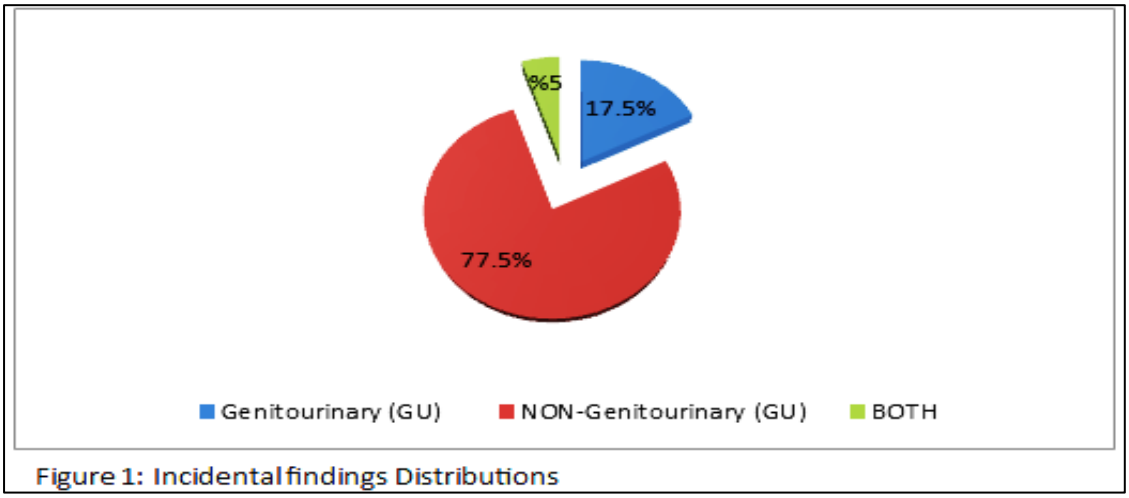

Figure 1: Incidental findings Distributions

Table 2: Genitourinary Findings and their clinical significance.			
Incidental Findings	Frequency	Percentage	Clinical significance
Renal cyst	25	12.5%	DT
Hydrocele	5	2.5%	II
Ectopic kidney	10	5%	NCI
Atrophic kidney	5	2.5%	NCI
Pyelonephritis	5	2.5%	II
Horseshoe kidney	Null	Null	DT
Duplex collecting system	Null	Null	DT
Sponge Kidney	Null	Null	LCI
Renal Mass	Null	Null	II
Extra-Renal pelvis	Null	Null	LCI

II, requires Immediate Intervention; DT, Deferred Treatment; LCI, Little Clinical Importance; NCI, No Clinical Importance

Table 3: Non-Genitourinary Findings and their clinical significance.			
Incidental Findings	Frequency	Percentage	Clinical significance
Appendicitis	20	10%	II
Cholecystitis	NULL	NULL	II
Pancreatitis	NULL	NULL	II
Cholelithiasis	40	20%	DT
Gastrointestinal			
Diverticulosis	20	10%	DT
Mesenteric Lymph Nodes	15	7.5%	DT
Hepatic cyst	5	2.5%	LCI
Spine pathology			
Fracture	10	5%	II
Degenerative Changes	10	5%	DT
Spondylosis	NULL	NULL	DT
Gynecological			
Ovarian cyst	10	5%	LCI

Adnexal cyst	5	2.5%	LCI
Other			
Pelvic Phelboliths	20	10%	NCI
Hernia	35	17.5%	DT
Pleural Effusion	20	10%	DT
Firearm Injury	NULL	NULL	II

II, requires Immediate Intervention; DT, Deferred Treatment; LCI, Little Clinical Importance; NCI, No Clinical Importance

Discussion:

NECT KUB is the preferred imaging modality for urothelitis and incidental findings due to its higher and greater temporal and spatial resolution, which enhances the ability to detect minor abnormalities.

Our study aimed to evaluate incidental findings during NECT KUB, which demonstrated its ability to detect and classify incidental findings into Genitourinary and non-genitourinary categories, thereby assisting in estimating their clinical significance. Consequently, fast decision-making and management are consistent with the study conducted by Abdul Salam et al. (2023). However, the majority of incidental findings regarding the American College of Radiology (ACR) observations are likely benign and frequently have little to no clinical importance in management [26].

In a present study on a total of 200 patients that undergone to NECT KUB at KASSH that revealed incidental findings were seen higher in male patients 125 (62.5%) than female patients 75 (37.5%) with male to female ratio 1.6 similar to study conducted by U. Siddique et al 2020 .while the Elderly patients were The most age group was affected with age range 70y to 79y as shown in present study.

The incidental finding in the current study was classified into the genitourinary system in 155 cases (77.5%). The non-genitourinary system was involved in 35 cases (17.5%), and 10 had both, representing 5% of the study. The most frequent genitourinary finding was a renal cyst (25), which was followed by an ectopic kidney (10). In contrast, the most common non-genitourinary finding was cholelithiasis (40), followed by Hernia (35). Appendicitis, diverticulosis, Pleural Effusion, and pelvic phleboliths collectively represent 20% of the study sample. After that, mesenteric lymph nodes, ovarian cysts, fractures, and degenerative changes represent 10% of the study sample. Adnexal cysts account for 5%, which is in disagreement with many studies [24, 25, 26]. However, NECT has an additional advantage over the other imaging modalities in that it may uncover unexpected outcomes while performing a CT KUB scan for possible kidney stones. All CT scans, not just the KUB scan, have the potential to catch other findings that are either less or more important for immediate intervention. As they progress from having little clinical significance to having much clinical significance, incidental findings of GU and non-GU are significant. Some results in both GU and non-GU require prompt intervention and appropriate follow-up care in order to avoid adversely affecting someone's life and creating additional issues. Due to the urgency of the situation, those incidental findings needed to be managed at the base level and communicated as fast as possible to the pertinent specialty. To induce variations in pathology for simple detection, some abnormalities also require deferred treatments and follow-up using alternative imaging modalities or the injection of contrast material. Even though some results are not clinically significant, CT scans can still detect them, and radiologists report them in radiological reports, so the patient is at least aware of them, which can be treated later.

Conclusion:

NECT is a valuable tool for identifying incidental findings and has a significant impact on how patients are managed. The excellent spatial and temporal resolution of MDCT is also crucial for rapidly and accurately diagnosing both major and minor abnormalities. It can be divided into distinct sections for each section's convenience and to ensure that no abnormality is missed during the examination. Radiologists' and radiology technologists' knowledge, skills, and genuine attention play a crucial role in diagnosing abnormalities beyond kidney stones.

Recommendation: Large populations are required for better assessment and contrast media utilization if necessary.

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