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بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

ملاحظات:
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Visibility of Urinary Stones in Plain Kidney, Ureter and Bladder Radiographs and Computed Tomography Scout View With Correlation with CT Hounsfield Unit

Thesis

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In Radio diagnosis

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List of Abbreviations

Abb.	Full term
ACR	*American College of Radiology*
AIDS	*Acquired immunodeficiency syndrome*
BMI	*Body mass index*
CT	*Computed Tomography*
DECT	*dual-energy CT*
DEI	*The dual energy index*
DIR	*Dose Index Registry*
dsDECT	*dual-source DECT*
ESWL	*extracorporeal shock wave lithotripsy*
HIV	*Human immunodeficiency virus*
HU	*Hounsfield units*
IVP	*Intravenous Pyelogram*
KUB	*kidney, ureter and bladder*
MDCT	*The multidetector CT*
MRI	*magnetic resonance imaging*
NCCT	*noncontrast computed tomography*

NCHCT	*Non-contrast helical CT*
PCNL	*percutaneous nephrolithotomy*
PRF	*pulse repetition frequency*
ROI	*region of interest*
RR	*relative risk*
SAFIRE	*sinogram-affirmed iterative reconstruction*
SSD	*stone-to-skin distance*
ssDECT	*singlesource DECT*
URS	*Ureteroscopy*
US	*Ultrasound*

INTRODUCTION

Urinary calculus remains to be a common presentation in the hospital ***(Mahmoud et al., 2007).*** It is the third most common urological problem after urinary tract infection and prostate disease with life time prevalence of urolithiasis at 10-15%. The prevalence has risen over a 20-year period from the mid 1970's to the mid 1990's ***(Stamatelou et al., 2003).***

The diagnosis of urolithiasis is largely dependent on analyzing the clinical presentation and physical examination ***(Mahmoud et al., 2007).***

Imaging has an important role in urolithiasis and aids not only in the initial diagnosis but also in planning treatment and follow-up of patients with renal and ureteric stones. Since the 1990s noncontrast computed tomography (NCCT) has become the gold standard imaging modality ***(Waqas et al., 2018).***

Various imaging modalities are available to evaluate hydronephrosis and renal calculi (conventional X-ray of the abdomen; specific X-ray examination of the kidney, ureter and bladder (KUB), ultrasound (US),multidetector computed tomographay (MDCT); and magnetic resonance imaging (MRI), although most recent protocols limit the choice of initial imaging modalities in an acute setting to MDCT and ultrasound ***(Brisbane et al., 2016), (Coursey et al., 2012).***

Noncontrast CT of the abdomen and pelvis consistently provides the most accurate diagnosis but also exposes patients to ionizing radiation ***(Brisbane et al., 2016).***

Traditionally US has a lower sensitivity and specificity than CT, but does not require use of radiation. However, when these imaging modalities were compared in a randomized controlled trial they were found to have equivalent diagnostic accuracy within the emergency department. Both modalities have advantages and disadvantages ***(Brisbane et al., 2016).***

KUB plain film radiography is most helpful in evaluating for interval stone growth in patients with known stone disease, and is less useful in the setting of acute stones ***(Brisbane et al., 2016).***

MRI provides the possibility of 3D imaging without exposure to radiation, but it is costly and currently stones are difficult to visualize ***(Brisbane et al., 2016).***

(CT) is widely used to examine stones in the urinary system. In addition to the size and location of the stone and the overall health of the kidney, CT can also assess the density of the stone in Hounsfield units (HU). The HU, or Hounsfield density, measured by CT, is related to the density of the tissue or stone. A number of studies have assessed the use of HU in urology ***(Gücük and Uyetürk, 2014).***

In recent years, the use of non-contrast MDCT in patients with urinary system stones has increased. Hounsfield units (HU), a parameter generated from standard CT, are related to the density of the stone ***(Spettel et al., 2013).***

NCCT scan provides several advantages over the KUB radiograph such as detection of radiolucent calculi, sensitivity for small stones, identification of other causes of flank pain as well as avoidance of any preparation prior to the procedure ***(Jellison et al., 2009).***

Non-contrast CT scan has long replaced the plain abdominal radiograph as the gold standard in the diagnosis of urolithiasis ***(Krishnamurthy et al., 2005).*** However, a KUB radiograph has remained part of the protocol for most clinicians even after a non-contrast CT scan is carried out because of its impact in clinical decision making prior to treatment ***(Saw et al., 2000).***

KUB X-ray has been the preferred mode of follow up imaging provided the stone is visible on plain X-ray or radio-opaque. It has a much lower dose of radiation and is considerably cheaper, quicker and exposes patients to less radiation, CT scout film should be reported before proceeding to KUB. If the stone is visible on CT scout film, then the decision to use KUB for follow-up can be made. This minimizes radiation exposure and other costs ***(Van Randen et al., 2011).***