OPTIMAL USE OF COMPUTED TOMOGRAPHY KIDNEY, URETER, AND BLADDER: REVIEW OF PATIENTS PRESENTING WITH ACUTE FLANK PAIN

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ABSTRACT

Objective: To describe detection and management of alternative pathology established by Computed Tomography (CT) Kidney, Ureter, and Bladder (KUB) in patients associated with acute flank pain.

Methodology: This retrospective review of 300 patients, presented with acute flank pain during one year from March 2019 to March 2020. All Computerized Tomographies were ordered from the Emergency Room after consultation with a urologist and subsequently reported by a consultant radiologist having a minimum of two years of experience in reporting non-contrast CT scans.

Results: A total of 300 patients presented to the emergency room with acute flank pain, out of whom 198 (66%) were male and 102 (34%) were female patients with a mean age of 35 years. The majority (n=249) of the patients were diagnosed with ureteric calculi and the remaining 51 patients (17%) came out to have alternative radiological findings. Eighteen (35.2%) patients were those who needed acute surgical management which included 13 female and 5 male patients. The remaining 33 (64.7%) patients were referred to specialized clinics as there was no emergency involved. The clinically important alternative findings were overall higher in the female cohort i.e., 25.5% versus 9.8% in male patients. Genitourinary findings were discovered in 11(21.5%) patients while 7 (13.7%) patients had non-genitourinary pathologies requiring emergency management.

Conclusion: CT-KUB is a useful tool for investigating acute flank pain aiding the decision-making process. The majority of the patients were diagnosed to have ureteric calculi with a significant number of alternative diagnoses mainly in the female population.

Keywords: Computed Tomography (CT); Kidney, Ureter, and Bladder (KUB); Flank Pain; Surgical Management.

INTRODUCTION

Acute flank pain is a common presentation to Emergency Room with a lifetime incidence of 12%.[1] Smith et al in 1995 first time suggested the vital role of Unenhanced Helical Computerized Tomography (UHCT) in the diagnosis of acute flank pain.[2] Unenhanced Helical Computerized Tomography (UHCT) is now the gold standard imaging modality for the diagnosis of ureteric and renal stones replacing Intravenous Urogram (Intravenous Urogram (IVU)) and ultrasonography.[3] Exposure to radiation is an important disadvantage of Unenhanced Helical Computerized Tomography (UHCT).[4] The difference between the radiation dose is 2.5 mSv for Intravenous Urogram (IVU) versus 4.7 mS for Unenhanced Helical Computerized Tomography (UHCT) performed for renal colic.[5] On the other hand, Unenhanced Helical Computerized Tomography (UHCT) has multiple advantages such as diagnostic accuracy, no contrast-related complications, rapidity, cost-effectiveness, operator independence and it can detect alternative abdominal pathologies. The purpose of this study was to assess the detection rate of alternative pathologies by Computed Tomography (CT) Kidney, Ureter, and Bladder (KUB) in patients presenting with acute flank pain.

METHODOLOGY

This retrospective analysis of 300 patients, presented with acute flank pain to the emergency department of Lady Reading Hospital for one year from March 2019 to March 2020. All these patients were advised non-contrast Computed Tomography (CT) Kidney, Ureter, and Bladder (KUB) done on 160 slicers, Toshiba Aquilion Prime™, and viewed on institutional Radiant Dicom viewer software. All CT scans were reported by a consultant radiologist having a minimum of two years experience in reporting Noncontrast CT scans. Alternative diagnoses were subdivided into clinically significant and insignificant. Clinically significant alternative

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diagnoses were those that required emergency management while clinically insignificant diagnoses required deferred treatment. The alternative pathologies were further subdivided into genitourinary and non-genitourinary for ease of assessment.

RESULTS

A total of 300 patients presented to the emergency room with acute flank pain, out of whom 198 (66%) were male and 102 (34%) were female patients with a mean age of 35 years. The majority (n=249) of the patients were diagnosed with ureteric calculi and the remaining 51 patients (17%) came out to have alternative radiological findings (Fig 1). Eighteen (35.2%) patients were those who needed acute surgical management which included 13 female and 5 male patients. The remaining 33 (64.7%) patients were referred to specialized clinics owing to the fact that there was no emergency involved. The clinically important alternative findings were overall higher in the female cohort i.e. 25.5% versus 9.8% in male patients. Genitourinary findings were discovered in 11 (21.5%) patients while 7 (13.7%) patients had non-genitourinary pathologies requiring emergency management.

DISCUSSION

Ureteric lithiasis is very common in our part of the world. These patients usually present with acute flank pain. Noncontrast Computed Tomography (CT) Kidney, Ureter, and Bladder (KUB) is the gold standard investigation for these stones with a sensitivity and specificity of 96-100 %.[6] Noncontrast Computed Tomography (CT) Kidney, Ureter, and Bladder (KUB) is rapidly performed, without needing iodinated contrast and bowel preparation.[6-9] The detection rate of alternative pathologies in this study is 17% which is comparable with a similar study by Nadir et al 2012 who detected alternative pathologies in 14 % of patients.[10] Sarofim et al 2016 diagnosed 33.5% with alternative pathologies but only 7% had clinically significant diagnoses requiring acute management. Likewise, in various other similar studies, the rate of detection of alternative pathologies ranged from 10 to 15%.[9,11] Urologists and Emergency physicians are more apt in diagnosing ureteric calculi on Computed Tomography (CT) Kidney, Ureter, and Bladder (KUB) in as many as 67 % of cases while the figures are quite lower among other specialists (43%). The detection rate of ureteric calculi is significantly high in our study (83%) considering the fact Computed Tomography (CT) Kidney, Ureter, and Bladder (KUB) is primarily advised by a consultant urologist. keeping in view our detection rate of alternative pathologies (17%), which is somewhat comparable to alternative diagnosis among urologists (12%) and ED physicians (18%).[12] In the female population, the detection rate of ureteric calculi is low while alternative pathologies are diagnosed more frequently compared to the male population.[13,14] Similar findings are discussed in our study which indicates that the female population needs more detailed evaluation before exposing them to radiation.

Ahmed et al emphasized that Computed Tomography (CT) Kidney, Ureter, and Bladder (KUB) should be advised to those patients who present with flank pain having had a prior history of urolithiasis, flank tenderness, dysuria, and/or microscopic hematuria. Whereas, the rest of the patients need to be first worked up with ultrasound and x-ray KUB only to be followed by Computed Tomography (CT) Kidney, Ureter, and Bladder (KUB) in case of inconclusive previous radiology.[9]

This study has its share of limitations, firstly in being a retrospective analysis followed by a lack of standardized protocol for Computed Tomography (CT) Kidney, Ureter, and Bladder (KUB) reporting. In addition, there were delays involved when it came to the timely release of reports as well. The final limitation was our inability to follow up with these patients with further imaging and biopsies to confirm our alternative pathologies.

CONCLUSION

Computed Tomography (CT) Kidney, Ureter, and Bladder (KUB) is a useful tool for investigating acute flank pain aiding the decision-making process. The majority of the patients were diagnosed to have ureteric calculi with a significant number of alternative diagnoses mainly in the female population. A concerted effort in terms of assessment is needed especially in female patients before ordering Computed Tomography (CT) Kidney, Ureter, and Bladder (KUB) to optimize its use in a clinical setting.

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Author's Contribution

MA helped in the write up of the manuscript. NH conceived the Idea and reviewed the manuscript. BA helped in the collection of the data. SB helped in the provision of data and review of the manuscript. SI contributed to the write up of the manuscript.Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflict of Interest

Authors declared no conflict of interest

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None

Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.