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Original Article

Urologist operated ultrasound scanning of the urinary system: findings and impact on day to day management

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Abstract

Introduction Urologist held ultrasonography has become a standard practice in the developed world. The aim of the present study was to describe the practicality and the outcome of urologist held ultrasound scan of kidney-ureter-bladder (USS-KUB), and the effect on the management.

Methods and material A prospective, descriptive study was designed to analyze the first 100 in-ward USS-KUB performed by urologist. Findings were compared and confirmed by radiologists' findings.

Results The mean length of the kidneys (right – 9.8 cm; range: 5.7-16 cm, left – 9.6 cm; range: 5.2-16 cm), average width (right – 5.2 cm; range: 3.4-10 cm, left – 5.1 cm; range: 3.4-8.8 cm), mean cortical thickness (right – 1.14 cm; range: 0.3-1.9 cm, left – 1.12 cm; range: 0.2-2.5 cm) and clear cortico-medullary demarcation (right – 83%, left – 86%) were comparable with radiologists' findings.

Gross, moderate, and mild hydronephrosis were seen in 29%, 17% and 20% patients, respectively. Renal calculi were observed in 10%, cortical cysts in 3 and renal mass in 2 patients. Five percent of the patients had perinephric collections. Right ureter was dilated in 22% and left ureters in 21%. Ureteric calculi were visualized in 7%. Twelve percent of the bladders showed a wall thickness over 4 mm and 10 patients had a significant post-voidal residual volume. Out of the males 26% had a prostatomegaly over 30 ml and intravesical prostatic protrusion was grade 2 or 3 in 52% of them. All the scans eliminated radiological waiting time and helped in rapid decision making and urgent intervention in 35% of them.

Conclusions The urologist held USS-KUB was a very helpful tool in rapid deciding of the management, to fast track intervention and for follow up of the patients in a urology department.

Key words: in-ward ultrasonography of kidney, ureter and bladder, urologist held USS-KUB.

Introduction

In-ward ultrasound scan (USS) is a popular and a very useful tool in surgical wards, especially in a urology and andrology unit (1). Most of the treatment decisions in urology are based on findings of an imaging modality, particularly the USS of kidney, ureter and bladder (KUB). It is used to take decisions on the patients with urological problems. It helps to diagnose the pathology, confirm it, to decide on the urgency of the intervention and sometimes to decide on the side, site of incision. It helps in guided procedures such as inserting percutaneous nephrostomy (PCN) tubes, taking transrectal ultrasound (TRUS) guided prostate biopsy, aspirating perinephric collections or abscess and removal of longstanding or retained indwelling urethral catheters. Accurate as well as early ultrasonography findings are very valuable in a busy urology department.

Methods

We conducted a prospective descriptive study collecting the data of all the inward ultrasound scans of KUB which was done since October 2009 at the Department of Urology and Renal Transplant, National Hospital of Sri Lanka, Colombo. The data of the first 100 procedures were analyzed to assess the outcome and the impact on the management. The in-ward ultrasonography

guided procedures (PCN, TRUS, etc) were not included in this analysis. Data were entered in a prepared form of which a copy was given to the patient as well.

The USS was performed by a urologist in the unit and two ultrasonography machines (Siemens Sonoline SI-400 and Toshiba SSA-510A) were used. The standard 3.75 MHz abdominal probe was used for all the procedures.

All the patients had an x-ray KUB and USS performed at the Department of Radiology or a CT-scan of KUB with or without contrast in addition to the inward procedure. When an urgent USS of KUB was essential but, when it is not possible to get it done by the radiology department or when late dates were given for patients who need early scans the patients were subjected to in-ward USS of KUB to confirm or exclude a sinister pathology. The patients who needed intervention according to the scan was subjected to a CT- KUB or an USS at the Department of Radiology prior to intervention. Some of the inward USS were performed when the previous USS of KUB was not compatible with the clinical picture. Some scans were done to see the response to an intervention.

Results

The analysis included the first 100 in-ward USS of KUB. The population consisted of patients from age 10 to 77 years with a mean age of 46 years. Male to female ratio was 2:1. The mean length of the kidneys was 9.8 cm (range: 5.7-16 cm) on the right and 9.6 cm (range: 5.2-16 cm) on the left. The average width was 5.2 cm (range: 3.4-10 cm) on the right and 5.1 cm (range: 3.4-8.8 cm) on the left. Mean cortical thickness was 1.14 cm (range: 0.3-1.9 cm) on the right and 1.12 cm (range: 0.2-2.5 cm) on the left. In right and left kidneys, respectively, good cortico-medullary demarcation was seen in 83% and 86% of the patients. These findings were comparable to the USS findings performed at the radiology department or the CT scans.

Gross, moderate, and mild hydronephrosis were seen in 29%, 17%, and 20% patients, respectively. Majority (48%) of the hydronephrosis was due to vesico-ureteric junction (VUJ), bladder or bladder outlet pathology. Next commonest reason (33%) was ureteric pathology, either stricture or calculi. The rest included pelvi-ureteric junction obstruction and renal pelvic stones.

Renal calculi were observed in 10% out of which 5 were in the renal pelvis and the rest were calyceal stones There were 3 cortical cysts and all were Bosniak grade I simple renal cortical cysts. The 2 renal masses found in 2 patients were renal cell carcinomas. The cysts and the masses were subjected to CT scanning to confirm and stage. Five percent of the patients had perinephric collections. Right ureter was dilated in 22% and the left in 21%. Ureteric calculi were visualized in 7%.

Twelve percent of the bladders showed a wall thickness over 4 mm and 10 patients had a significant post-voidal residual volume. Out of the males 26% had a prostatomegaly over 30 ml and 8% over 50 ml. Intravesical prostatic protrusion (IPP) was grade 2 or 3 in 52% of them. All the scans lead to a plan of management such as decision on intervention, discharge on catheter or to give a trial without catheter. Urgent interventions were decided in 35% of them.

Discussion

Ultrasonography is a non-invasive imaging technique with no risk of ionizing radiation, which is widely available and very cost-effective. In an extremely busy urology unit at a tertiary referral center with a high patient turnover, receiving over 150 patients per week including 35 casualty admissions, there is a very high demand for USS-KUB. On average 35 USS-KUBs are needed per week only to tackle the urgent admissions. Without providing this facility it will be extremely difficult to continue services as there will be decisions based solely on the USS-KUB finding on who needs intervention.

The alternative non-contrast CT scan of KUB has lot of disadvantages and limitations. Since the services provided by the Department of Radiology were not sufficient to cover the work load in the unit, urologist held in-ward USS-KUB became mandatory.

In other parts of the world, urologist held USS-KUB is a basic, essential investigation in the urology department or the emergency department for the day to day management of patients (1). This has been able to improve the outcome, save time by avoiding time consuming referrals as well as cut down the cost according to many authorities (2). Urologist held ultrasonography has been a very useful tool to help the decision-making in urological emergencies with a reasonable accuracy (3).

In Sri Lanka this was initiated at the Department of Urology, National Hospital of Sri Lanka. In all the initial scans, the patient was subjected to another USS-KUB or a CT-scan by the department of radiology before intervention.

The findings regarding the dimensions of the kidneys were comparable to the other imaging findings. Detection of hydronephrosis (gross, moderate, and mild hydronephrosis were seen in 29%, 17%, and 20% patients, respectively) was crucial since it helped us to offer the patient urgent or early decompression and prioritize them as well. The clue regarding the cause of obstruction made it easy to decide on the definitive intervention or the next line of investigation. In our study group the commonest cause for hydronephrosis was VUJ, bladder or bladder outlet obstruction. They had prostatomegaly, bladder cancer or undergone radiotherapy to the pelvis leading to the obstruction.

The patients with renal calculi were either decided on definitive management or directed to further imaging (eg: intravenous urography) before intervention. The size of the prostate gland, the IPP and the post voidal residual volume helped in deciding the method of intervention to be offered to the patients. Urgent interventions such as percutaneous nephrostomy, ureteric stenting, aspiration of perinephric collections were decided on the ultrasonographic findings, which improved the patient outcome rapidly. In-ward urologist operated ultrasonography of the KUB is a very helpful and a mandatory tool in the day to day management of a busy urology unit.

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