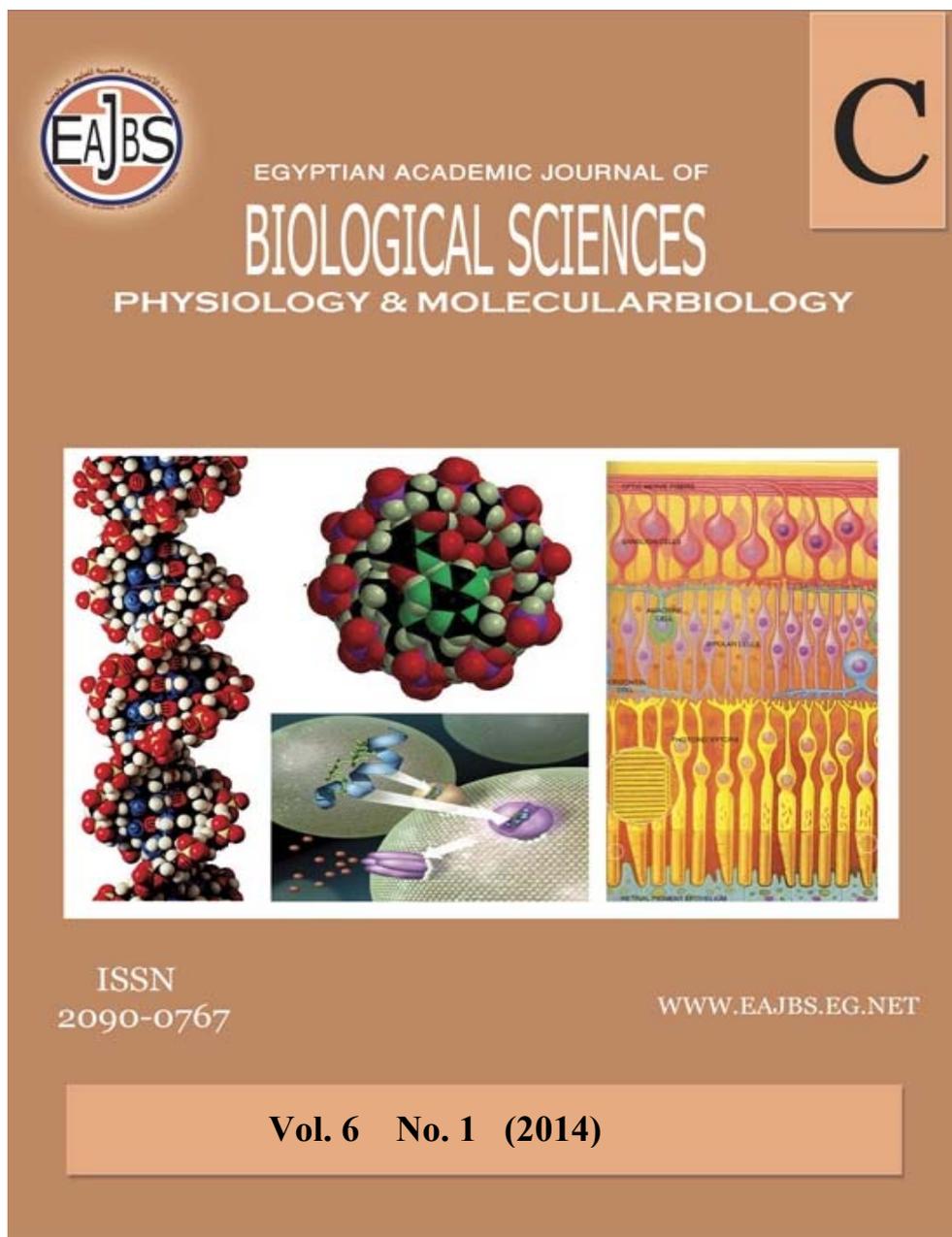


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Evaluation of Urinary system diseases using Intra-venous Urography and Ultrasound

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ABSTRACT

Objectives: This study aimed to assess various renal diseases using IVU and US examinations

Methods: This is a retrospective analytical which included 50 subjects referred for IVU and was done in Fedail hospital, Soba University hospital and Alnilain medical center radiology departments, Data were collected in the period between (16.7.2011) to (21.10.2011).

Results: This study included 50 subjects referred for IVU, 76% male against 24% females, the most affected ages ranged between 21 to 40 years .There was 43(86%) of the patients with renal or ureteric stone according to U/S findings and 7(14%) with other problem, according to the renal function 26(52%) were normal secretion and 9(18%) showed nonfunctioning kidney up to 24 hrs. The most common affected site was kidney represented 76 %, then ureter which represented 24%.

Conclusion: The study concluded that kidney with normal secretion in IVU which associated with stone not cause obstructive changes. The non-functioning kidney was strongly associated with severe hydronephrosis and showed delayed function at IVU films.

INTRODUCTION

The urinary system is one of the most important system in the body, any disturbance may lead to major complications all over the body. Intravenous urography (IVU) is one of radiographic study of the urinary system using an intravenous contrast agent (dye). (Ballinger ,*et al* 1999), Plain abdominal radiographs combined with IVU have been the standard imaging procedures of choice for the evaluation of acute flank pain or any other urinary system diseases over the last decades.

Direct detection of even small ureteral calculi is achieved in 40–60%, whereas using indirect signs such as ureteral and renal pelvic dilatation stone detection is possible in up to 80–90% of all cases. However, IVU might be hampered by poor quality due to lack of bowel preparation, by nephrotoxicity of contrast agents, by serious allergic and anaphylactic reactions in 10% and 1% of the patients, respectively, and by significant radiation exposure.

The use of ultrasonography (U/S) in the management of urinary system diseases has been growing and when combining the findings of pyelo-ureteral dilatation, direct visualization of stones, and the absence of ureteral ejaculation, the sensitivity to detect ureteral dilatation can be as high as 96%. Recently, unenhanced helical CT (UHCT) has been introduced as imaging modality with a high sensitivity and specificity for the evaluation of urinary system diseases (Smith RC, *et al.* 1995). UHCT has been demonstrated to be superior since (i) it detects ureteral stones with a sensitivity and specificity from 98% to 100% regardless of size, location and chemical composition, (ii) it identifies extra-urinary causes of flank pain in about one third of all patients presenting with acute flank pain, (iii) it does not need contrast agent, and (iv) it is a time saving imaging technique being performed within 5 min. Based on the data published, one can predict that UHCT will become the imaging procedure of choice for evaluation of urinary system diseases within the next years (Tamm, *et al.* 2003). Of the many ways to obtain images of the urinary system, the intravenous injection of a contrast agent has been traditionally considered the best, although other modalities, such as computed tomography (CT) or ultrasound, are better for some disease processes.

The kidneys excrete the contrast into the urine, which becomes visible

when x rayed (radiopaque), creating images of the urinary collection system. (Ballinger, *et al.* 1999). In order to obtain the best visualization of the kidneys, ureters, and bladder, the intestines must be free of gas and fecal material (Schull *et al.* 1998). Every radiology department has their own specific requirements. Most include a laxative such as castor oil, eucarbon tablet, cascara tablet taken the day preceding the exam. This is followed with a light fat-free dinner which includes lean meats, noodles, white rice, bread with no butter, and tea or black coffee. Fluids are permitted until midnight, after which no food or liquid is allowed until after the intravenous urogram is completed (Heymann *et al.*, 2010). Many patients say that the bowel prep is worse than the actual procedure the prep is done for (Heymann *et al.*, 2010). Common Side Effects of Bowel Prep; May be present in up to half of all patients doing bowel prep-Cramping-Nausea-Feeling of Fullness-Fecal Incontinence Changes in Taste-Vomiting-Sweating and may be some rare Side Effects of Bowel Prep occur like; Seizure-Shortness of Breath-Facial Redness Chest Pain Heart Palpitations-Muscle Weakness- Acute Renal Failure (Smiley, 2010), Dehydration is common when doing a bowel prep if you are not taking in adequate fluids during the process. (HalfLytely and Bisacodyl 2010). An allergic reaction to the contrast agent is the primary risk, although kidney damage is also a potential complication.

No contrast media can be completely safe (www.enotes.com 2011). A mild reaction consists of a skin rash-nausea-vomiting or hives, whereas a more serious reaction includes swelling of the larynx, difficulties in breathing, asthmatic attacks, and a severe drop in blood pressure (hypotension). (Schull, 1998), since x-rays are involved during this procedure, there is a risk due to radiation. This exam is not done on pregnant women or women who think

they may be pregnant (www.enotes.com 2011). Ultrasound is a quick, safe, simple, and inexpensive way to obtain views of internal organs. Renal size can be measured as well as the visualization of hydronephrosis, cysts, tumors, and renal calculi (Ballinger, *et al.* 1999). The attempt of the following study is to assess the urinary system diseases by using intra venous urography (IVU).

MATERIALS AND METHODS

This study was done in Fedial hospital, Soba University hospital and Alnileen Medical Center radiology departments. Data were collected in the period from the period of July to October 2011. The sample size was 50 patients who had been selected randomly. They complain of renal colic and referred for IVU. The study population consists of 12 females and 38 were males, their ages were ranged from 1 to 70 years old. (age, gender, US findings & IVU findings were recorded).

Machine used

For IVU major X-ray machines have been used, (shimadzu in fedial hospital and alnileen center and toshiba in soba university hospital) with the following specifications:

Toshiba specification: model: drx-1603B

Max voltage: 150 Kv

Max mA: 500 mA

Focal spot: 2.0 – 1.0 mm

Shimadzu specification: model: 0.3/0.8P323DK-85

Max kV: 150 kV

Max mA: 500 mA

Focal spot: 0.3 – 0.8 mm

Comparison of diversity indices (Sp, species number; Sr, speceis richness; Bd, beta-diversity; H', The technical factor average used to x-rayed

the patients during IVU procedure are 60 to 80 kV, 200 mA, S 0.14 to 0.30 sec.

Images are processed computerized in fuji film unit called (capsula 2) by using special cassette placed under the body part or object to be examined and the x-ray exposure is made. Hence, instead of taking an exposed film into a darkroom for developing in chemical tanks or an automatic film processor, the imaging plate is run through a special laser scanner, or CR reader, that reads and digitizes the image and then printed by laser printer.

Images for patients in Soba hospital were processed by using automatic processor and used fast screen film and green sensitive.

The results of the ultrasound examination was already done in different Medical Centers by expert Sonologists, and then compared with the IVU findings which reported with highly qualified Radiologists who work in research field.

RESULTS

This study included 50 subjects referred for IVU, 76% male against 24% females, the results of this study revealed that the most affected age range between 21 and 40 years Fig. (1). The most affected ages ranged between 21 to 40 years. 24% of cases presence of family history Tables (1&2). The most affected side is the Lt side (54%) Table (3), There was 43(86%) of the patients with renal or ureteric stone according to U/S findings and 7(14%) with other problem such as Calcification, pelvic kidney Figs. (2 & 3), according to the renal function 26(52%) were normal secretion and 9 (18%) showed nonfunctioning kidney up to 24 hrs. The most common affected site was kidney represented 76 %, then ureter which represented 24%.

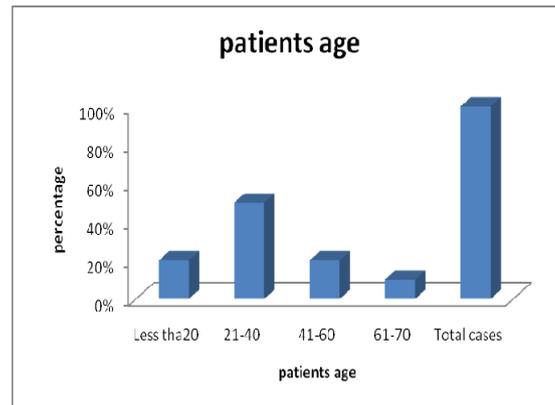


Fig.1: Shows distribution of age of study sample the age between 21-40 is more affected

Table 1: Shows the findings of IVU and US in cases of renal and ureteric stones without and with obstructive changes.

<i>IVU finding</i>	<i>US with no obstructive changes</i>	<i>US with obstructive changes</i>
Normal kidney secretion	23 (52%)	3
Stone cause Hydronephrosis	0	14 (28%)
Non functioning kidney	0	9 (20%)

Table 2: Shows Percentage of presence of family history(from the study source)

Family history	Frequency	percentage
Present	12	24%
Not present	38	76%
Total cases	50	100%

Table 3: Shows the frequency and percentage of affected side.

<i>Side</i>	<i>frequency</i>	<i>Percentage</i>
RT	16	32%
LT	27	54%
Both	7	14%
Total	50	100%



Fig. 2: male 13 years old show in calcification in the area of supra renal gland with normal concentration and excretion of contrast media



Fig. 3: male 35 years old in oblique view Show pelvic kidney with normal function

DISCUSSION

Renal diseases are a common clinical problem which might include a variety of urinary and extra urinary abnormalities among which nephrolithiasis and ureterolithiasis being the most frequent (Federle PM *et al.* 1981), the common involved age were the age Groups of 21-40 years old which is due to special considerations, however the predominance of obstructive uropathy among adults is prone to high incidence of formation of stones during the ages of 40s (Ellis, 1979). the common involved gender is male group with specific percent of 76% relative to female with 24% incidence.

A recent study with 178 patients showed a sensitivity of 45% but a specificity of 77% which are similar to findings in our study with sensitivity of 40% (Levine *et al.* 1997). The use of renal Ultrasonography (US) in the management of renal diseases has been growing.

Most patients has no history of urinary system diseases in their family (76%) instead of (24%) had family history. This means that the majority of renal disorders have no family history.

IVU showed normal kidney secretion (52%) while the US showed stone without obstructive changes, when stone cause obstructive changes the IVU reveals renal pelvis dilatation and uretral dilatation (28%) and caused in others patients delayed film up to 24 hours (non functioning kidney (20%).

When combining the findings of pyelo-ureteral dilatation and direct visualization of the stone, the sensitivity of US can be high, 37-64% for calculi detection and 74-85% for detection of acute obstruction as confirmed in study of Arain GM *et al.* 2008.

IVU examinations in which images are evaluated are useful for revealing urinary tract anatomy in the selected group of patients in whom urinary tract abnormalities are strongly suspected.

IVU has the potential to reveal urinary system abnormalities.

CONCLUSION

This study concluded that out of the previous enumeration for the results related to assessment of renal diseases using IVU and US examination, Stones with no obstructive changes such as moderate hydronephrosis in US findings show normal kidney secretion in IVU appearance, this depend on site of renal stones (upper & lower pole, minor or major calyces) made no changes in appearance, urteric stones cause hydronephrosis in US scan caused delayed functioning may be up to 24hrs in IVU exam. The use of renal Ultrasonography (US) in the management of renal diseases has been growing up. So, further studies are recommended to compare between US and radiologic imaging modalities to avoid radiation risks.

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ARABIC SUMMARY

تقويم أمراض الكلى بالأشعة الملونة والموجات فوق الصوتية

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الأهداف: هدفت هذه الدراسة إلى تقييم مختلف أمراض الكلى باستخدام فحص الجهاز البولي با الصبغة الملونة والموجات فوق الصوتية.

طرق القياس: أجريت هذه الدراسة في أقسام الأشعة بمستشفى فضيل ، مستشفى سوبا الجامعي ومركز النيليين التشخيصي في الفترة من 16 يوليو 2011 الي 21 أكتوبر 2011. شملت الدراسة 50 حالة أرسلت للفحص باستخدام الصبغة الملونة 76% من الرجال مقابل 24% من النساء ويتراوح الفئة العمرية الأكثر تأثراً بين 21-40 سنة .

النتائج: اوضحت الدراسة ان 43 حالة (84%) يشكون من حصاوي بالكلية أو الحالب و 76% من الحالات ليس لهم تاريخ عائلي للأصابة بالحصوات. وجد أن ظهور الكلية طبيعي في 26 حالة (52%) و في 9 (18%) حالات لم يحدث تغير أو تلوين للكلية في الجهة المصابة حتي 24 ساعة من بداية الفحص، وان أكثر الاعضاء التشريحية اصابة هي الكلية حيث سجلت 76 % مقابل 24% للحالب.

الخلاصة: فحص الجهاز البولي بواسطة الصبغة الملونة يكون تلوين الكلي طبيعي عند وجود حصوة لا تتسبب في أنسداد حسب نتيجة الموجات فوق الصوتية وكذلك لا يحدث تلوين للكلية عند وجود أنسداد وأحتقان كبير للسوائل في الكلية مما يتسبب في خللها الوظيفي وبالتالي تأخير ظهورها في الصور الشعاعية.