

Efficacy of renal ultrasound in the first UTI episode in a 120 paediatrics patents in two PHC (Comprehensive specialized clinics of KAMC & Hayat Hospital)

Dr. Ahmed Moosa Assery

Ambulatory care Paediatrics Consultant. King Abdulaziz Medical City, National Guard Health Affairs, Comprehensive specialized clinics in Umm Al Hamam.

Abstract: I have completed now 22 years in the paediatrics medical field and among such period I faced many UTI cases in both children's sexes and in most of the times I were randomly requesting a RBUS for some patients and I were really surprised by some cases of hidden GUS anomalies without applying any definitive indications of the imaging studies usually requested with UTI episodes mentioned in two major references of paediatrics medicine whom are AAOP and UpToDate. , **The aim:** of such study is to double check again the accuracy of the indications of performing imaging studies with every UTI in a simple way, **Design:** of the study is cross-sectional type of study, **Setting:** in the primary health care settings, **Tool:** was via the observational follow up via the main dependant official operating system of the patients medical records in both institutions of NGCSC and HNH.120 Patients from my outpatient clinics in NGCSC (117 patients) and HNH (3 patients) with confirmed UTI infections whom were not full-fill the indication of a subsequent radiological study mentioned in AAOP and Up-to-date references. Those patients undergone a further RBUS under the supervision of radiologist consultant to evaluate their GUS status randomly. **Results:** only two cases showed a significant radiological anomaly in form of hydro nephrosis, one of them was a male patient in NGCSC whom urine culture isolated the *Staphylococcus Aureus* who showed a grade 4 bilateral hydro nephrosis and needed a temporal dialysis, and the other one was a female from the HNH showed a unilateral significant hydro nephrosis and ended with a renal shut down in one kidney.

Conclusion: Despite the well-made precise indication of performing a further radiological study for the documented UTI paediatrics patients (mentioned in two major paediatrics references) but still there are some missed cases not applying such indications who found to be with a significant GUS hidden anomalies.

RBUS: Renal bladder ultrasound.,

VCUG: Voiding cystouretrogram.,

GUS: Genito-urinary system.,

UTI: Urinary tract infection.,

NGCSC: National guard comprehensive specialized clinics.,

HNH: Hayaat national hospital.,

AAOP: American academy of paediatrics.,

PHC: Primary health centre.,

KAMC: King Abdulaziz Medical City.,

WBC: White blood cells count.,

VUR: Vesicoureteral reflux.

1. INTRODUCTION

The urinary tract infection is one of the most important clinical challenges we are facing in our daily clinic, this is mainly due to two causes: first one being asymptomatic in most of the cases or with very invisible clinical picture and the second one is the usual challenge of collecting the urine samples in paediatrics patients to confirm the diagnosis.

That type of infection in paediatrics commonly associated with some congenital and pathological anomalies that hidden and can't be diagnosed unless you offer a renal radiological study (like RBUS or VCUG) for further evaluation.

Doing these radiological studies (RBUS only here in my study) with the first UTI attack generally will make a big difference in protecting the patient from any underdiagnosed UTI and any hidden congenital Genito-urinary system anomalies that can coexist with such UTI'S that can lead to ultimate renal failure apart from that they could be the major cause of its recurrence.

Through my modest paediatrics experience of 22 years, I encountered only 5 cases of first UTI attack and whom I randomly did for them an RBUS that showed a striking Genito-urinary system anomalies (though the AAOP and UpToDate do not recommend that with each first UTI episode), that thing made me so interested to put both of this fundamental paediatrics references recommendations in this point under the focal research and verification of its efficacy and safety.

[¹] AAOP guidelines in the UTI entity says that long -term outcome studies have not been performed to determine the best initial imaging study in children diagnosed with UTI. Guidelines based on observational studies and expected opinion recommend that all boys, girl whom age between 2-24 months with confirmed positive urine culture and temperature above 38C should undergo RBUS even with first UTI episode (*American Academy of Paediatrics 2012*) otherwise no need to do an imaging study with each initial UTI attack. despite of the well trusted medical reference the AAOP here the [²] (*UpToDate 2021*) that mentioned here very clear almost different indications of doing RBUS with episode of childhood UTI which are:

- Children younger than two years of age with a first febrile UTI
- Children of any age with recurrent febrile UTI'S
- Children of any age with a UTI who have a family history of renal or urologic disease, poor growth, or hypertension (table 1A-B)
- Children who do not respond as expected to appropriate antimicrobial therapy.

2. AIM OF THE STUDY

The aim of this study is:

- 1) to evaluate the benefit of doing RUBS with every first UTI attack happened in paediatrics patients' males and females regardless to indication mentioned previously (in AAOP and UpToDate) if documented (i.e., UTI) by urine culture.
- 2) to specify the most common renal radio-pathological finding comes with those UTIs episodes in this patient's group and its severities.
- 3) to estimate how percent the of cases recorded in this study came with first UTI and showed a subclinical GUS anomaly in their Genito-urinary system.
- 4) and to estimate the sex ratio of the positive cases with GUS if found.

3. METHOD OF THE STUDY

This is a cross-sectional study that started at 12th of February 2014 and closed at 12th of February 2021 among which I pretended to predestine any first UTI episode in the paediatric patients coming to our PHC of NGCSC (One of the PHC belongs to KAMC under the supervision of the medical health affair of national guard ministry and in Elhayate hospital in Riyadh city (a private hospital) by me and by informing my colleges in the paediatrics outpatients clinics and ER and family medicine physicians also to feedback me about any query first UTI attack among the visiting paediatrics patients.

The patients group involved in the study are those male and females from birth till 14 years old who presented with any suspected UTI episode depending on the symptoms (burning micturition, foul urine smell, urgency, urine dripping, haematuria, urinary mucous discharges, or flank pain) suggesting a non- febrile type of UTI (Not with Pyelonephritis) which comes with chills and rigor with high fever and high WBC and need an urgent emergency referral who(so not involved in our study here).

Each patient from the above group requested to collect a urine by mid-stream way under the septic techniques then sending the samples of urine in a sterile container for cultures. then any result of positive culture equals to or more than 10 to the power 5 colonies considered to be positive provided an ideal perianal hygiene measure before the samples collection.

Those who are not well-trained we just ordered a bag urine collection under a good hygiene measure and any result of pathogen colonies more than or equal to 10 to the power 5 provided to be done at least 3 times subsequently.

In this study the pathogens that are isolated should be within the well-known group mentioned in our major paediatrics references books ^[3] (like NELSON TEXTBOOK) which are *E. coli*, *klebsiella*, *proteus*, *staphylococcus aureus*, *pseudomonas* and *proteus*.

With each urine sample sent for culture there is spontaneous urine analysis to be done for cell count, types, chemistry, and nitrite estimation as a supporting factor for the diagnosis.

Those came with positive urine culture to be booked soon for further radiological study of the whole renal system (RBUS) and a detailed report to be done by a radiologist within one week from the booking.

The sample of the patients involved (only 120 patents) I realize it still low but though of that we selected a pure real UTI cases and thus few numbers of cases is due to the nature of the disorder (being asymptomatic in most of the cases) from one side and since of the good hygiene measures noticed recently in the society related to the good toilet habits which is considered the milestone cause against the occurrence of UTI especially in girls.

4. THE RESULTS OF THE STUDY

Documented UTI cases (dependently on our previously mentioned bases) were 120 cases distributed between 117 cases from NGCSC centre and 3 from HNH, the 117 cases reported in NGCSCS 99 of them were girls and 18 were boys and those reported from HNH were all females (3).

All the reported cases caused by *E. coli* infections except one case was in NGCSCS caused by *Staphylococcus* (male patient).

All the above cases undergone RBUS after the infection confirmed by the urinary study and showed the following:

Only two cases of the above showed a significant radiological anomaly in form of hydro nephrosis, one of them is the male patient in NGCSC whom urine culture isolated the *staphylococcus* who showed a grade 4 bilateral hydro nephrosis (with a subsequent significant left VUR in the VCUG and needed a temporal dialysis, and the other one is one female from HNH showed a unilateral significant hydro nephrosis the followed by a renal shut down of that affected kidney.

Table number 1 here is simplifying my whole results of the study among the two institutions in simple manner:

Table 1: Showing the summarized result of the study in both NGCSC and HNH.

	NGCSC	HNH
Number of the patients	117.	3 Only.
Males.	18.	Nil.
Females.	99.	3.
Pathogen isolated.,	All caused by <i>E. coli</i> except one male caused by <i>Staphylococcus</i> , aureus.	All caused by <i>E. coli</i>
RBUS result.	Only one case presented with grade IV unilateral hydronephrosis and needed dialysis.	Only one case showed a significant unilateral Hydronephrosis.

5. DISCUSSION

Among this study I registered 120 cases of confirmed UTI (117 from NGCSC and 3 from HNH) depending on their symptoms and positive urine study, that cases undergone a subsequent RBUS only (without VCUG) with an ultimate radiological report after which put in the suitable antimicrobial agent, I realized that the guidelines of doing a subsequent imaging study in the paediatrics patients mentioned in AAOP and UpToDate are almost accurate though the two exceptional cases I discovered among my study that really not applying the criteria, but Imagine with me here if I did not do the RBUS for the two positive patient mentioned before who came with such significant GUS anomalies (The hydronephrosis) what will be their fate especially the male one who was diagnosed on NGCSC with grade IV hydronephrosis and VUR saved soon under the temporal dialysis done for him soon after the diagnosis.

From the previous study also, I found that both guidelines mentioned in the two references were almost the same with some detailed information's added in the UpToDate one made them clearer.

That study also supported further that the girls still more prone to get UTI'S episodes more than male in general since of their anatomical GUS and may be the more special way of their post-toilet cleaning habits.

Also, from our study here still the E. coli bacteria topping the scene and representing the commonest cause of UTI'S episode in paediatrics despite the one registered Staphylococcus case who came later with advanced unilateral hydronephrosis and subsequent dialysis. And that thing here may be alert us not to underestimate any pathogen isolated from the GUS despite its low virulence and commonness.

Before I close my study, I really respect one study don on ^[4] PEDIATRICS AAP Publication done on MARCH 01 2013 that supported my study here and it was under the title of Different Guidelines for Imaging After First UTI in Infants: Yield ,Cost and radiation that done on 304 child and concluded that there is no ideal diagnostic protocol following a first febrile UTI , An aggressive protocol has a high sensitivity for Detecting VUR and scarring but carries high financial and radiological costs with questionable benefits.

6. CONCLUSION

Despite the well-made precise indication of performing a further radiological study for the documented UTI paediatrics patients (mentioned in many major paediatrics references) but still there are some missed cases not applying such indications who found to be with a significant GUS hidden anomalies.

REFERENCES

- [1] American Academy of Paediatrics: KENNETH B. ROBERTS, MD, University of North Carolina School of Medicine, Chapel Hill, North Carolina, Am Fam Physician. 2012 Nov 15;86(10):940-946.
- [2] UpToDate: May 05.2021 by Nader Shiekh, MD, Alejandro Hoberman, MD).
- [3] Elder JS. Urinary tract infections. In: Behrman RE, Kliegman RM, Jenson HB, eds. Nelson textbook of Paediatrics. 18th ed. Philadelphia: Saunders, Elsevier; 2007
- [4] Paediatrics: 2013 Mar;131(3):e665-71. doi: 10.1542/peds.2012-0164. Claudio La Scola¹, Chiara De Mutiis, Ian K Hewitt, Giuseppe Puccio, Antonella Toffolo, Pietro Zucchetta, Francesca Mencarelli, Martino Marsciani, Roberto Dall'Amico, Giovanni Montini.