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Urolithiasis is a common genitourinary disease affecting an increasing proportion of pediatric population each year for which multiple lines of treatment have emerged. Percutaneous nephrolithotomy has been the gold standard in management of large portion of kidney stone for decades now.

Although the procedure is easily applicable with excellent results, it exposes the patient to several hazards, one of them in radiational hazards which are not only dangerous to the patient, but the treating staff as well considering the repeated exposure especially in high volume centers.

Ultrasound guided puncture used in tandem with fluoroscopy has been described as an effective method for achieving intrarenal access with effective results and the potential to decrease the exposure to radiation for both the patient and the medical staff.

Aim of the Work

The aim of this study was to compare fluoroscopy-assisted ultrasound and fluoroscopy only guided puncture in mini-PCNL according to different intraoperative variables, short term complications and stone free rate.

Patients and Methods

This study included 50 children presented to the pediatric genitourinary unit in Alexandria Main University Hospital with the following criteria:

1. Children (aged less than 18 years).
2. Kidney stone either:
 - a. Burden that is more than 10 mm.
 - b. Burden that is less than 10 mm with previous history of failed ESWL (inability to proceed with ESWL or failure to achieve stone free state after 3 sessions).

We excluded patients with the following criteria:

- Patients showing active urinary tract infection.
- Anomalies in the upper urinary track.
- Renal transplantation.
- Uncontrolled coagulopathy.
- Urinary diversion.

Patients with kidney stone disease that were considered candidates for mini-PCNL were assigned randomly using Sealed Opaque Envelope System to one of two groups (A or B).

Group A: Intrarenal puncture and dilatation using ultrasound with minimal use of fluoroscopy in certain steps.

Group B: Intrarenal puncture and dilatation using fluoroscopy only guidance.

All children in this study were subjected to preoperative Ultrasound renal assessment non-contrast computerized tomography (CT) of abdomen & pelvis, Intra Operative surgical and radiation parameters and postoperative course short time complications and stone-free state

Results

	Group A (n = 25)	Group B (n = 25)	U	p
Time to access				
Min. – Max.	15.0 – 145.0	55.0 – 280.0	42.50*	<0.001*
Mean ± SD.	52.20 ± 33.20	136.6 ± 50.78		
Median (IQR)	45.0 (30 - 65)	135.0 (95 - 165)		
Number of trials				
Min. – Max.	1.0 – 3.0	1.0 – 7.0		<0.001*
Mean ± SD.	1.64 ± 0.57	2.96 ± 1.46		
Median (IQR)	2.0 (1.0 – 2.0)	3.0 (2.0 – 4.0)		
Time to enter				
Min. – Max.	50.0 – 215.0	85.0 – 215.0	224.0	0.085
Mean ± SD.	113.1 ± 41.47	138.6 ± 46.69		
Median (IQR)	105.0 (90 - 130)	120.0 (95 - 185)		

U: Mann Whitney test

p: p value for comparing between group A and B

*: Statistically significant at $p \leq 0.05$

SD: Standard deviation

Group A: Intrarenal puncture and dilatation using ultrasound with minimal use of fluoroscopy in certain steps.

Group B: Intrarenal puncture and dilatation using fluoroscopy only guidance.

	Group A (n = 25)	Group B (n = 25)	Test of sig.	p
Operative time (min)				
Min. – Max.	20.0 – 70.0	35.0 – 95.0	t=4.245*	<0.001*
Mean ± SD.	42.60 ± 12.76	58.80 ± 14.19		
Median (IQR)	45.0 (40.0 – 50.0)	60.0 (47.50 – 66.0)		
Radiation dose				
Min. – Max.	2.40 – 14.17	9.89 – 61.09	U=11.0*	<0.001*
Mean ± SD.	6.07 ± 3.57	32.35 ± 13.79		
Median (IQR)	4.35 (4.46 – 10.88)	31.79 (26.41 – 39.72)		
Radiation time				
Min. – Max.	12.0 – 65.0	49.0 – 312.0	U=10.50*	<0.001*
Mean ± SD.	29.44 ± 17.01	157.9 ± 68.54		
Median (IQR)	21.0 (21.0 – 53.0)	163.0 (129.5 – 194.5)		

t: Student t-test, U: Mann Whitney test

p: p value for comparing between group A and B

*: Statistically significant at $p \leq 0.05$

IQR: Inter quartile range

SD: Standard deviation

Group A: Intrarenal puncture and dilatation using ultrasound with minimal use of fluoroscopy in certain steps.

Group B: Intrarenal puncture and dilatation using fluoroscopy only guidance.

Conclusion

With its high success rate for establishing access to the collecting system and the targeted calyx, fluoroscopy assisted ultrasonography guidance for access for PCNL seems to be an acceptable if not better option than plain fluoroscopy guidance to limit radiation exposure.