

## Feasibility and safety of daycare pediatric ureteroscopy in low volume centers: Hints to be considered during Coronavirus disease-2019 pandemic

Ahmad Jaradat <sup>1,2,\*</sup> & Faris Abushamma <sup>1, 2,3</sup>

<sup>1</sup>Department of Medicine, Faculty of medicine and health Sciences, An-Najah National University, Nablus, Palestine; <sup>2</sup> Department of Urology, An-Najah National University Hospital, Nablus, Palestine; <sup>3</sup> Bristol Urological Institute, North Bristol NHS Trust, Bristol, United Kingdom

\*Corresponding author: a.jaradat@najah.edu

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### ABSTRACT

Several guidelines and algorithms have been established since the declaration of Coronavirus disease 2019 (COVID-19) pandemic to organize work across surgical departments and face the enormous demands on health care facilities without affecting patient's health and safety. Pediatric ureteric calculi is an uncommon condition that may be encountered and requires appropriate triage and management. However, pediatric urologists are not available in all centers, mandating adult urologists to deal with such cases despite the small volume, especially during COVID-19, where patients transfer is restricted. We have reviewed pediatric ureteroscopy outcomes at our tertiary center as adult urologists did all cases. We retrospectively reviewed the files of all pediatric patients who had endoscopic management of symptomatic ureteric calculi between 2013 and 2020. Patient demographics, stone characteristics, operative details, hospital stay, and complications were recorded and analyzed. Twenty-one patients were included, 13 males and eight females. The mean age was  $8.4 \pm 2.9$  years. The mean ureteral stone size was  $9.9 \pm 3.6$  mm. 28.6% (n=6) of patients known to have other comorbidities, 33.3 % (n= 7) of patients required pre-operative double J stent (JJ) stent insertion. One lithotripsy session was sufficient for complete stone clearance in most patients, 76.2 % (n=16), while the remaining patients required two sessions. None of the patients developed postoperative urinary tract infection (UTI) or gross hematuria with clots. All patients except one were discharged home on the same day. Daycare pediatric ureteroscopy is a feasible and safe option to be considered by adult urologists in order to treat pediatric ureteric stone disease, especially in the current era of COVID-19 pandemic where the number of beds is limited, and patients transfer is restricted.

**Keywords:** Pediatric. Ureteroscopy. Stone. Urolithiasis. Outcome. COVID-19.

### INTRODUCTION

The World Health Organization (WHO) declared the epidemic of Coronavirus disease 2019 (COVID-19) as a pandemic on March 12, 2020. It has currently spread to every country globally, where it has started in China [1]. Morbidity and mortality related to COVID-19 are not the only concern facing the health system as hospitals capacity, elective surgeries cancelation, and Healthcare workers (HCW) safety are paramount [2].

Ureteric calculi in the pediatric age group are uncommon, but the incidence is constantly rising [3]. The number of cases is variable between centers, but most centers have a small to medium volume per year [4]. The patients' age, the presence of comorbidities, and the future risk of developing recurrent attacks of

stones are challenges facing the treating urologist in a pediatric cohort of patients [5, 6]. Furthermore, the perioperative period and hospital stay are paramount, especially during the COVID-19 pandemic, where hospital beds and staff availability is limited. In addition, pediatric urologists are not available in all centers in the Middle East, so adult urologists are expected to deal with these cases during the current pandemic, especially that patients transfer is restricted and bed availability is a major concern.

Ureteroscopy and extracorporeal shock wave lithotripsy (ESWL) are well-established treatments in stone diseases, especially in adults as for example European association of urology (EAU) recommends ureteroscopy and intracorporeal lithotripsy for lower ureteric stones but ESWL for managing upper ureteric

stones as the first choice of treatment [7]. However, pediatrics' ideal approach is still controversial, mostly that younger children less tolerate ESWL, unable to stay always for a long time, and have got a low threshold of pain, which means general anesthesia may be required for ESWL in the pediatric age group. Therefore, pediatric ureteroscopy is the mainstay of acute ureteric calculi in pediatrics [8-12].

A recent systematic review shows a comparable outcome for medium (25-49 cases) and high-volume centers ( $\geq 50$  cases) in terms of safety and efficacy in using ureteroscopy for managing pediatric ureteric stones. However, the review excluded low volume centers which reported less than 25 cases similar to our center [4].

The main purpose is to evaluate the outcome of daycare pediatric ureteroscopy performed by adult urologists in low-volume centers in the prospect of feasibility and safety. We hope that this message will help in the era of COVID-19, where hospital capacity is limited, and available hospital beds is essentially required for sick patients.

## METHODS

We retrospectively reviewed all pediatric patients' records and files (under the age of 18 years) who were treated operatively for symptomatic ureteric stones at our tertiary university hospital between January 2013 and April 2020, after getting the institutional review board (IRB) approval.

Patient demographics (age, gender, and comorbidities), stone characteristics (site, size, and laterality), operative details (pre-operative stenting, number of sessions required, and stone-free rates (SFR)), Hospital stay and complications, were recorded and analyzed.

All patients were investigated to confirm the stone location and burden either by non-contrast computed tomographic scan (CT) or an ultrasound scan of the urinary tract.

All sessions were done as a daycare procedure (same-day admission and discharge) under general anesthesia. Three different adult urologists did the procedures. At our center, we use 7.3 French (Fr) semi-

rigid pediatric ureteroscope (Karl Storz), Polytetrafluoroethylene (PTFE) coated guidewire (Boston Scientific), 4 Fr ureteric catheter and 12-18 cm (4 Fr) ureteric stents (Boston Scientific) based on patient age and height. We used 375 Micron laser fiber with variable frequency and energy based on surgeon preference regarding the laser setting. Stone baskets were not used to retrieve stone fragments; instead, stone forceps were used. All patients were evaluated 3 hours postoperative by the surgeon in order to discharge them if clinically suitable on simple analgesia (paracetamol) and oral antibiotics (cefuroxime for 3 days).

Complications were monitored and recorded within 30 days' post-procedure. Success was defined as no residual stone fragments found at the time of stent removal and check ureteroscopy. Thus, visual confirmation of complete clearance was used in our study rather than imaging studies.

## RESULTS

Twenty-one patients, 13 males and eight females (61.9 % and 38.1 % respectively) with a mean age of  $8.4 \pm 2.9$  years, referred to the urology department between January 2013 and April 2020 for operative management of ureteric stones.

The mean duration of symptoms before referral was  $11.5 \pm 19.2$  days. 57.1% (n=12) underwent urgent intervention, and the remaining was admitted through the outpatient clinic as elective cases. 6 patients (28.6%) were diagnosed with other comorbidities e.g., bronchial asthma, primary megaureter, hyperoxaluria, chronic kidney disease, Becht's disease, and single functioning kidney.

The mean ureteral stone size was  $9.9 \pm 3.6$  mm. Left side ureteric stones were more prevalent in our cohort 66.7 % (n=14), and also the distal ureteric stone location is more common 66.7% (n=14). The degree of hydronephrosis was classified by ultrasound or CT-scan as mild, moderate, and severe. Severe hydronephrosis was found in 23.8 % (n=5) of patients, moderate in 47.6% (n=10) and mild in 28.6% (n=6).

Primary ureteroscopy and laser stone fragmentation was performed in the majority

of cases, 66.7 % (n=14), while the remaining 33.3 % (n=7) required upfront double J (JJ) stent insertion either for sepsis or for ureteric dilatation prior to ureteroscopy. Retrograde pyelography at the end of laser lithotripsy was done based on surgeon decision in prolonged lithotripsy cases or the possibility of ureteric injury to look for urine leakage or extravasation. According to our results, it was performed in 52 % (n=11) of patients, with evidence of contrast extravasation was found in one case. Postoperative stenting was routinely performed in all cases, and follow-up JJ stent removal and ureteroscopy procedure was done within a few weeks where complete stone clearance was confirmed visually.

One laser lithotripsy session was sufficient for complete stone clearance in the majority of patients, 76.2 % (n=16), while the remaining patients required two sessions.

**Table (1):** Outcomes for daycare pediatric Ureteroscopy for large ureteric stones.

Demographics	Total number of patients:21
	Mean Age:8.8 +/- 2.9 years
	Duration of symptoms before referral:11.5+/-19.1 days
	Male to Female Ratio:1.6:1
	Comorbidities:28.6%(n=6)
Stone characteristics	Stone size:9.9 +/-3.7 mm
	Stone location: upper ureter:28.6% (n=6) Middle ureter:4.7%(n=1) distal ureter: 66.7% (n=14)
	Laterality: Right: 33.3% (n=7) Left: 66.7 % ( n=14)
	Degree of hydronephrosis: Mild: 28.6% (n=6) Moderate: 47.6% (n=10) Severe: 23.8 % ( n=5)
Operative Details	Preoperative stenting:33.3 % ( n=7)
	Intraoperative retrograde pyelography:52 % ( n=11)
Results	Initial stone free rate:76.2 % (n=16)
	Final stone-free rate:23.8(n=5)
	Complications requiring hospitalization:4.8%(n=1)

None of the patients developed postoperative urinary tract infection (UTI) or gross hematuria with clots.

None of them required emergency readmission (unplanned admission within 30 days after the procedure).

Of most patients, 95.2% (n=20) were discharged home on the same day. The remaining patient who had contrast extravasation in the retrograde pyelogram was admitted for three days and managed conservatively (JJ stent insertion, foley catheter, and intravenous antibiotics). A few weeks later stent was removed, and the patient was followed up with ultrasound at 3 and 6 months postoperatively with no evidence of either hydronephrosis or any other abnormalities.

## DISCUSSION

Several guidelines and recommendations have been established in the Middle East since the declaration of the COVID-19 pandemic in order to arrange work across different medical and surgical departments. For instance, the American college of surgeons recommends the cancelation of all elective surgeries at the beginning of COVID-19 early in 2020. Still, these recommendations are constantly evolving and changing in order to protect medical personal and secure beds for prioritized-sick patients [13].

Pediatric ureteric calculi are a rare condition that requires thorough evaluation and meticulous treatment to achieve the best outcome in view of stone-free rate (SFR) with the least possible complications. However, adult urologists don't deal with pediatric stone disease frequently, especially in small volume centers. Furthermore, pediatric urologists and pediatric instruments such as pediatric ureteroscopy, stents, and wires are not always available in all centers. In our study, pediatric ureteroscopy seems to be a reasonable and safe option to be considered by adult urologists even in small volume centers regardless of stone size or location. This is supported by the EAU guidelines, which recommend ureteroscopy and laser lithotripsy as the first modality treatment in pediatric ureteric stones [7].

Our experience supports the concept of daycare procedure for pediatric ureteric stones regardless of the site, size, and stone density. However, some patients were required more than one session, but this was not reflected in morbidity or mortality. Furthermore, medical comorbidities present in (28.6%) of our cohorts, such as asthma, Bechet's disease, and cavernous vein thrombosis, did not lead to prolonged admission or serious complications. Thus, we concluded that daycare pediatric ureteroscopy is safe and feasible, supported by several published articles regarding the management of pediatric ureteroscopy [11].

The concept of daycare procedures is also currently encouraged and adapted by several centers and regional guidelines, especially in

the era of the COVID-19 pandemic. In particular, more available beds are required, and COVID-19 free operational sites concept is encouraged by several health authorities across the middle east [14].

The argument of upfront ureteric stenting to avoid complications is still controversial [15]. A round third of our cohort required a ureteric stent prior to ureteroscopy and laser fragmentation based on surgeon experience to manipulate the ureteric orifice. Age is a key factor as younger patients mainly stenting of upfront needed, supported by the literature as P. Jones et al. highlights the importance of lowering the threshold of upfront stenting for children younger than six years old to perform a safe surgery [16].

Stone free rate as a definition of success is variable in the literature as clinical outcome, imaging, and check ureteroscopy at the time of stent removal. All were used previously in the literature to define pediatric ureteroscopy stone success treatment [11, 12]. We used check ureteroscopy at the time of stent removal as an accurate definition of success based on the visualization of stone fragments. Sixteen patients (76.2 %) had just one laser fragmentation session to achieve success with no major complications despite having a relatively large ureteric stone

## LIMITATIONS

The retrospective nature of this study and the small sample size are considered minor limitations. However, we aim to show the outcome of such a procedure in low-volume centers in the Middle East to give some hints to similar centers primarily in the era of COVID-19.

## CONCLUSIONS

Daycare pediatric ureteroscopy is a feasible and safe option to be considered by adult urologists in order to treat pediatric ureteric stone disease, especially in the current era of COVID-19 pandemic where the number of beds is limited, and patients transfer is restricted.

### Competing interests

The authors declare that they have no competing interests.

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