Intermittent Catheterization Frequency and Interval in Children: Are We Clear Enough?

Seyyed Mohammad Ghahestani[1]*, Sara Karimi[2]

Since the introduction of clean intermittent catheterization (CIC) it has been a mainstay in the treatment of neurogenic and non-neurogenic bladder dysfunction. Proactive management with CIC beginning in the first month of life is recommended and supposed to decrease the likelihood of bladder intestinal augmentation.[(1)]. Despite this inseparable integration of CIC and the burden of frequency of doing this procedure for the patient, intervals of catheterization in children are not clarified. In adults, the frequency has been a recapitulation of normal voiding patterns and this has been reported to have a frequency of 4-6 times a day. Generally, bladder volume must be kept below 500 cc[(2)] . Normal voiding frequency in healthy children has been reported to vary between 2 to 10 times a day which is clearly a wider range.[(3)].Obviously, bladder volume range is also considerably variable in a growing child. Despite the facts, the literature is boldly reticent about the frequency of catheterization in children.

Catheterizing every three hours has been widely speculated as the shortest interval and the highest frequency of CIC the patient can tolerate with an acceptable compromise in quality of life. It seems that this has been construed as an extrapolation of recommendations in the adult population of catheterizing 4 to 6 times during a day[(2)].

In children, it is perceivable that there are cases in whom more frequent CIC- may help the patient to sustain a low pressure and stable bladder without prompt rush to bowel cystoplasty. Vice versa some children may suffer unnecessary high CIC frequency and lose their quality of life even more. Especially when you consider the fact that recommendations of proactive institution of intermittent catheterization during the neonatal period are increasingly advocated.[(1)]

Another aggravating factor, particularly attributable to children is decreased specific gravity of urine. This defect may be potentially correctable by more frequent CIC to lower bladder pressure and push the patient out of a vicious cycle. The patient and parents have a right to know that a more than generally supposed frequency of CIC (We improvised to call it hyper frequent CIC e.g. every 2 hours during awake time) may procure them a window to hinder bowel cystoplasty.

The question is what an interval or number of CIC attempt per day are desirable for an individual patient. The goal is keeping the filling pressure below safe DLPP. We presume there is no component of bladder neck insufficiency. The safe DLPP has been widely touted as 35-40. Observing a safety margin ,20 cmH_2O has been recently proposed as safe DLPP while still 40 cmH20 is widely accepted as the most quoted upper tract deterioration redline[(3)].

We can consider 35 the lower threshold to stay on the self-side securely. The patients specially those on the brink of cystoplasty are presumed to use free overnight drainage[(4)]. The compliance number of bladder shows us how much a specific amount of urine volume raises the pressure. Therefore, we estimate: the safe volume the bladder retains in each interval will be 35*Compliance.

If you want to know the number of catheterization in wake hours, it will simply be Wake Hours Out Put(W-TO)/35*comp. The wake hours' output can be obtained by avoiding diary as an initial and essential assessment for any functional lower urinary tract disorder.

Knowing the number of hours, the child remains awake, the interval can be easily calculated:

Interval in hours=35*comp*Whrs /WTO

As a simplification in the usual scenario of a toddler sleeping eight hours a day the wake hours will be 16 and calculation will be:

Interval in hours: 560*compliance/WTO

This easily understandable formula helps us be clearer. In some instances, this number may fall below 3 hours. Some parents need time to adjust to the supposed cystoplasty procedure or get ready in life circumstances. A temporizing hyper frequent schedule may also help kidneys regain their concentrating ability. Sometimes one can give a try to lengthen the intervals gradually and bladder may be apt to improve its functional capacity a little bit. Patient compliance with the schedule decreases with intolerably short intervals and close observation is mandatory. Intermediary interventions e.g. intradetrusor onabutilinium toxin injection or neurostimulation may increase bladder compliance and functional capacity if not done previously. This may recruit some marginal patients into hyper frequent schedule before intestinal cystoplasty. I think this should be proposed to parents especially in marginal cases with a calculated interval between 2 and 3. Moreover, we must be plain and explicit with patients about intervals

[1]Assistan Professor,Tehran University of Medical Sciences (TUMS), Urology department.
Pediatric urology ward, Children Medical Center Hospital, Gharib St, Keshavarz Blvd, Tehran , Iran.
[2]Fellow of female and functional urology, Shahid Beheshti Medical University, Urology Nephrology Research Center,Boostan 9th,Pasdaran Ave,Tehran,Iran.
*Correspondence: Assistan Professor,Tehran University of Medical Sciences (TUMS), Urology department.
Pediatric urology ward, Children Medical Center Hospital, Gharib St, Keshavarz Blvd, Tehran , Iran.
Phone:+989128491811. Email:mgrosva@gmail.com.
Received May 2021 & Accepted May 2021

in any case. Data and trials are undoubtedly required.

REFERENCES

1. Stein R, Bogaert G, Dogan HS, Hoen L, Kocvara R, Nijman RJ, et al. EAU/ESPU guidelines on the management of neurogenic bladder in children and adolescent part I diagnostics and conservative treatment. Neurourol Urodyn. 2020;39(1):45-57.
2. BLANKER MH, BOHNEN AM, GROENEVELD FP, BERNSEN RM, Prins A, Ruud Bosch J. Normal voiding patterns and determinants of increased diurnal and nocturnal voiding frequency in elderly men. J Urol. 2000;164(4):1201-5.
3. Mattsson SH. Voiding frequency, volumes and intervals in healthy schoolchildren. Scand J Urol Nephrol. 1994;28(1):1-11.
4. Nguyen MT, Pavlock CL, Zderic SA, Carr MC, Canning DA. Overnight catheter drainage in children with poorly compliant bladders improves post-obstructive diuresis and urinary incontinence. J Urol. 2005;174(4):1633-6.