Feasibility of Voiding Cycle Ambulatory Monitorization: beyond home uroflowmetry

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Abstract

Home uroflowmetry with the Minze system was used in 73 consecutive patients for different indications. A portable uroflowmeter connected to an on line patient portal was used for at least 2 days. 61 patients provided complete and significative readings, with younger patients providing better assessment. Patient acceptance was high, specially in children, due to the sparing of catheter placement.

A total of 311 days and 1954 micturitions were recorded at the patient´s home. Tracings,volue and frequency analysis provided significant information in children, as well as adults with voiding dysfunction and nocturial.

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Introduction

Home uroflowmetry (HU) is available in different versions (1-3) . Minze HomeFlow (MINZE Health, Antwerp, Belgium) is an HU that automatically registers voiding volume at an exact time, connected to an online app using BlueTooth technology. Its design is user firiendly and voiding assesment can be performed in children and adults, both male and female. Collected data are processed on the cloud-based Minze Clinician Portal accessible to physicians in real-time. It can be used anywhere, though it´s preferable in the home setting. Minze HomeFlow device allows to monitoring remotely patients´ micturition cycle, following a natural bladder filling and giving them autonomy to do the things they know cause their symptoms from experience. Lockdown due to Covid-19 increased our use of the system, given patients´ reluctance to undergo full urodynamic studies. We aim to audit the pioneering experience with this device in adult and pediatric populations, and its feasibility and indications in a functional urology clinic. Data from Qmax, Void Vol, hour and date provided a Voiding Cycle Ambulatory Monitorization (VCAM)

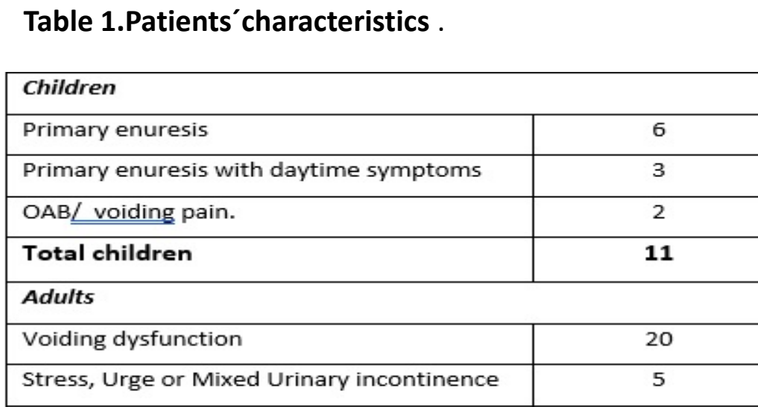
Methods and Materials

A retrospective descriptive study of the first patients who were given the Minze HomeFlow device in a functional urology consultation was performed. Medical history, previous urodynamic studies and all traces produced where analized. Informed consent was obtained in all patients. The device can record unlimited fowmetries and is connected via Blue tooth to an online patient´s portal. It was given to 73 patients in the period between May 2019 and February 2022. 12 were children and 61 adults. We excluded twelve patients with incomplete readings (less than 48h or less than 50% registred voidings) or unable to use the equipment . 61 patients provided good readings for analysis (overall feasibility 83%): 11 were children- mean age 8, yrs, and 50 adults -mean age 48 yrs . The indication in children was enuresis and voiding dysfunction. Only one child had previous urodynamics, and 4 rejected catheterization during scheduled urodynamics. The main indications in adults were voiding dysfunction, hyperactive bladder and nocturia (Table 1) Each patient´s data were analyzed according to sex, age, the reason for use, days of device use, and uroflowmetry

Table 1.Patients´characteristics .

Children	
Primary enuresis	6
Primary enuresis with daytime symptoms	3
OAB/ voiding pain.	2
Total children	**11**
Adults	
Voiding dysfunction	20
Stress, Urge or Mixed Urinary incontinence	5
Overactive bladder	15
Nocturia	10
Total Adults	**50**

Figure 1; Minze system setup for females and males .



Results

The range of days recorded ranged from 2 to 14 days, with a total of 311 days recorded (average of 5 days/ patient) and a total of 1954 micturitions (average 32 voids / patient). At least 8 voids and 2 days were recorded, but most patients produced more than 15 good quality readings over 3 days. Incomplete studies were more common in the first months of use and in the elderly patients. The uroflowmetry parameters obtained in adults included a mean urinary volume of 170.4 ml (range 40-413 ml) and a mean maximum urine flow rate (Qmax) of 15.4 ml/s. Adults with complete readings had a lower mean age (48) than those with incomplete study (68,5). In children, the mean volume was 98.2 ml (range 21 to 210 ml), and the mean Qmax was 15ml/s. (Table 2) Diagnostic contribution: CHILDREN: in all patients, VCAM enabled to consistently determine low capacity bladder in the absence of voiding dysfunction and thus, anticholinergic therapy could be started without the need of catheterization. Aside from the children who refused urodynamics, the rest of the parents and children decided not to undergo a full study once offered the possibility of a non - invasive test. ADULTS: Voiding dysfunction was confirmed in patients with variable patterns or unable to void in hospital (shy bladder syndrome); low capacity bladder and normal was confirmed in patients with suspected OAB; in some patients with nocturia the coexistence of bladder obstruction was seen. There were no complications with the use of this device.

Table 2. Ambulatory recording data .

	Adults	Children
Total (n)	50	11
Women, n (%)	13 (26%)	2 (18%)
Men, n (%)	37 (74%)	9 (82%)
Mean age (range)	48 (18-81)	8 (4-10)
Days recorded Mean (range)	5,4 (2-11)	3,6(2-7)
Voids recorded Mean (range)	34,8 (6-108)	19,2 (10-43)
Mean Void V (range)	170 ml (40-413)	98 ml (21-210)
Mean Qmax	15.4 ml	15 ml

Figure 2; Results´summary layout in an adult patient .

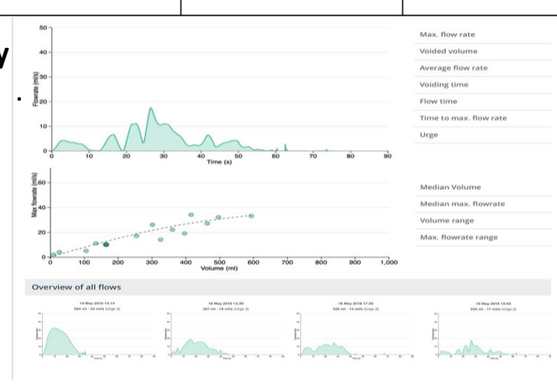
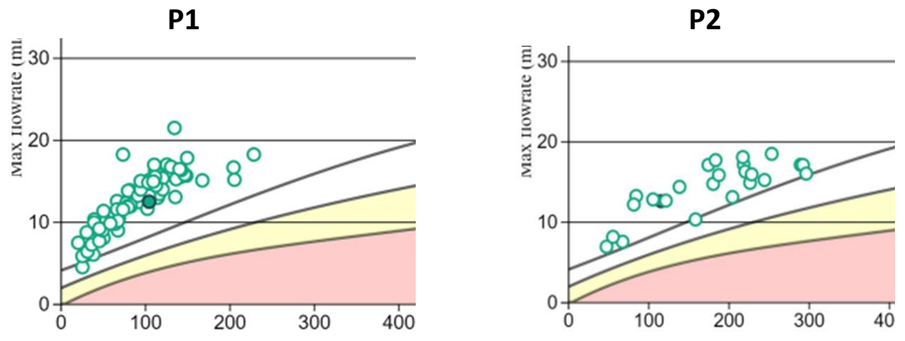


Figure 3; Scatter plot of multiple home flow tracings in 2 adult patients with frequency and nocturia. Patient 1 (P1) shows lower functional capacity and Qmax values, whereas patient 2 (P2) recorded a different pattern.



Discussion

VCAM was well accepted and viable in the majority of patients, providing very valuable information that goes beyond uroflowmetry: frequency, as well as daytime and night frequency can be assessed.

CAM by means of Home uroflowmetry provided the ability to analyze a great number of uroflowmetry readings and thus , a more accurate assessment. Additionally, the hesitation that a patient may have due to the “white-coat” influence on micturition is significantly minimized in children and in many adults (3). Patients´ ability to use the device has increased in the last months, due to technical improvements and our ability to explain the procedure. The main diagnostic contribution in children was the study of the low-capacity bladder with normal emptying and in adults the complete assessment of the emptying phase. Other conditions that can co- exist with nocturia can also be assesed (obstruction, low capacity). The system provides a non-invasive user-friendly diagnosis in many conditions. Patients with incomplete readings were older, and therefore feasibility improvement is needed. In children, most parents as well as patients preferred the system because no catheteter had to be placed

Despite pressure can´t be measured, voided volumes and time provide a good indirect measure of filling phase. Additionally, it provides an indirect measurement of patient motivation and adherence. This initial experience will enable us to offer this system to more patients whilst better defining its indications.

Conclusions

VCAM / HU is already a feasable and challenging diagnostic tool that can provide significant information in many patients. Further studies will help us define wider indications.

We have found VCAM extremely useful in some patient groups: 1)children to confirm overactive bladder and exclude dysfunctional voiding; 2) adults with voiding dysfunction (specially if there is an irregular pattern) and 3) adults with nocturia.

References

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