

Original Paper

The Prevalence of Nocturnal Enuresis among Patients with Vesicoureteral Reflux

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Received: March 8, 2020

Accepted: March 20, 2020

Online Published: May 1, 2020

doi:10.22158/rhs.v5n2p1

URL: <http://dx.doi.org/10.22158/rhs.v5n2p1>

Abstract

Background: To identify the prevalence and other associated factors of nocturnal enuresis in children with vesicoureteral reflux undergoing surgical interventions.

Methods: This is a cross-sectional study where the medical records of 40 children with confirmed vesicoureteral reflux were reviewed. Additionally, parents were asked to fill out a questionnaire inquiring about presence, onset & course of nocturnal enuresis as has been defined according to ICD-10.

Results: Among the 40 children, 22 children (55%) had nocturnal enuresis before any surgical intervention. However; gender, family history of bedwetting, renal hydronephrosis on ultrasound,

positive urine culture, and pre-op creatinine level were found to have statistically insignificant association with nocturnal enuresis. After surgical management only 13 (32.5%) children experienced nocturnal enuresis.

Conclusion: This study can conclude that there is a weak correlation between NE and VUR in patients undergoing surgical intervention. Also, the surgical management of VUR did not significantly affect the prevalence of NE. However, it is an essential problem for both families and children in Jordan for which specific guidelines should be developed.

Keywords

Nocturnal Enuresis, Vesicoureteral Reflux, Epidemiology, Jordan

1. Introduction

According to the International Statistical Classification of Diseases and Related Health Problems tenth edition (ICD-10), Nocturnal enuresis (NE) is defined as intermittent episodes of urinary incontinence during sleep in children five years of age (<https://www.icd10data.com/ICD10CM/Codes/N00-N99/N30-N39/N39-/N39.44>). It has been suggested that most nocturnal enuresis is a developmental delay rather than an emotional problem or physical illness. Only a small percentage (5-10%) of NE cases are caused by specific medical situations (Johnson, 1998).

NE may accompany urological abnormalities (Kawauchi, Kitamori, Imada, Tanaka, & Watanabe, 1996), and urinary incontinence can be caused by anatomic or neurologic abnormalities, including VUR, ectopic ureter, bladder exstrophy, myelomeningocele, congenital urethral stricture, anterior urethral valve, and posterior urethral valve (Chen, Mao, Homayoon, & Steinhardt, 2004; Sugimoto, Kakehi, Yamashita, Matsuki, Inui, & Taketa, 2005; Wu, Dei Yang, & Tsai, 2007; Kihara, Nakai, Mori, Sato, Kitahara, & Yasuda, 2008).

We aimed to assess the prevalence of NE among children with VUR & those who underwent surgical intervention for VUR, as NE is considered a crucial day-to-day lifestyle problem that faces both families & children themselves.

2. Materials and Methods

The medical records of 95 children with VUR, aged between 3 and 15 years, were retrospectively reviewed. All children presented to the pediatric surgery clinic at Jordan University Hospital (a tertiary teaching hospital in Amman, Jordan) between March 2013 and June 2018 were included in this study.

The patients were divided into 3 groups according to the type of surgery they had. The first group underwent endoscopic correction of reflux using Vantris injection, the second group underwent ureteral re-implantation and the third group had both procedures.

Data collection was completed by conducting a parental phone interview to answer a pre-designed questionnaire assessing the frequency of NE in children with VUR. The questionnaire encompassed a

range of questions related to the child's pattern of enuresis, family history of bedwetting, family stressors, fluid intake, and sociodemographic data.

Age, gender, and type of surgery were collected for all patients. The outcome of interest was the prevalence of NE among patients with VUR and whether the type of surgery affects the prevalence of NE after surgery.

Enuresis has been defined according to the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10):

- A child's chronological and mental age is at least five years.
- Involuntary bedwetting occurs at least twice a month in children aged under seven years, and at least once a month in children aged seven years or more.
- Duration of the enuresis is at least three months.
- The enuresis is not a consequence of an epileptic attack, not a direct consequence of structural abnormalities, and there is no evidence of any psychiatric disorder.

Data were analyzed using Microsoft Excel and SPSS 25.0 (SPSS Inc., Chicago, IL). Discrete variables are reported as percentages. Continuous variables are reported as a mean and standard deviation.

Prevalence of NE regarding age, gender, family history of bedwetting, circumcision, renal hydronephrosis, and VUR was evaluated using an independent t-test or chi-square test as appropriate. The strength of the association between categorical data was estimated by using a 95% confidence interval. A two tailed P value of $< .05$ was considered statistically significant.

The Hospital Ethics Committee approved the study, and consent was obtained from all participating parents.

3. Results

The medical records of 95 patients with confirmed VUR were reviewed. However, only 40 children meet our inclusion criteria, 20(50%) patient of whom were males. The mean age and standard deviation (SD) was 7.6 ± 3.1 years.

Of the 40 patients included in the final analysis, the prevalence of NE, as defined by the ICD-10 criteria, was 55% (22 patients). All 40 patient underwent surgical interventions to correct VUR. The interventions were split between endoscopic suburetric Vantris injection or ureteral re-implantation.

After surgical management, and regardless of the type of surgery, the prevalence of NE was 32.5%.

Only 9(41%) out of the 22 children with NE and VUR and who underwent surgical correction showed improvement; 8 children had complete resolution of NE while the remaining patient showed partial improvement in symptom. There was no statistical significance in NE before and after surgery ($p=0.295$).

Additionally, gender, family history of bedwetting, renal hydronephrosis on ultrasound, positive urine culture, or pre-op creatine level were not found to be correlated with the development of NE.

4. Discussion

NE is the bed wetting's most frequent cause, and it distinguished by the absence of other etiologies; as described by ICD-10 (Becker, 2013). NE is caused by various causes that are mostly functional, and it has many pathophysiology mechanisms like genetics, maturational delay, sleep habit, bladder capacity, and antidiuretic hormone (Kanitkar & Dua, 2003).

In the literature, multiple studies showed that there is no correlation between NE and birth order, number of children in the family or gender (Dolgun, Savaser, Balci, & Yazici, 2012). In contrast, other studies have shown that gender and child's age have roles in the pathogenesis of NE as boys are three times more commonly affected than girls. At five years of age, 15-25% of children experience bedwetting; nevertheless, with each year the number decrease by 15% (Kanitkar & Dua, 2003).

Naseri et al. (2012) found that VUR was strongly related to NE and interestingly it was more common in female patients; additionally, the authors showed that children with VUR and NE have a strong family history of enuresis. Additionally, Tanaka et al. (2003) showed that half of patients who underwent surgical intervention for VUR and had nocturnal enuresis, they had an improvement in their enuresis postoperatively.

According to our data analysis, we found that the age and gender of the child do not correlate with NE. Different risk factors of NE were established; one of them is sleeping disorders and patterns which were investigated thoroughly (Kanitkar & Dua, 2003). Enuresis can occur at any stage of sleep, and an abnormally deep sleep pattern may be found in children with NE (Ramakrishnan, 2008).

The literature also emphasizes on fluid intake and the timing of intake as a significant role, because having the right amount of fluid intake at daytime and restriction of fluid intake at night-time before going to sleep is vital for NE management (Fleisher, Evers, Wiener-Kronish, & Ulatowski, 2013).

However, our study has several limitations that should be noted. Firstly, the study design and the small sample size preclude drawing conclusions of these data. Second, we did not come across medical therapy of NE nor white blood cells in the urine as a surrogate marker for infection. Missing data was also a significant limitation in this study.

So, further studies are needed to elaborate on the association between VUR and NE, as well as the impact of surgery on NE outcomes.

5. Conclusion

In conclusion, we did not found any correlation between NE and VUR. As the surgical management of VUR did not significantly decrease the prevalence of NE. NE was also not significantly correlated with gender, family history, and other possible risk factors.

However, as NE is an essential problem for both families and children, and the frequent observational concurrence between NE and VUR, further similar studies with a more extensive study sample is recommended to prove the real correlation between NE and VUR.

Ethical Approval

The study was approved by the Institutional Ethics Committee.

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