#25673 the Characteristics of Urinary Tract Infection in Children With Neurogenic Bladder with or without Vesicoureteral Reflux

Huang Shaogang[1], Xu Rui[1], Gao Kexin[1], Li Shoulin[1]

[1]Department of Urology, Shenzhen Children's Hospital, Shenzhen, China

Introduction

- Neurogenic bladder (NB) is a bladder dysfunction caused by neuropathy or damage
- Vesicoureteral reflux (VUR) is the most common complication of NB
- Urinary tract infections (UTI) are difficult to treat in these children
- This study is to investigate the clinical features, bacterial species, and treatment of UTI in children with NB with or without VUR

Methods and Materials

- Clinical data of children with NB and UTI admitted to our department from 2013 to 2023 were retrospectively collected, including UTI symptoms, urine culture and drug sensitivity, and antibiotic use records
- Inclusion criteria: ① Diagnosis of NB confirmed by history, clinical manifestations, urodynamics and imaging, ② urinary leukocytes ≥ 5/HP
- Exclusion criteria: ① incomplete medical records, ② not performed voiding cystourethrogram (VCUG)
- According to the results of VCUG, they were divided into a non-VUR and VUR group

Results

Table 1. Basic information of children

	Non-VUR group	VUR group	Toal
Number of cases	13	24	37
Number of admissions	25	48	73
Male	9	8	17
Female	4	16	20

Table 2. Results of VCUG in VUR group

		n
Grade of reflux	**III**	5
	IV	11
	V	8
Laterality of reflux	**Left**	8
	Right	4
	Bilateral	12

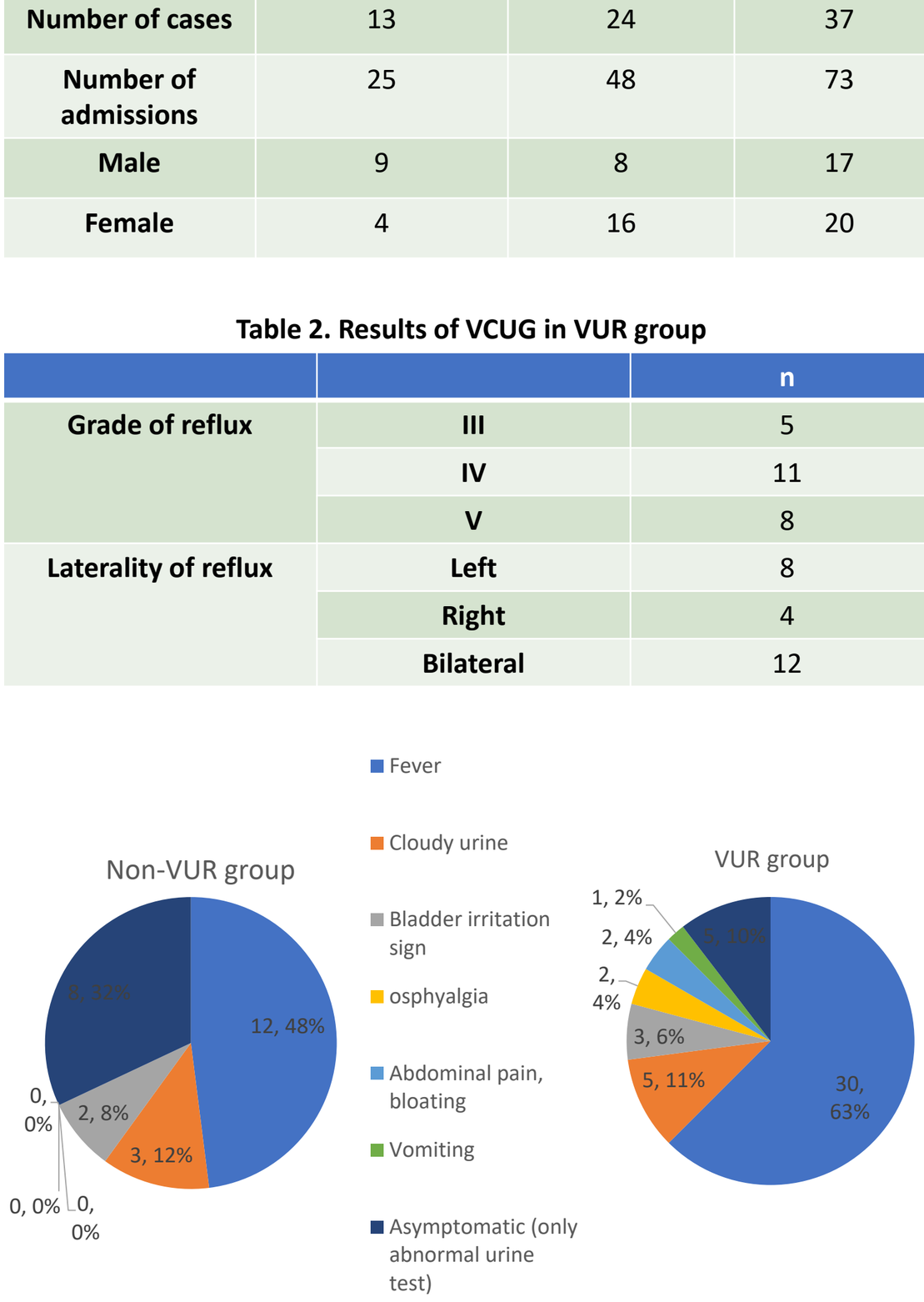

Figure 1. Clinical manifestation of UTI， VUR group had a higher frequency of symptomatic UTI (P=0.049)

Figure 2. Urine culture, the proportion of Enterococcus faecalis infection was more in non-VUR group (P=0.020)

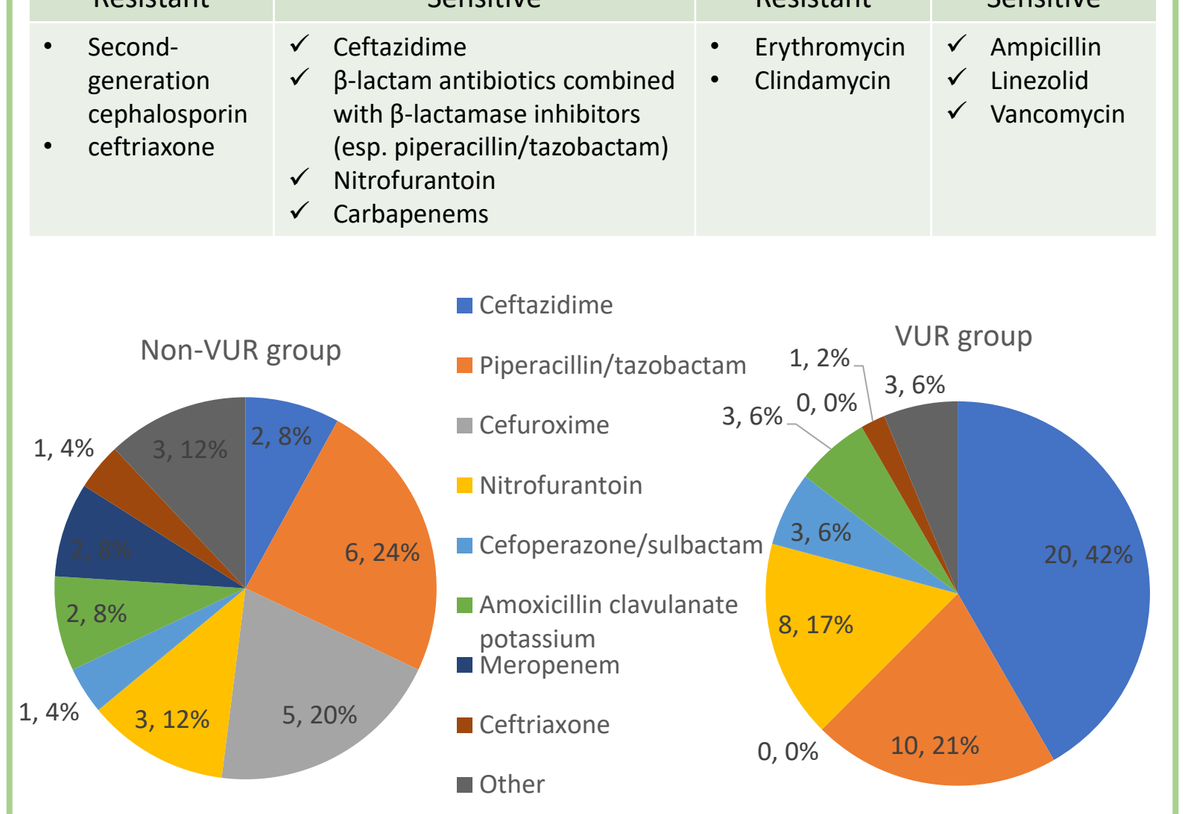

Figure 3. Proportion of drug-resistant bacteria, VUR group cultured more (P=0.047)

Table 3. Drug sensitivity of several common types of bacteria, The resistance rate of Enterococcus faecium was higher than that of Enterococcus faecalis (P=0.000)

Escherichia coli & Klebsiella pneumoniae		Enterococcus faecalis & Enterococcus faecium	
Resistant	Sensitive	Resistant	Sensitive
• Second-generation cephalosporin • ceftriaxone	✓ Ceftazidime ✓ β-lactam antibiotics combined with β-lactamase inhibitors (esp. piperacillin/tazobactam) ✓ Nitrofurantoin ✓ Carbapenems	• Erythromycin • Clindamycin	✓ Ampicillin ✓ Linezolid ✓ Vancomycin

Figure 4. Antibiotic use of cure cases, VUR group used ceftazidime more frequently (P=0.003) and cefuroxime less frequently (P=0.004)

Discussion

- VUR is a common complication of NB, and high-grade VUR can lead to recurrent UTI.
- VUR group has a higher proportion of symptomatic UTI, which may be due to the reflux of pathogens into the upper urinary tract, making it more likely to develop clinical symptoms.
- Gram-negative bacteria are the most common bacteria of UTI, among which Escherichia coli and Klebsiella pneumoniae are the most common bacteria, which is consistent with the results of many other studies.
- Enterococcus faecalis and Enterococcus faecium are common Gram-positive enterococci of UTI. In this study, the drug resistance rate of Enterococcus faecium was higher, and they all existed in the reflux group. The increased proportion of Enterococcus infection is a characteristic of complicated UTI, so antibiotic use should be noted.
- Cefuroxime was more frequently used in non-VUR group, while ceftazidime was more frequently used in VUR group, , suggesting that the combination of VUR is more prone to complex UTI and has a higher proportion of antibiotic resistance.
- There was no significant difference in the proportion of use of piperacillin-tazobactam between the two groups, because it is sensitive to most Gram-negative bacilli and it can reduce the prevalence of ESBL-producing strains.

Conclusions

- NB children with VUR are more likely to have symptomatic UTI, of which fever is the most common.
- Children with VUR are more likely to develop drug-resistant bacterial infections.
- For UTI children with NB and VUR, ceftazidime or piperacillin tazobactam can be chosen. For those without VUR, cefuroxime can be used first. If ineffective, it can be upgraded to piperacillin tazobactam.
- Urine culture and drug sensitivity results should be monitored during treatment.
- If the culture result is enterococcus, it is necessary to pay special attention to the etiological basis and use antibiotics rationally.