Free video uroflowmetry and its role in evaluating neurogenic bladder in children

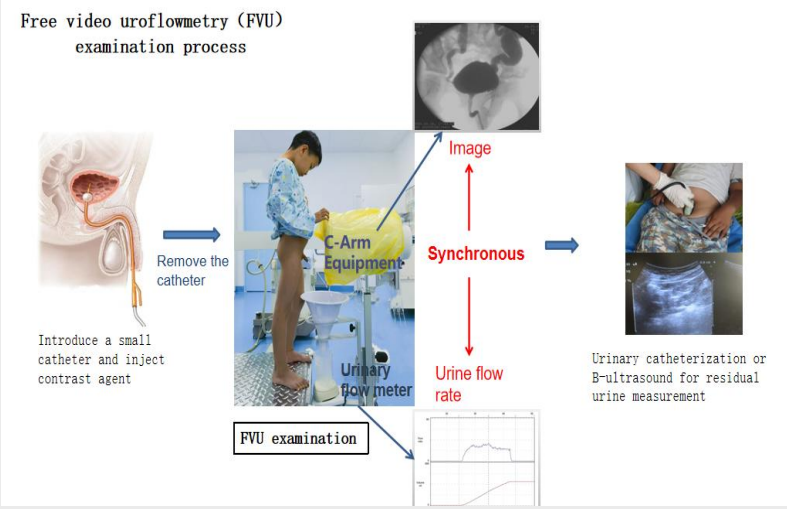
Guoxing Wu[1],Ruifa Wu[1],Honghui Li[1],Yurou Wang[1],Jianguo Wen[2]

1.Dongguan Children's Hospital

2.The First Affiliated Hospital of Zhengzhou University

Background

In order to compensate for the shortcomings of free uroflowmetry(FF) and video urodynamic examination(VUDS), we propose a novel "free video uroflowmetry(FVU)" technique: instilling contrast agent via a catheter, ,performing free uroflowmetry under C-arm fluoroscopy after removing it. This study aims to evaluate the feasibility and clinical significance of free video uroflowmetry in children with neurogenic bladder.

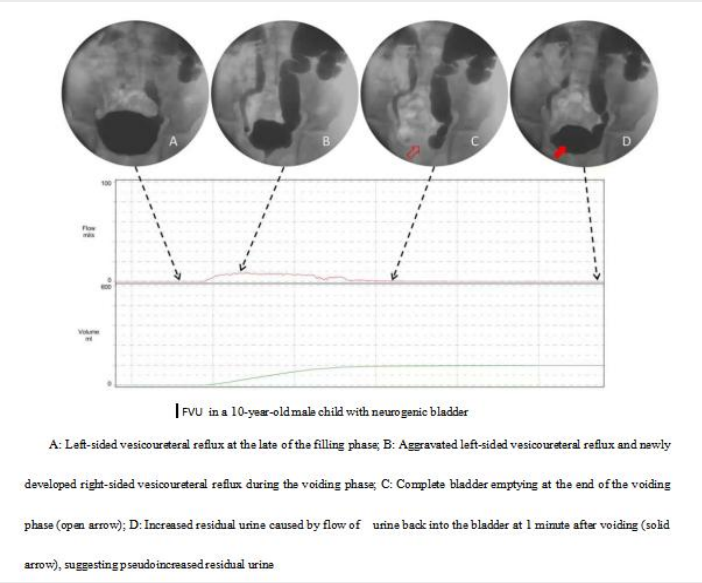


Methods

A retrospective analysis was performed on the data of free imaging uroflowmetry in hospitalized children finally diagnosed with neurogenic bladder from January 2025 to September 2025. Parameters included urinary flow metrics (maximum flow rate, average flow rate , voiding-time, voided-volume, post-void residual urine)and imaging findings (vesicoureteral reflux, detrusor-sphincter dyssynergia , pseudo-residual urine).

Results

Thirty-five children were included.Eight children were unable to urinate due to urethral pain during video urodynamic examination. Both FF and FVU showed significant differences compared to VUDS in maximum flow rate, average flow rate , voiding-time, voided-volume, post-void residual urine) ($P < 0.05$) . Imaging findings showed no significant difference between FVU (31/35) and VUDS (32/35) ($P > 0.05$) .



FVU in a 10-year-old male child with neurogenic bladder

A: Left-sided vesicoureteral reflux at the late of the filling phase; B: Aggravated left-sided vesicoureteral reflux and newly developed right-sided vesicoureteral reflux during the voiding phase; C: Complete bladder emptying at the end of the voiding phase (open arrow); D: Increased residual urine caused by flow of urine back into the bladder at 1 minute after voiding (solid arrow), suggesting pseudoincreased residual urine

Implications

FVU enables functional assessment of voiding in a near-physiological state while simultaneously visualizing anatomical abnormalities. It serves as a highly effective complementary tool to both VUDS and FF, and more importantly, an important method for evaluating neurogenic bladder function in primary hospitals or other medical institutions lacking pressure-flow study equipment.