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Dynamic ultrasound in diagnosis of bladder dysfunction in children - 25 years of experience

Lower urinary tract dysfunction (LUTD) accounts for about 40% of pediatric nephro-urology consultations and may predispose children to urinary tract infections and vesicoureteral reflux, potentially leading to renal scarring and chronic kidney disease. Symptoms such as urinary urgency and incontinence have significant emotional and quality-of-life impacts on children and their families. Dynamic ultrasound (DUS) is a non-invasive, real-time imaging technique designed to evaluate LUTD. It assesses involuntary contractions of the detrusor and pelvic floor muscles during bladder filling and observes qualitative signs of increased intravesical pressure. In addition, it identifies causes of urinary leakage, determines bladder capacity, and measures post-void residual urine, including after leakage or catheter-assisted emptying. DUS correlates strongly with urodynamic studies while avoiding catheters and ionizing radiation. The evaluation is performed during natural bladder filling, reproducing the child's normal voiding habits. DUS is indicated for LUTD related to structural urinary tract abnormalities (such as vesicoureteral reflux, posterior urethral valves, and prune belly syndrome) and neurological conditions (including spinal dysraphism, cerebral palsy, multiple sclerosis, tumors, and trauma). It also diagnoses functional disorders like voiding postponement, enuresis, bladder-bowel dysfunction, infantile and transient dysfunction, which occurs during toilet training, in the period of acquisition of sphincter control. This technique can identify hyperactive or hypoactive bladder from birth. In neurogenic LUTD, DUS detects early detrusor-sphincter dyssynergia and helps define causes of stress urinary incontinence. Overall, DUS is a powerful tool for diagnosis and follow-up of pediatric LUTD.

Keywords: bladder dysfunction, children, dynamic ultrasound, ultrasonography

Biography

Dr. Maria Francisca Tereza Freire Filgueiras is a Brazilian physician specialized in pediatric ultrasonography. She graduated in medicine from the Federal University of Minas Gerais (UFMG), in 1982, completed a fellowship in ultrasonography in Germany at Uniklinik RWTH Aachen, in 1985, earned specialist certification in 1987, and obtained an MSc in Child and Adolescent Health in 2000. From 1992 to 2018, she worked as assistant physician and residency preceptor in diagnostic imaging at UFMG's university hospital. Dedicated to pediatric ultrasonography since 1987, she developed the Dynamic Ultrasound of the Urinary Tract technique and has disseminated it through national training courses.