

THE ROLE OF LOWER URINARY TRACT DYNAMICS IN CHILDREN*

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The study of urodynamics is not just a question of measuring pressures and flows but is the total assessment of the ability of the patient to hold and pass urine. The history is of considerable importance in relation to such factors as frequency, flow, straining, dribbling, stress, urge, etc. It is often necessary for the patient to keep a chart of the frequency and volumes, and the results of these charts are often quite different from the general impression. Also a chart should be kept of fluid intake as this can very easily be under- or overestimated.

Modalities for investigation

We now have available to us the measurement of urinary flow rate, the pressure within the bladder, a recording of the electromyographic activity (EMG) in the pelvic floor and sphincters and the urethral pressure profile.

Flow

When measuring flow it is of utmost importance to know the volume, as flows tend to be inaccurate below a voiding volume of 150 - 200 ml. Flow readings alone can be useful to check the results of previous treatments and to monitor the progression of diseases such as strictures and bladder neck obstruction. Flows are also useful as a screening procedure but not particularly valuable as a single diagnostic test. In its interpretation one needs to know not only the volume voided but also the residual volume afterwards. The reason why a flow estimation alone is of limited value is that the pressure within the bladder is also needed to have a total urodynamic assessment.

The shape of the flow curve should make it possible to distinguish between a normal flow and a flow associated with either a stricture, dyssynergia or detrusor atony.

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If the flow curve is normal and there is no residual urine then one can conclude that there is no significant voiding abnormality. If the flow curve is abnormal and there is an increased residual urine then a full urodynamic investigation is necessary. It is important to appreciate that instability is often associated with a normal flow curve.

Cystometrogram

During the filling phase of a cystometrogram instability can easily be assessed, and this will distinguish between incontinence from urge (instability) and stress incontinence. The cystometrogram also allows an estimation of the capacity of the bladder and the volume at the first sensation of fullness. However, it will not be capable of diagnosing dyssynergia. The filling can be as fast as 100 ml per minute, but it may be necessary to ask the patient to stand, cough or jump if all instability is to be diagnosed. At the end of the filling phase the patient is allowed to void; the normal voiding pressure in the female is less 30 cm of water and in the male less 50 cm of water.

Cystometrogram with voiding pressure flows and video

This addition of video recording of the X-ray appearances during voiding adds anatomical detail and is ideal for the postoperative study of cystoplasty or before undiversion.

A combined study with EMG

EMG is essential to look at the sphincter activity. It is necessary for the diagnosis of dyssynergia and is particularly helpful in both the neuropathic and the occult neuropathic bladders. If used in the first few months of life it is possible to make an accurate prognosis in children with neuropathic bladders as to the likelihood of deterioration in renal function or urographic appearances.

Urethral pressure profiles

These allow the estimation of the functional length of the urethra, the maximal urethral pressure and the maximum urethral closing pressure. The closing pressure is the maximal pressure minus the bladder pressure. These studies are particularly useful preoperatively when used in association with nerve stimulation and also in cases of postprostatectomy incontinence.