

Initially, a urinalysis is likely to be performed: testing the urine for the presence of blood (haematuria), protein (proteinuria), glucose (glucosuria) concentration (specific gravity) and acidity/alkalinity(pH).

This will detect or exclude conditions such as diabetes, kidney disease (nephrosis) and infection.

A mid-stream urine sample (MSU) is usually collected and tested for presence of bacteria: a process which involves microscopy and then culturing of bacteria to determine their identity in order to best treat with appropriate antibiotics.

For problems with continence, generally specific tests need to be carried out. These are called **urodynamics** and are aimed at establishing the type of continence problems that are occurring.

These tests usually comprise:

- **Uroflow:** to test for possible bladder outlet obstruction: symptoms such as frequency, nocturia, poor flow. Basically it involves assessing the flow rate over time. Low flow may also be due to poorly functioning bladder muscle. Various techniques are used, most commonly Dantec's rotating disk mictrometer, where the urine is directed onto a spinning disc.
- **Pressure flow:** the definitive method of diagnosing bladder outlet obstruction. The micturition reflex initiates a contraction of the detrusor (bladder muscle) and relaxing of the urethra, which is highly distensible which enables a large flow for little rise in pressure in the normal case. The obstructed urethra requires very high pressure to initiate flow. This high detrusor pressure may have repercussions for the upper urinary tract (kidneys).
- **Cystometry:** carried out to categorise the bladder function, in particular, the stability of the detrusor, which is normally stable under all conditions of filling or stress. The compliance and capacity of the bladder and patient's sensation and urge to void are also assessed. 2 pressure channels are typically measured: rectal pressure and bladder (intravesical). The rectal pressure responds to any changes in abdominal pressure due to straining or stress, which can

be subtracted from the measured bladder pressure to give the true intravesical pressure. An unstable bladder will cause detrusor contractions at low capacity, and these may be of sufficient strength to exceed the maximum urethral pressure, which leads to incontinence. The unstable bladder is due to triggering of the micturition reflex. Unstable bladders also risk urine reflux (which may be tested by x-ray contrast cystometry). A low compliance bladder shows a drop in pressure once filling is stopped, which is termed accommodation. A *hyperreflexive detrusor*

is one which is unstable in the presence of confirmed neuropathy.

- **Urethral pressure profile:** continence is maintained by the muscular action of the external sphincter. 2 methods are available to measure the patency of the musculature and/or innervation: catheter tip transducers or water-filled catheters. Transducers are more sensitive, but the water-filled catheters have already been positioned for the cystometry, therefore no extra catheterisation is necessary. The effective pressure maintaining continence is not the urethral pressure, but the 'closure pressure' (urethral- intravesical pressure)

Urethral stress tests

demonstrate that a cough will cause a spike of bladder pressure which is transmitted to the urethra. If the urethra is damaged by childbirth/obesity/surgery, the urethral pressure is less than the bladder pressure, the closure pressure becomes negative and leakage (stress incontinence) occurs. Stress incontinence can also be diagnosed if leakage occurs during cystometry

- **Ambulatory urodynamics:** only recently available. Small catheter tips and a portable recording system are used. May be use if static urodynamics fail to demonstrate clinically-indicated unstable bladder or stress incontinence.

G

enuine Stress incontinence

(GSI) is the involuntary leakage of urine in the absence of unstable bladder, but it can be mimicked by an unstable bladder and a cough(therefore incorrect diagnosis of stress incontinence is applied when unstable bladder is the problem). Using ambulatory techniques, everyday stressed can be recreated and GSI demonstrated.

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Ultrasound scans of the kidneys and/or bladder may be performed: to detect/exclude stones or anatomical abnormalities.

Abdominal X-ray (KUB): plain X-ray which can detect kidney/bladder stones.

Renal scan: renogram: renal perfusion scintigram: a small amount of radioactive dye is injected into the arm vein; a short time later, the kidneys are scanned. Several images, each lasting 1-2 seconds (total scan time about 20 minutes) are taken.

Analysis of the images allows detailed information about kidney function and anatomy.