
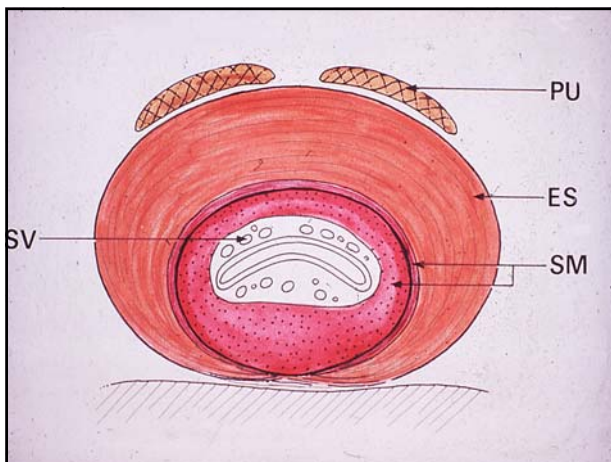
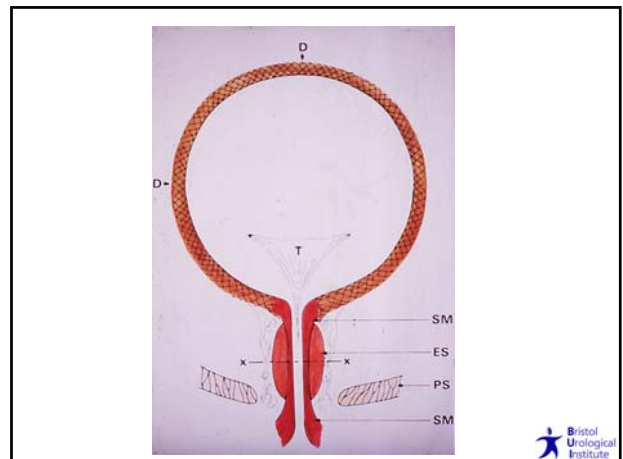


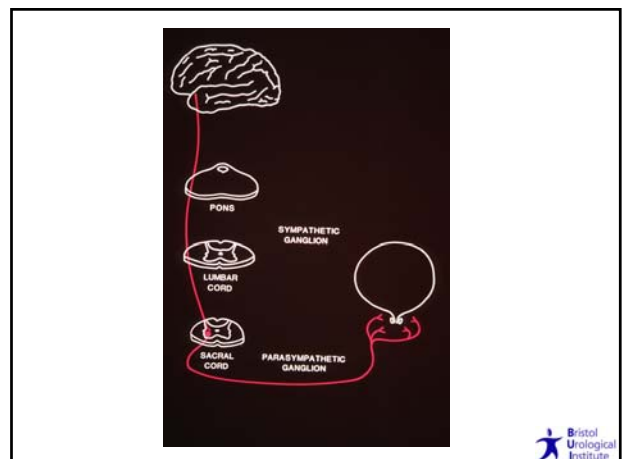
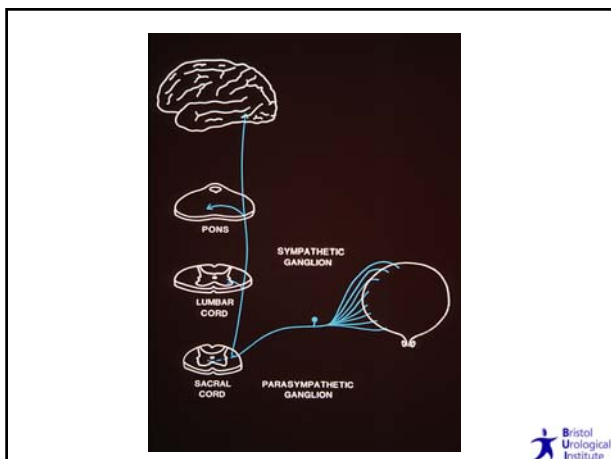
# Urodynamics

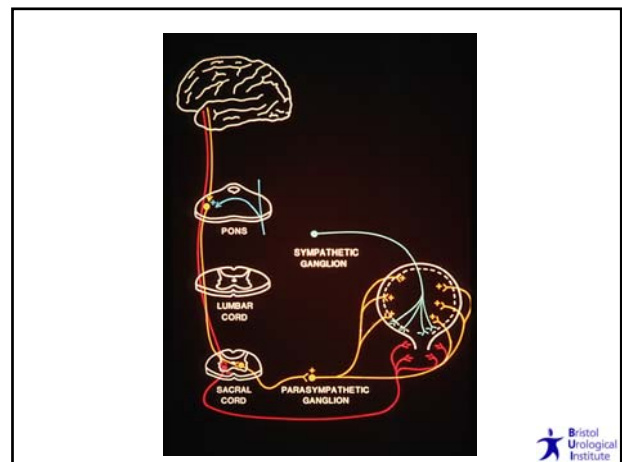
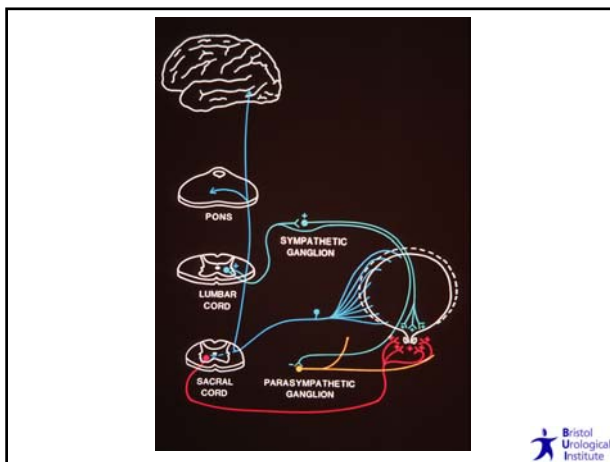
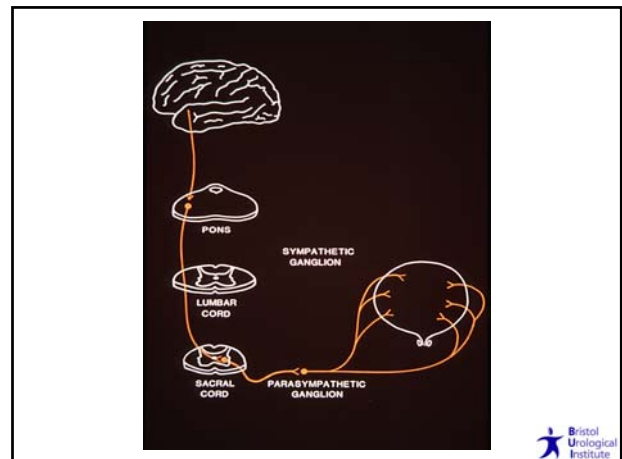
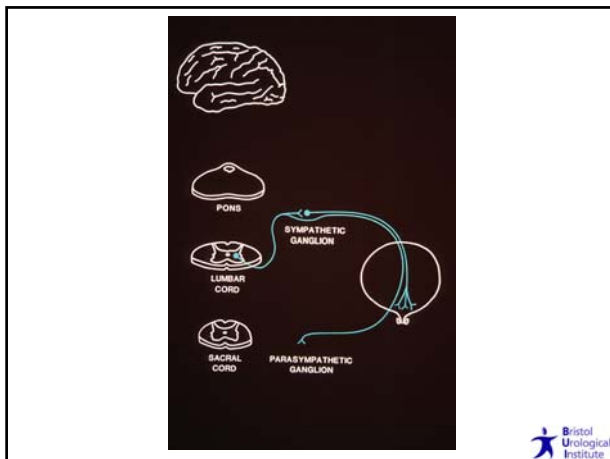
Paul Abrams  
 Professor of Urology  
 Bristol Urological Institute

## Urethral Anatomy

FEMALE	MALE
3-4 cm	15.20cm
Straight	“S” shaped
Wide	Narrow
Sphincter “horseshoe”	Sphincter “circular”
Laminar flow	Turbulent flow
Voiding “low pressure”	Voiding “high pressure”





CONTINENCE depends on:

1. Detrusor relaxation
2. Continuous urethral closure despite intravesical pressure changes

### Detrusor Relaxation

1. Muscle relaxation at the end of voiding
2. Visco – elastic properties of detrusor muscle
3. Inhibitory effect of sympathetic nerves on parasympathetic ganglion
4. Normal bladder wall composition

## Urethral Closure

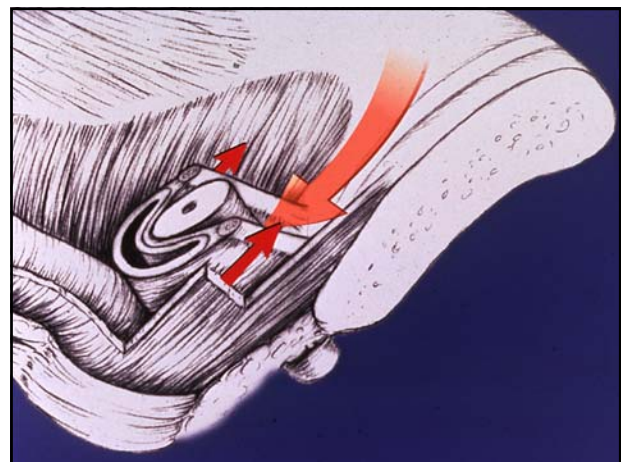
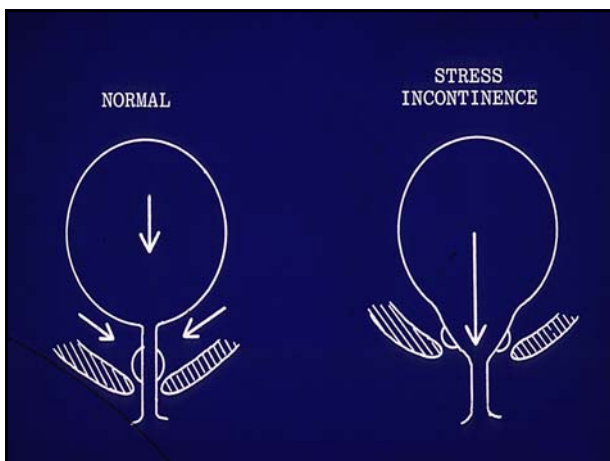
Maintained by:

1. Bladder neck (proximal sphincter)
2. Intra-urethral striated muscle sphincter
3. Voluntary pelvic floor contraction



## Urethral Closure during Filling

1. Bladder neck closure
  - elastic tissue
2. Mucosal surface tension
3. Submucosal vascular plexus
4. Relaxation of inner longitudinal smooth muscle
5. Contraction in the intra-urethral striated muscle
6. Periurethral support
  - Striated muscles of the pelvic floor
  - Collagen of the endo-pelvic fascia
7. Transmission of abdominal pressure



## Factors responsible for efficient voiding

1. Urethral relaxation
2. Adequate expulsive forces
3. Normal urethral geometry



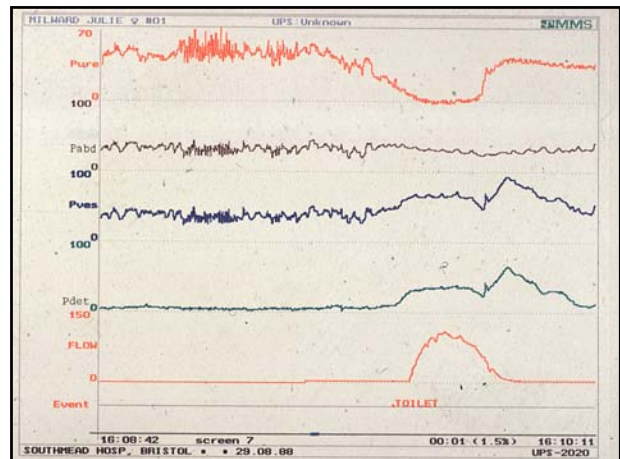
## Urethral Relaxation During Voiding

1. Pelvic floor relaxation
2. Relaxation of urethral rhabdosphincter (intraurethral striated muscle)
3. Urethral shortening (contraction of inner longitudinal muscle)
4. Funnelling of the bladder neck



### Expulsive Forces During Voiding

1. Sustained detrusor contraction
2. Straining during micturition
  - abdominal wall muscles
  - diaphragmatic muscle



### Patient Assessment

1. History
2. Physical examination
3. Urine examination
4. Radiology
5. Endoscopy
6. Urodynamic testing



### Patient Assessment

1. History
2. Physical examination
3. Urine examination
4. Radiology
5. Endoscopy
6. Urodynamic testing



### History

1. Frequency
2. Nocturia
3. Stream
4. Hesitancy
5. Urgency
6. Incontinence



Naam		John Smith		Datum afspraak		19/1/96		
Dag	Tijd/Volume (mL/s)	Overdag				's Nachts		Aantal gebruikte pats gedurende 24 uur
1	08.30 09.10 10.10 11.10 12.10 13.10 14.10 15.00 17.10 18.10 19.10 21.10	100	150	200	150	100	150	3
2	08.00 09.00 10.00 11.00 12.00 13.00 14.00 15.00 16.00 17.00 18.00 19.00 21.00	150	100	100	100	100	100	2
3	08.00 09.00 10.00 11.00 12.00 13.00 14.00 15.00 16.00 17.00 18.00 19.00 21.00	100	100	100	100	100	100	4
4	08.00 09.00 10.00 11.00 12.00 13.00 14.00 15.00 16.00 17.00 18.00 19.00 21.00	100	100	100	100	100	100	2
5	08.00 09.00 10.00 11.00 12.00 13.00 14.00 15.00 16.00 17.00 18.00 19.00 21.00	100	100	100	100	100	100	3
6	08.00 09.00 10.00 11.00 12.00 13.00 14.00 15.00 16.00 17.00 18.00 19.00 21.00	100	100	100	100	100	100	4
7	08.00 09.00 10.00 11.00 12.00 13.00 14.00 15.00 16.00 17.00 18.00 19.00 21.00	100	100	100	100	100	100	4

Gemiddelde dagelijkse vloeistof inname (in kopjes) 5

Name: M. Denny SENEY Date of appointment: \_\_\_\_\_

DAY	time / volume (mls.)	DAY-TIME	NIGHT
1			
2			
3	 8:30 10:30 11:30 2:45 3:10 4:45 6:15 7:45 10:00 11:00		
4	 0:15 7:10 9:00 10:00		
5			

## Assessing Lower Urinary Tract Dysfunction

- symptoms
- impact on quality of life
- physical examination
- baseline tests
  - urine analysis
  - imaging?
  - endoscopy?
- urodynamics



## Patient Assessment

1. History
2. Physical examination
3. Urine examination
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## Urine Examination

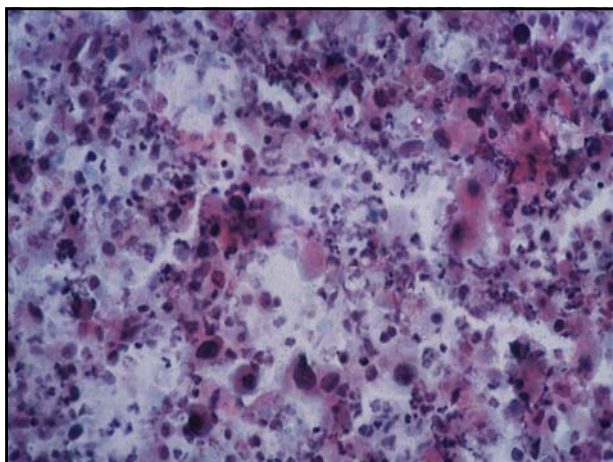
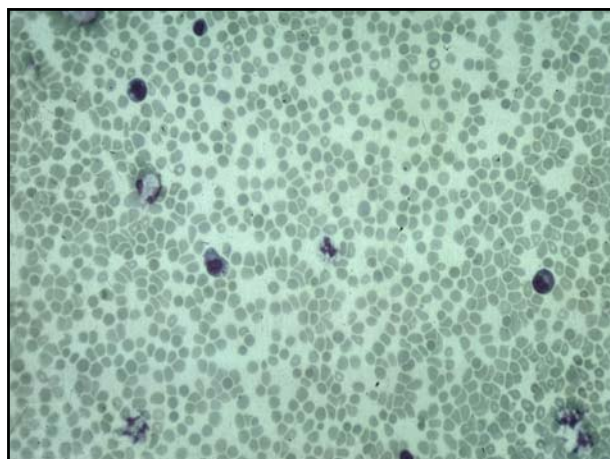
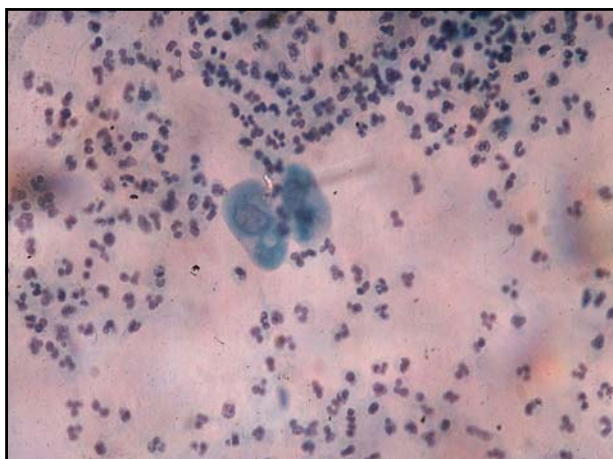
- Look at the urine
- Dipstick
  - Leucocytes
  - Nitrites
  - Blood
- Urine microscopy



## M.S.U.

1. White cells
2. Red cells
3. Neoplastic cells





### Patient Assessment

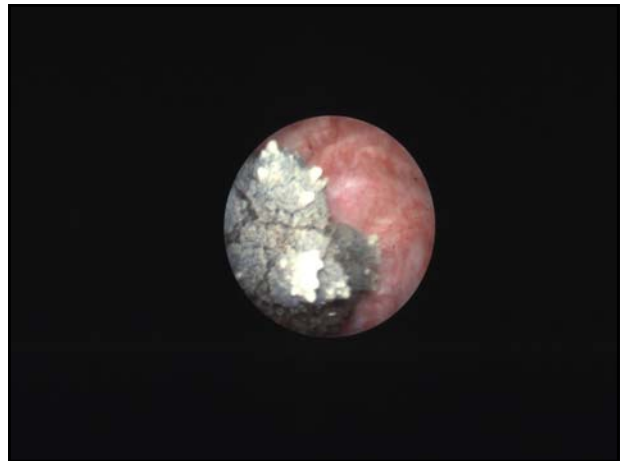
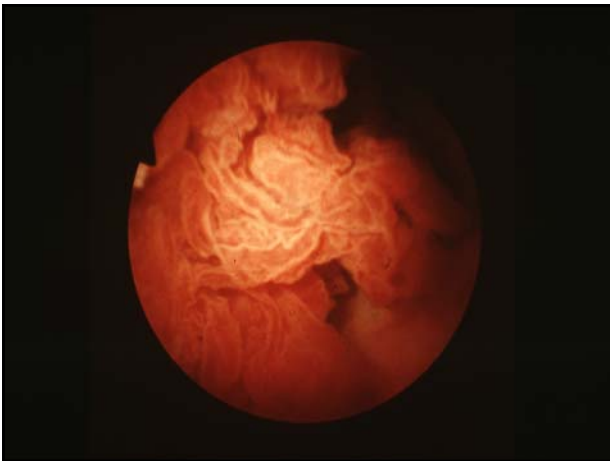
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### Patient Assessment


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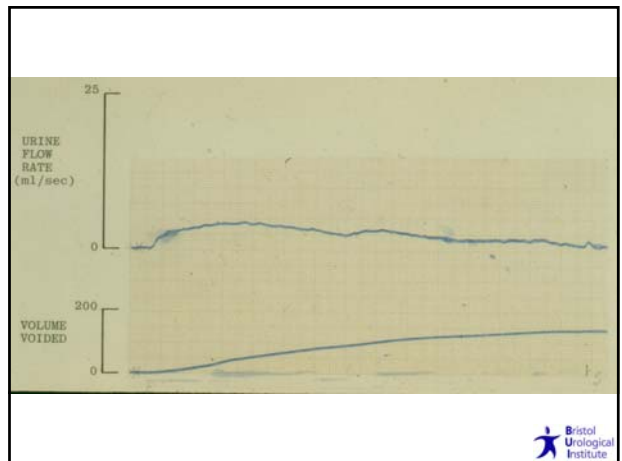
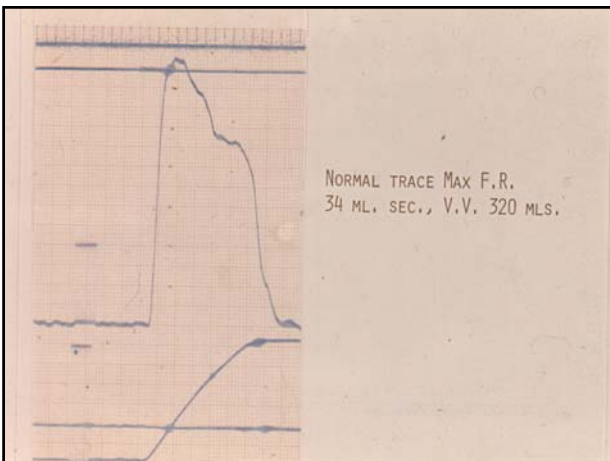
### Urodynamic Studies

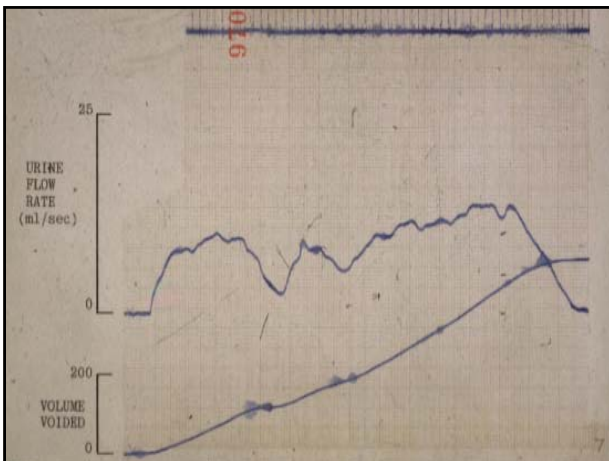
1. Simple
  - a) uroflowmetry
  - b) ultrasound assessment of residual urine
2. Basic
  - a) filling cystometry
  - b) voiding cystometry
3. Complex
  - a) video urodynamics
  - b) urethral function studies
4. Advanced
  - a) ambulatory urodynamics
  - b) neurophysiological testing



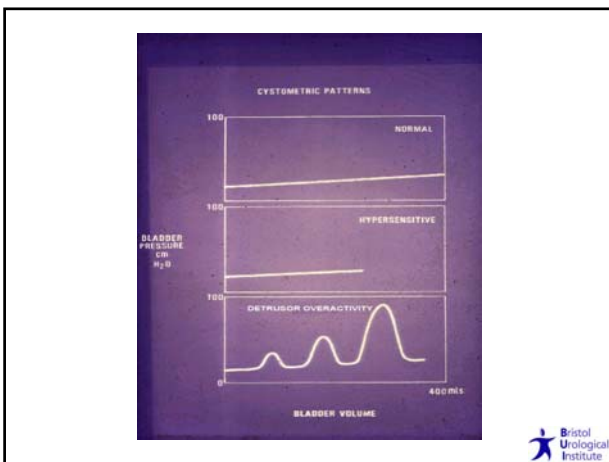
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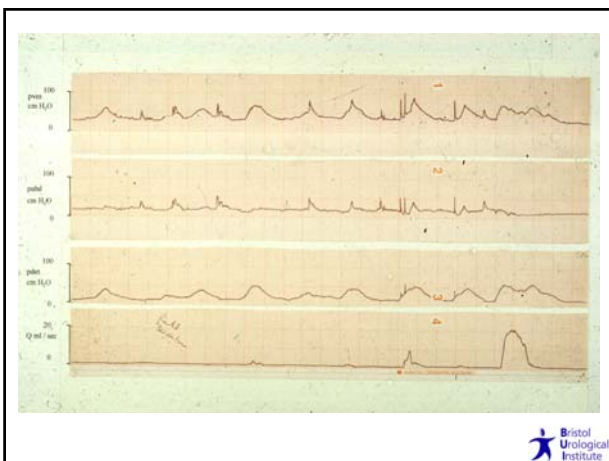





- ### Urodynamic Studies
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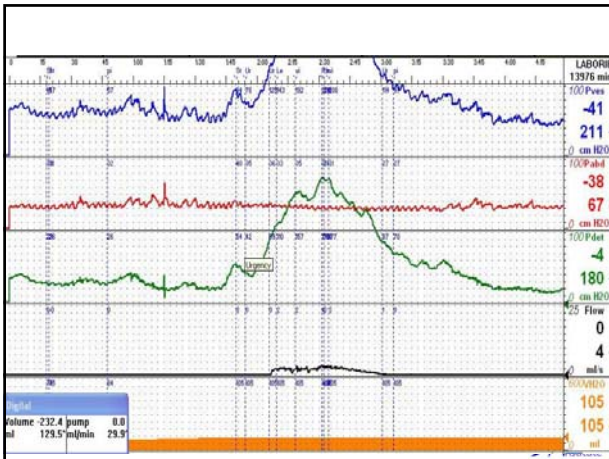
- ### Investigation of LUTD: Storage Phase
- Bladder function
    - filling cystometry
  - Urethral function
    - urethral pressure profilometry
    - leak point pressures



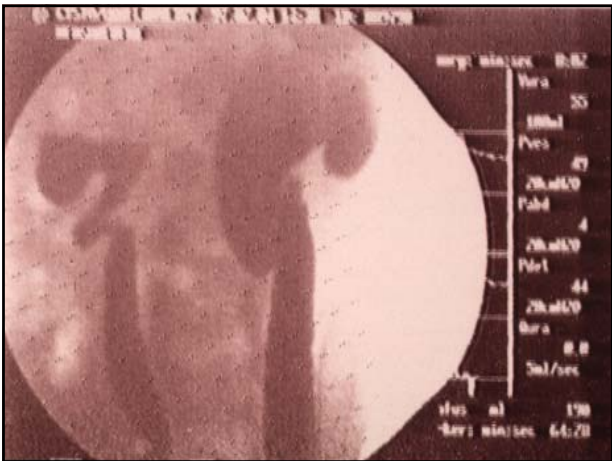
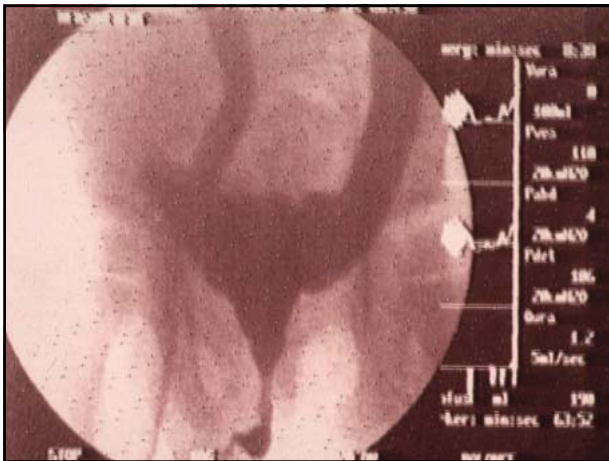
- ### Investigation of LUTD: Voiding Phase
- Bladder/urethral function
    - urine flow studies
    - pressure-flow studies
  - Urethral function
    - sphincter/pelvic floor EMG







- ### Urodynamic Studies
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    - b) ultrasound assessment of residual urine
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- ### Urethral Function Studies
- Urethral pressure profilometry (static)
  - Measurement of leak point pressure
  - Voiding urethral pressure profilometry



- ### Urodynamic Studies
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## Neurophysiological Testing

1. Electromyography
2. Nerve conduction studies
3. Reflex latencies
4. Evoked responses



## The Four Diagnoses of Urodynamics

1. Bladder during filling
2. Urethra during filling
3. Bladder during voiding
4. Urethra during voiding



## The Four Diagnoses of Urodynamics

- Define normal function
  1. Detrusor relaxed during filling
  2. Urethra competent (closed) during filling
  3. Detrusor contracts during voiding
  4. Urethra relaxes during voiding



## The Four Diagnoses of Urodynamics

- Define normal function
- Anything else is abnormal
  1. Overactive detrusor during filling
  2. Incompetent urethra during filling
  3. Underactive detrusor during voiding
  4. Obstructed urethra during voiding

