SNS COLLEGE OF ALLIED HEALTH SCIENCES

SNS Kalvi Nagar, Coimbatore - 35

Affiliated to Dr MGR Medical University, Chennai

DEPARTMENT : PHYSICIAN ASSISTANT

COURSE NAME : NEPHROLOGY

UNIT : GENITO URINARY SYSTEM

TOPIC : MICTURITION

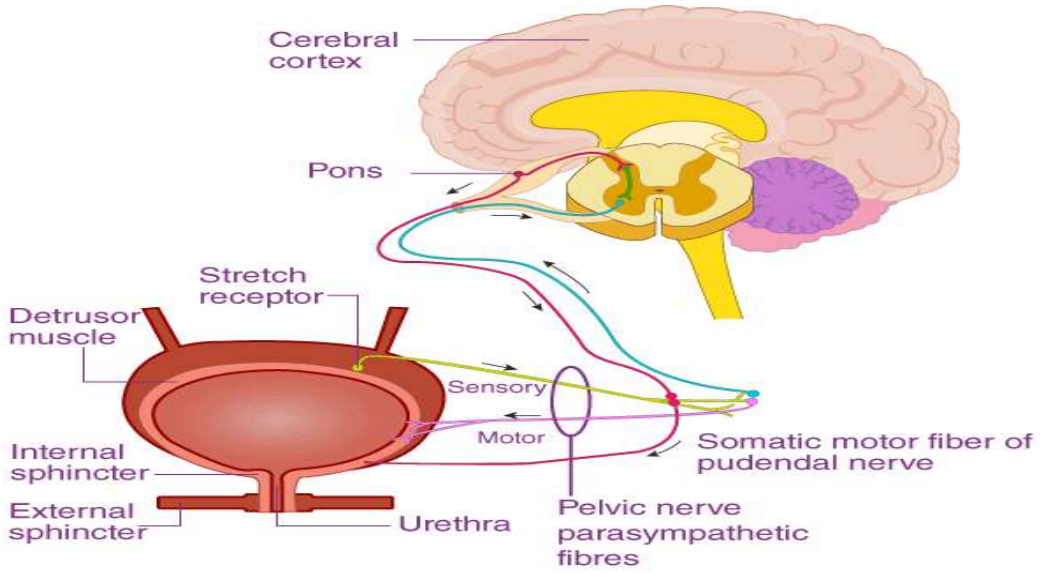
MICTURITION

- Micturition, commonly known as urination or voiding, is the physiological process of emptying the bladder of urine.

- Micturition is a vital physiological process that helps maintain fluid and electrolyte balance in the body by removing waste products, excess water, and ions from the bloodstream.

- Micturition is the process of urine excretion from the urinary bladder.

- As the bladder becomes full, the stretch receptors increase their firing rate. This increase the urge to urinate and causes micturition reflex. It sometimes even causes involuntary urination. Micturition is also termed as the voiding phase to expel the stored urine.


Cerebral cortex
Pons
Stretch receptor
Detrusor muscle
Sensory
Motor
Somatic motor fiber of pudendal nerve
Internal sphincter
External sphincter
Urethra
Pelvic nerve parasympathetic fibres

MICTURITION PROCESS

Micturition process consists of two phases:

- Storage phase
- Voiding phase

STORAGE PHASE

- **Bladder Filling:** During the storage phase, the bladder fills with urine produced by the kidneys via the ureters.

- The detrusor muscle of the bladder relaxes, allowing it to expand and accommodate increasing urine volume.

- **Sphincter Control:** The internal urethral sphincter, composed of smooth muscle, remains contracted to prevent urine leakage from the bladder into the urethra.

MICTURITION REFLEX

- **Initiation of Micturition:** When the bladder reaches its capacity (approximately 300-400 milliliters in adults), stretch receptors in the bladder wall send sensory signals to the central nervous system, triggering the micturition reflex.

- **Parasympathetic Activation:** Sensory signals from the bladder stimulate parasympathetic neurons in the sacral spinal cord (S2-S4), leading to the activation of the detrusor muscle and simultaneous relaxation of the internal urethral sphincter.

- **Conscious Control:** Simultaneously, signals are sent to the brain, particularly the pontine micturition center in the brainstem, which coordinates the conscious decision to initiate or inhibit micturition based on social, environmental, or psychological factors.

VOIDING PHASE

- **Detrusor Contraction:** Activation of the detrusor muscle causes it to contract, generating intravesical pressure and expelling urine from the bladder.

- **Sphincter Relaxation:** Concurrently, the relaxation of the internal urethral sphincter allows urine to flow into the urethra.

- **Voluntary Control:** During voluntary micturition, the external urethral sphincter, composed of skeletal muscle, is under conscious control.

- Relaxation of the external urethral sphincter permits urine to be expelled from the body.

CONTINENCE MECHANISMS

- **Urinary Sphincters:** The internal and external urethral sphincters maintaining urinary continence by preventing involuntary urine leakage between micturition events.

- **Pelvic Floor Muscles:** Supporting structures such as the pelvic floor muscles, including the pubococcygeus and levator ani muscles, help maintain bladder control and support the organs of the pelvic region.

MICTURITION DISORDERS

- **Detrusor Instability -** This is a condition where the detrusor muscle contracts without any apparent reason.

- This muscle is responsible for contracting the bladder and help with the micturition process. As a result, detrusor instability results in urinary incontinence.

- **Urinary Incontinence:** Characterized by involuntary urine leakage, urinary incontinence can result from various factors such as weakened pelvic floor muscles, neurogenic bladder dysfunction, or obstructive uropathy.

- **Spinal Cord Trauma** – Injuries to the spinal cord, specifically the tenth thoracic vertebra (T10) can cause the bladder to be overactive or cause urinary incontinence.

- **Urinary Retention** – This condition is characterized by the inability to empty the bladder completely. The onset may be gradual or sudden.

- The causes can range from a blockage in the urethra, nerve problems and weak bladder muscles.

MANAGEMENT OF MICTURITION DISORDERS

- The nerve pathway to the urinary tract should be intact.
- The bladder capacity should be normal.
- Normal muscle tone should be observed in the sphincters, detrusors, and pelvic floor muscles.

- There should be no obstruction to the urine flow in any region of the urinary tract.

- The environmental and psychological factors that inhibit micturition should be absent.

- The coordinated activity of sympathetic, parasympathetic, and somatic nerves help in normal micturition.

ASSESSMENT

- What is Micturition ?
- What all are the Disorders in Micturition ?