

UNIT-3 MICTURITION AND MICTURITION REFLEX

Micturition is a process by which urine is voided from the urinary bladder. It is a reflex process. However, in grown up children and adults, it can be controlled voluntarily to some extent.

Urinary bladder and the internal sphincter are supplied by sympathetic and parasympathetic divisions of autonomic nervous system where as, the external sphincter is supplied by the somatic nerve fibers.

Functions of nerves supplying urinary bladder and sphincters

Nerve	On detrusor muscle	On internal sphincter	On external sphincter	Function
Sympathetic nerve	Relaxation	Constriction	Not supplied	Filling of urinary bladder
Parasympathetic nerve	Contraction	Relaxation	Not supplied	Emptying of urinary bladder
Somatic nerve	Not supplied	Not supplied	Constriction	Voluntary control of micturition

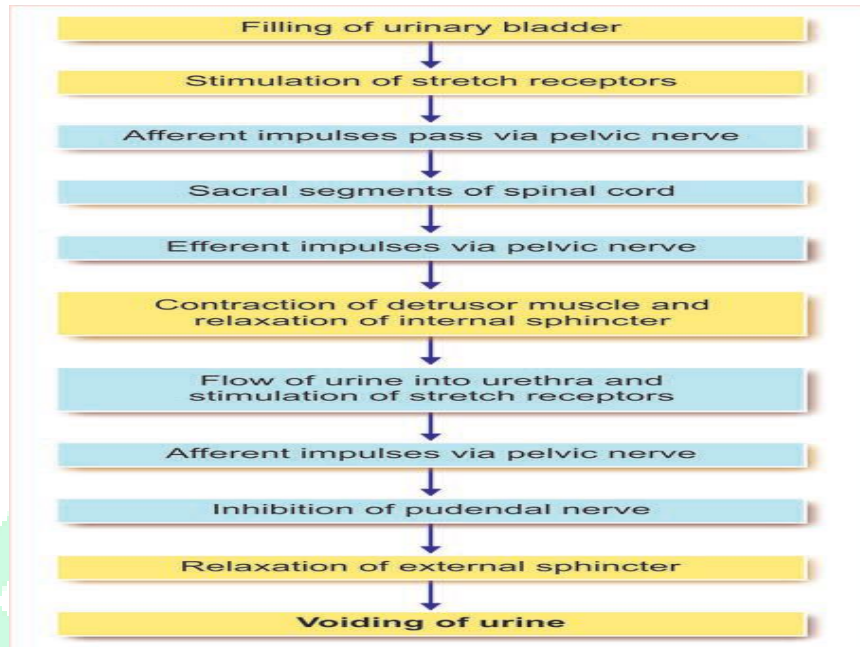
Filling of urinary bladder

- Urine is continuously formed by nephrons and it flows into urinary bladder drop by drop through ureters.
- When urine collects in the pelvis of ureter, the contraction sets up in pelvis. This contraction is transmitted through rest of the ureter in the form of peristaltic wave up to trigone of the urinary bladder.

- **Peristaltic wave** usually travels at a velocity of 3 cm/second. It develops at a frequency of 1 to 5 per minute. The peristaltic wave moves the urine into the bladder.
- After leaving the kidney, the direction of the ureter is initially downward and outward. Then, it turns horizontally before entering the bladder.
- At the entrance of ureters into urinary bladder, a valvular arrangement is present.
- When peristaltic wave pushes the urine towards bladder, this valve opens towards the bladder.
- The position of ureter and the valvular arrangement at the end of ureter prevent the back flow of urine from bladder into the ureter when the detrusor muscle contracts. Thus, urine is collected in bladder drop by drop.
- A reasonable volume of urine can be stored in urinary bladder without any discomfort and without much increase in pressure inside the bladder (**intravesical pressure**). It is due to the adaptation of detrusor muscle. This can be explained by cystometrogram.
- Cystometrogram is the graphical registration (recording) of pressure changes in urinary bladder in relation to volume of urine collected in it.
- Cystometry is the technique used to study the relationship between intravesical pressure and volume of urine in the bladder.

Micturition reflex

- Micturition reflex is the reflex by which micturition occurs. This reflex is elicited by the stimulation of stretch receptors situated on the wall of urinary bladder and urethra.
- When about 300 to 400 mL of urine is collected in the bladder, intravesical pressure increases.
- This stretches the wall of bladder resulting in stimulation of stretch receptors and generation of sensory impulses.



Spinal centers are regulated by higher centers.

The higher centers, which control micturition are of two types, inhibitory centers and facilitatory centers.

Inhibitory centers for micturition

Centers in midbrain and cerebral cortex inhibit the micturition by suppressing spinal micturition centers.

Facilitatory centers for micturition

Centers in pons facilitate micturition via spinal centers. Some centers in cerebral cortex also facilitate micturition.

Abnormalities of micturition

- **Atonic bladder** - Atonic bladder is the urinary bladder with loss of tone in detrusor muscle. It is also called **flaccid neurogenic bladder** or **hypoactive neurogenic bladder**. It is caused by destruction of sensory (pelvic) nerve fibers of urinary bladder.
- **Automatic bladder** - Automatic bladder is the urinary bladder characterized by hyperactive micturition reflex with loss of voluntary control.

- **Uninhibited neurogenic bladder** - Uninhibited neurogenic bladder is the urinary bladder with frequent and uncontrollable micturition caused by lesion in midbrain. It is also called **spastic neurogenic bladder** or **hyperactive neurogenic bladder**.
- **Nocturnal micturition** - Nocturnal micturition is the involuntary voiding of urine during night. It is otherwise known as **enuresis** or bedwetting.

