Micturition

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18/mhs02/095

Nursing 200L

PHY 212

28th June, 2020

Micturition, also known as urination, this is the ejection of urine from the urinary bladder through the urethra to the outside of the body. Urinary flow rate in a full bladder is 20- 25ml/s in male and 25-30ml/s in female. Whilst the capacity of the bladder varies from roughly 300-550ml, afferent nerves in the bladder wall signal the need to void the bladder at around 400ml of filling (Reynolds, 2020). Micturition consists of a storage phase and a voiding phase. Stretch receptors in the bladder increase their firing rate as the bladder becomes fuller. This causes the micturition reflex, and increases urinary urge, and can even cause involuntary urination.

Physiologically, micturition involves the coordination of the central, autonomic, and somatic nervous systems. The brain centers that regulate urination include the

* Pontine micturition center,
* The periaqueductal gray, and
* The cerebral cortex, which cause both involuntary and voluntary control over micturition.

In males, urine is ejected through the penis, and in females through the urethral opening. Due to sexual dimorphism, and the positions where the urethra ends, males and females often use different techniques for urination. Micturition consists of two phases:

* The storage phase: A relaxed bladder in which urine slowly fills the bladder.
* The voiding phase: A contracted bladder that forces the external sphincter open and discharges urine through the urethra.

Voluntary restraint of urination involves inhibition of bladder contraction, closure of the opening to the urethra, and contraction of the abdominal muscles. The ability to start and stop the flow of urine depends largely on the normal functioning of the muscles of the pelvic floor, the abdominal wall, and the diaphragm. Infants’ lack of inhibitory control over urination is related to the immaturity of the nervous system. Likewise, degeneration or destruction of certain areas of the central nervous system leads to incontinence due to the so-called neurogenic bladder. Such incontinence may be a dribbling overflow from a permanently distended bladder, or an efflux from a contracted bladder whose outlet is always open.

If the full bladder is not emptied, it becomes over distended. In time, bladder distension can cause bleeding, ulcerations, and rupture of the bladder wall. Obstruction to the outflow of urine can follow enlargement of the prostate (the gland in males that encircles the urethra close to the bladder), swelling of the urethral tissue around its channel, fibrous stricture of the urethra, or contraction of the muscles at the openings of the bladder and the urethra. Usually urine is retained until the pressure in the bladder overcomes the obstruction. With moderately chronic retention and stress, the detrusor muscle increases in tone and the contractile force of the bladder is increased. When over distension occurs over long periods, the detrusor muscle produces small rhythmic contractions that cause dribbling of urine. With continued distension, the muscle can become paralyzed, and urine voiding takes place only by overflow; this condition is usually termed passive incontinence. There may also be flow of urine back to the kidneys under these conditions, causing failure of [kidney](https://www.britannica.com/science/kidney) function (Encyclopaedia Britannica, 2017).

References

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