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Urination Mechanisms: The Urethra

The channel that drains urine from the bladder is called the urethra. It is not simply a “pipe” to drain the bladder. It is a complex muscular tube lined by a special membrane...mucosa. This lining must remain healthy for the complex activities described below to remain functional. Interaction of nerves, muscles, spinal cord and brain are necessary for urine control. Damage at many places in the nervous system can affect your urine control. Damage to muscles may lead to loss of control. Scarring of the lining from infection or injury may cause slowing of the stream

Two types of muscle are present in the urethra control mechanisms. Smooth muscle acts by nerve stimulation independent of our conscious thought processes (like heart, bladder or intestinal muscles). Striated muscle is like arm or leg muscles that we can control. Although the amounts of smooth muscle and the distance it goes in the urethra vary somewhat in males and females, the functions are the same. The striated muscles have variation also. There are mixtures of muscle types. Females have mainly slow twitch fibers that remain contracted (tight) most of the time. Males have almost equal amounts of fast twitch and slow twitch fibers. The presence of fast twitch fibers may relate to the importance of the urethra as a channel for rapid sperm flow for reproduction.

Different and complex nerves supply the urethra. Somatic nerves tell us touch sensation and let us control the starting and stopping of the stream. These nerves go to the striated muscles and part of the urethra lining. Autonomic nerves of different types keep the “bladder neck” closed. It will tighten more when we strain to lift, cough etc. Another type of autonomic nerve opens the urethra when the bladder signals that it is full. The urethra then shortens in length, urine pressure increases and the urine flow begins. As the bladder empties, the smooth muscle of the bladder neck receives signals from the spinal cord and closes to stop the stream. In the male, the bulbocavernosus muscle assists in squeezing out the last bit of urine from the urethra.

It is easy to understand that if the muscles are not relaxed, there is difficulty starting the stream. On the other hand, too much relaxation causes leakage.

Different medicines you take can affect the nerves of the urethra, especially at the bladder neck. Cold tablets like Sudafed or Actifed contain a chemical that relieves your stuffed up nose. This medicine also stimulates the urethra muscle at the bladder outlet. It can cause difficulty starting the urine flow (more so in older men with enlarged prostate glands).

Some pills for treating high blood pressure will relax the bladder neck and cause some trouble holding the urine.

The nerves that send signals from the urethra and bladder to the spinal cord and brain travel several routes. There are many places of cross connections and even message transfer by “cross talk” when nerves lay near one another. Messages from the brain and spinal cord can travel equally complex pathways to stimulate the urethral muscles into action. Thus, problems and processes in the pudendal nerve can have bothersome results on the urethra (or bladder) even though those organs are not infected or injured. When I see a patient with urine troubles I evaluate for many processes in both males and females. Pudendal nerve damage is only one possible cause of poor urine flow or urinary urgency or urinary incontinence.

The evaluation requires in-depth questioning about symptoms. At examination testing for skin sensation will be performed. Nerve function testing for muscle nerve action (Latency test) and skin nerve function will be done. Urination test (urine flowmetry) and bladder pressure testing (urodynamics) will test the bladder and urethral function. Treatment may include antibiotics for infection, muscle relaxants or

stimulators (depending on the problem). Self-care, meaning prevention of trauma to the pudendal nerve can cure long-standing voiding complaints. Nerve damage may require injection of medicines around the nerves. A small number of people need surgery to release compression a nerve in the pelvis.