

= Pudendal nerve =

The pudendal nerve is the main nerve of the perineum . It carries sensation from the external genitalia of both sexes and the skin around the anus and perineum , as well the motor supply to various pelvic muscles , including the male or female external urethral sphincter and the external anal sphincter . If damaged , most commonly by childbirth , lesions may cause sensory loss or fecal incontinence . The nerve may also be temporarily blocked as part of an anaesthetic procedure .

The pudendal canal is also known by the eponymous term " Alcock 's canal " , after Benjamin Alcock , an Irish anatomist who documented the canal in 1836 .

= = Structure = =

The pudendal nerve is paired , meaning there are two nerves , one on the left and one on the right side of the body . Each is formed as three roots immediately converge above the upper border of the sacrotuberous ligament and the coccygeus muscle . The three roots become two cords when the middle and lower root join to form the lower cord , and these in turn unite to form the pudendal nerve proper just proximal to the sacrospinous ligament . The three roots are derived from the ventral rami of the second , third , and fourth sacral spinal nerves , with the primary contribution coming from the fourth .

The pudendal nerve passes between the piriformis muscle and coccygeus (ischiococcygeus) muscles and leaves the pelvis through the lower part of the greater sciatic foramen . It crosses over the lateral part of the sacrospinous ligament and reenters the pelvis through the lesser sciatic foramen . After reentering the pelvis , it accompanies the internal pudendal artery and internal pudendal vein upwards and forwards along the lateral wall of the ischiorectal fossa , being contained in a sheath of the obturator fascia termed the pudendal canal , along with the internal pudendal blood vessels .

Inside the pudendal canal , the nerve divides into branches , first giving off the inferior rectal nerve , then the perineal nerve , before continuing as the dorsal nerve of the penis (in males) or the dorsal nerve of the clitoris (in females) .

= = = Nucleus = = =

The nerve is a major branch of the sacral plexus , with fibers originating in Onuf 's nucleus in the sacral region of the spinal cord .

= = = Variation = = =

The pudendal nerve may vary in its origins . For example , the pudendal nerve may actually originate off of the sciatic nerve . Consequently , damage to the sciatic nerve can affect the pudendal nerve as well . Sometimes dorsal rami of the first sacral nerve contribute fibers to the pudendal nerve , and even more rarely S5 .

= = Function = =

The pudendal nerve has both motor and sensory functions . It does not carry parasympathetic fibers , but does carry sympathetic fibers .

The pudendal nerve supplies sensation to the penis in males and the clitoris in females , through the branches dorsal nerve of penis and dorsal nerve of clitoris . The posterior scrotum in males and the labia in females are also supplied , via the posterior scrotal nerves (males) or posterior labial nerves (females) . The pudendal nerve is one of several nerves supplying sensation to these areas . Branches also supply sensation to the anal canal . By providing sensation to the penis and the clitoris , the pudendal nerve is responsible for the afferent component of penile erection and clitoral erection . It is also responsible for ejaculation .

Branches also innervate muscles of the perineum and pelvic floor ; namely the bulbospongiosus and ischiocavernosus muscles , the levator ani muscle (including the iliococcygeus , pubococcygeus , puborectalis and either pubovaginalis in females or pubourethralis in males) , the external anal sphincter (via the inferior anal branch) , and male or female external urethral sphincter .

As it functions to innervate the external urethral sphincter it is responsible for the tone of the sphincter mediated via acetylcholine release . This means that during periods of increased acetylcholine release the skeletal muscle in the external urethral sphincter contracts , causing urinary retention . Whereas in periods of decreased acetylcholine release the skeletal muscle in the external urethral sphincter relaxes , allowing voiding of the bladder to occur . (Clarification : Unlike the internal sphincter muscle , the external sphincter is made of skeletal muscle , therefore it is under voluntary control of the somatic nervous system .)

= = Clinical significance = =

= = = Anesthesia = = =

A pudendal nerve block , also known as a saddle nerve block , is a local anesthesia technique used in a obstetric procedure to anesthetize the perineum during labor . In this procedure , an anesthetic agent such as lidocaine is injected through the inner wall of the vagina about the pudendal nerve .

= = = Damage = = =

The pudendal nerve can be compressed or stretched , resulting in temporary or permanent neuropathy . Irreversible nerve injury may occur when nerves are stretched by 12 % or more of their normal length . If the pelvic floor is over @-@ stretched , acutely (e.g. prolonged or difficult childbirth) or chronically (e.g. chronic straining during defecation caused by constipation) , the pudendal nerve is vulnerable to stretch @-@ induced neuropathy . Pudendal nerve entrapment , also known as Alcock canal syndrome , is very rare and is associated with professional cycling . Systemic diseases such as diabetes and multiple sclerosis can damage the pudendal nerve via demyelination or other mechanisms . A pelvic tumor (most notably a large sacrococcygeal teratoma) , or surgery to remove the tumor , can also cause permanent damage .

Unilateral pudendal nerve neuropathy inconsistently causes fecal incontinence in some , but not others . This is because crossover innervation of the external anal sphincter occurs in some individuals .

= = = Imaging = = =

The pudendal nerve is difficult to visualize on routine CT or MR imaging , however under CT guidance , a needle may be placed adjacent to the pudendal neurovascular bundle . The ischial spine , an easily identifiable structure on CT , is used as the level of injection . A spinal needle is advanced via the gluteal muscles and advanced within several millimeters of the ischial spine . Contrast (X @-@ ray dye) is then injected , highlighting the nerve in the canal and allowing for confirmation of correct needle placement . The nerve may then be injected with cortisone and local anesthetic to confirm and also treat chronic pain of the external genitalia (known as vulvodynia in females) , pelvic and anorectal pain .

= = = = Nerve latency testing = = = =

The time taken for a muscle supplied by the pudendal nerve to contract in response to an electrical stimulus applied to the sensory and motor fibers can be quantified . Increased conduction time (terminal motor latency) signifies damage to the nerve . 2 stimulating electrodes and 2 measuring

electrodes are mounted on the examiner 's gloved finger (" St Mark 's electrode ") .

= = History = =

The term pudendal comes from Latin pudenda , meaning external genitals , derived from pudendum , meaning " parts to be ashamed of " . The pudendal canal is also known by the eponymous term " Alcock 's canal " , after Benjamin Alcock , an Irish anatomist who documented the canal in 1836 . Alcock documented the existence of the canal and pudendal nerve in a contribution about iliac arteries in Robert Bentley Todd 's " The Cyclopaedia of Anatomy and Physiology " .

= = Additional images = =