

Uterus

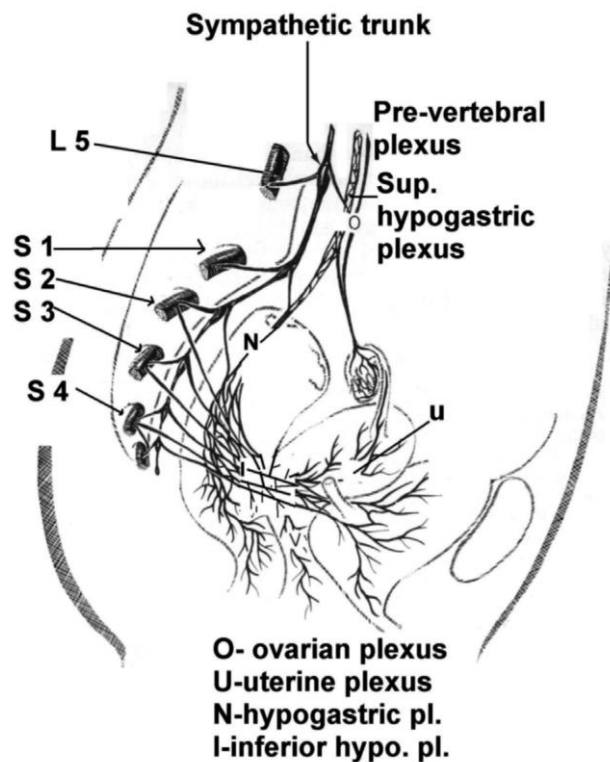
Nerve Supply.

Inspite of the extent of the nerves reaching the uterus, it is doubtful that nerve supply is important for normal uterine function.

The uterus receives its motor and sensory supply from both the sympathetic as well as the parasympathetic systems.

Motor supply of uterus.

Sympathetic fibers to the uterus



Uterus receives its main contribution of pre-ganglionic sympathetic fibres from T12-L2; however, some contribution also comes from T5-T9 levels.

- These fibres take a specific route to reach the uterus.
- 1) **The pre-ganglionic sympathetic fibers.**

Leave the spinal cord along the ventral rami of corresponding thoracic spinal nerves. Soon, they leave their nerves as white rami communicantes and join the lumbar portion of sympathetic trunk. Most of them leave the corresponding sympathetic trunks as such (without relaying).

The fibres from T5-T9 (10) coalesce to form greater splanchnic nerve; those from T9-T10 (sometimes T10-T11) to form the lesser splanchnic nerve and those from T12 are identified as the lowest splanchnic nerve. Each of these pierces the diaphragm in the vicinity of crus to synapse in the coeliac ganglion (greater splanchnic), aortico-renal ganglion (lesser splanchnic) and in case of lowest splanchnic, the inferior mesenteric or hypogastric ganglia.

2) Superior Hypogastric plexus.

The superior hypogastric plexus (pre-sacral nerve) is the direct extension of aortic plexus below the aortic bifurcation. It lies immediately behind the peritoneum and descends over the anterior surface of 5th. Lumbar vertebra.

It is present in the retroperitoneal tissue that continues downwards in front of sacrum and is often referred to as Pre-sacral fascia.

Nature of fibers.

Like aortic plexus, the superior hypogastric plexus consists of a mixture of pre. and post-ganglionic sympathetic fibres..

The superior hypogastric plexus ends by bifurcating into right and left hypogastric nerves. The right and left hypogastric nerves (in truth-plexus) diverge from each other at the level of sacral promontory. They run downwards and forwards along with the walls of pelvis in that lamina of pelvic fascia that lies closest to the peritoneum. Slightly more anteriorly, ureters enter the same fascial plane and in dissection, serve as guide to hypogastric nerves and inferior hypogastric plexus into which these nerves terminate. This hypogastric plexus is present well below the level of pelvic peritoneum.

The superior hypogastric plexus and hypogastric nerves apparently don't contain any parasympathetic fibres. The sympathetic efferents are vasomotor.

3) Inferior Hypogastric plexus.

Inferior hypogastric plexus receives most of its pre-ganglionic sympathetic fibres above from hypogastric nerves. Pre-ganglionic sympathetic fibres from L1 & L2 are also directed in this region. All the pre-ganglionic fibres reaching here synapse with ganglia and continue as post-ganglionic fibres.

The inferior hypogastric plexus is **2.5cm high and 3-4 cm long**. It lies against the postero-lateral wall of pelvis, internal to the branches of internal iliac vessels and lateral to rectum, the vagina and base of bladder. Its subsidiary plexus are embedded in some of the ligaments formed by the sub-peritoneal connective tissue and these plexus run medially toward the pelvic viscerae. One of the subsidiary plexus is **Utero-vaginal plexus**.

Utero-vaginal plexus.

The nerves to uterus arise from anterior and intermediate part of utero-vaginal plexus, which lies in front of rectum in broad ligament on each side of cervix

These nerves accompany the uterine arteries to reach the uterus.

Minor sympathetic contribution to uterus.

The fundus of uterus along with Fallopian tubes receive their post-ganglionic fibres from nerves which emerge from renal plexuses, which are themselves peripheral parts of coeliac plexus.

Function.

The sympathetic motor supply to the myometrium appears to be of little functional importance in respect to either pregnancy (including labour and delivery) or menstruation

Para-sympathetic fibres to uterus

- 1) Pre-ganglionic parasympathetic fibres arise from **S2-4** segments of spinal cord.
- 2) These fibres leave the spinal nerves as the pelvic splanchnic nerves (nervi erigentes). Pelvic splanchnic nerves represent the sacral para-sympathetic outflow and they are also known as **nervi-erigentes**, as they these are the nerves, capable of causing the erection of the penis and clitoris.
- 3) Largest contribution is from S3 with smaller one from S4. Occasional contribution is from the S2.
- 4) These nerves run forwards and medially through the branches of internal iliac vessels and lamina of pelvic fascia that contains these vessels. On the medial surface of these vessels, these nerves intermingle with the hypogastric nerves. Together, they form inferior hypogastric plexus.
- 5) Accompanying the internal iliac and then uterine arteries, the fibres destined to supply the uterus reach the uterus.

Postganglionic fibers.

The pre-ganglionic parasympathetic fibres synapse in minute ganglia situated within or very closely adjacent to, myometrium

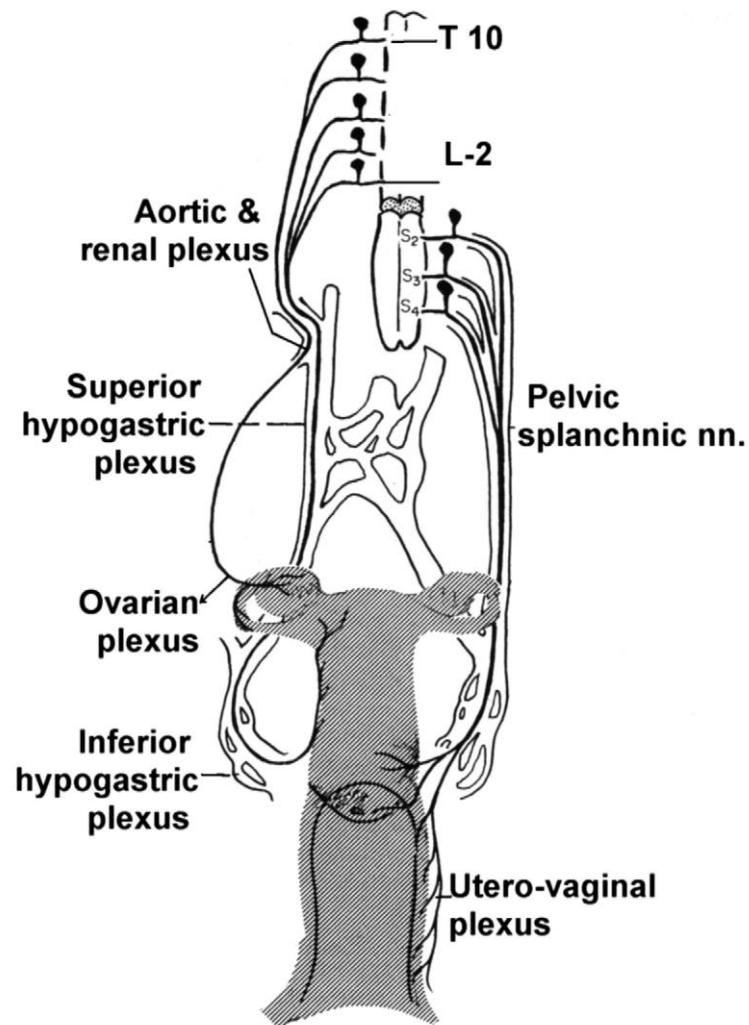
Functions.

The post-ganglionic fibres subserve a predominantly vasomotor function

Visceral Afferents.

Uterus is insensitive to most of stimuli, but pain is felt when the cervix is grasped with a forceps or is dilated. Some uterine disorders are painful and pelvic pain may be felt in some phases of menstrual cycle

Cervix like vagina is insensitive to cutting and burning. Pain is caused only by its dilatation.



Fibers transmitting impulses from the body of uterus and inner parts of the uterine tubes traverse the Utero-vaginal, Inferior hypogastric, Superior hypogastric plexuses, Splanchnic nerves and Sympathetic nerves to reach the cell bodies in the spinal ganglia T 12—L 2 and end in the spinal centers at these levels.

Sensory nerve fibers of root value T11 & T12 serve the fundus and body of uterus.

Thus, pain of uterine contraction is appreciated as referred pain in the somatic structures served by these roots. It is felt, therefore, in the lower abdomen, the groins and lumbosacral region

The more strong contractions promote increase in the train of sensory nerve impulses. At the spinal cord level, this encourages the phenomenon of reverberation, involving the neighbouring spinal segments **T10&L1**.

The pain is then also referred to somite regions supplied by these roots, anterior abdominal wall upto the umbilicus, anterior and posterior aspects of upper part of thigh and the small of back

As the labour advances and because of the anatomical incongruity between the maternal pelvis and the advancing fetal part, additional pain might be provoked by the unusual and sustained pressure upon musculofascial lining of posterior wall of pelvis. These structures are supplied by sensory nerves of root value of lower lumbar and upper sacral region

This pain is also referred to sacral regions and backs of thighs. As the nerves involved are somatic in origin, the pain is likely to be appreciated not only relatively superficially, but also deeply within sacrum itself.

When the presenting part distends the pelvic floor-usually subsequent to the full dilatation of cervix-the tension induced within the muscle and fascia, which comprises the floor, leads to pain, which is felt locally and within the general area of the perineum

Being pain due to stimulation of somatic structures, it is not referred to others areas supplied by S2, 3 and 4.

Pain fibres from cervix

It has long been assumed that pain fibres from cervix uteri do not follow those from body. Rather, they pass through the inferior hypogastric plexus and travel in pelvic splanchnic nerves (**nervi erigentes S2, 3 and 4**).

Fibers transmitting impulses from the cervix and the deeper parts of the vagina traverse the Utero-vaginal and inferior hypogastric plexuses and pelvic splanchnic nerves to reach the spinal ganglia S-2 to S – 4 and end in the spinal centers in these levels.

The pain associated with cervical dilatation is therefore referred to sacral dermatomes i.e. perineum, gluteal region, posterior thigh and leg)

Recent clinical studies have cast doubt on this type of pain conduction from cervix. Para-vertebral block of 11th. and 12th. thoracic nerves, para-vertebral block of upper lumbar sympathetic trunks or pre-sacral neurectomy, all eliminate pain caused by cervical dilatation during first stage of labour.

This indicates that pain fibres from cervix ascend from inferior hypogastric plexus with pain afferents from uterine body.

Pain caused by dilatation of cervix may also be blocked by injecting anaesthesia around the paracervical plexus of nerves through the lateral fornices of vagina. Such a paracervical block is also effective, when cervix has to be dilated for scrapping out the uterus.