

Anatomical Aspects of Guda (Anal Canal).....A Literary Review

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Background

Guda is very much important and last part of Gastrointestinal system. Many anorectal disorders occurs in this guda region that is why it is very much important to know all anatomical aspects in detail into a surgeons point of view. Guda is defined as the opening where the gastrointestinal tract ends and exits the body which excretes faeces and flatus through it. It is the mool of pureeshvaha strotasa. Acharya Charak mentioned it among fifteen koshtangas, it is one of bahirmukh strotas of the body. It is sadyopranahar marma. Anatomy i.e Shareer Rachana according to different samhitas and acharyas is elaborated here in descriptive mode.

KEYWORDS: *guda, shareer, samhita*

How to cite this paper: Dr. Tushar H. Shelar | Dr. Miteshkumar D. Gujrathi | Dr. Mukund Kisanrao Chandile "Anatomical Aspects of Guda (Anal Canal).....A Literary Review" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-7 | Issue-4, August 2023, pp.539-546, URL: www.ijtsrd.com/papers/ijtsrd59737.pdf



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Review of Sharir

The summary of the Ayurvedic descriptions regarding shareera aspect of guda, is as follows -

Embryology- Antra (intestines), Basti (bladder) and Guda of foetus are formed out of the essence of Rakta and Kapha (Sushrutacharya), the entire process begins helped by pitta and Vayu. It takes its origin from Matrujabhava (Charakacharya)

Utpatti (origin)- Charaka says that Guda is a Mridu and Matruja avayava and is formed from the uthama sara bhaga of rakta and kapha, digested by the pitta and vayu, giving it a hollow or tubular structure.(Ch.Sha.3/6)

Sthana (location) - Charaka mentions Uttara guda and Adhara guda as parts of the fifteen Koshtangas. Chakrapanis vyakhya on this says that Uttaraguda is where pureesha is stored and Adharaguda through which pureesha passes out i.e. excreted.(Ch.Sha.7/11) Charaka in the context of Uttara vasti, describes the

location of Vasti - Vasti is located between Mushkas, Sthula guda, Sevani and Sukra and Mutra vaha Nadis.(Ch.Sid.9/4)

Vagbhata says that guda is Sthulantra pratibaddha, through which vata and pureesha move out and abhigata to it causes sadyomaranam. (As.Sag.Sha.7/18)

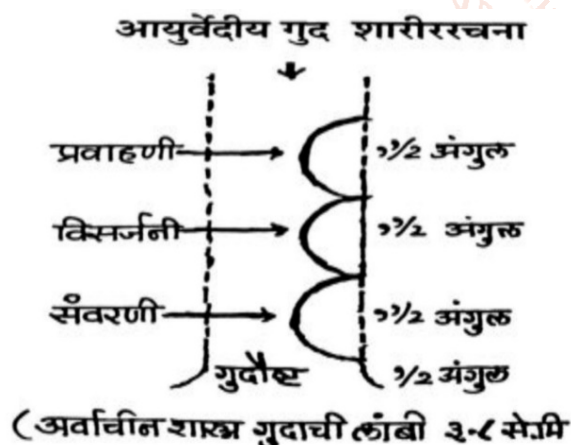
According to Susrutha - Guda, Vasti, Vasti shiras, Vrushans and Pourusha granthi are Eka sambandhi and are related to gudasthi vivara (Su.Ni.3/19) There are Dwa trimsat, sira Sroni supplying Guda and Medhra; Guda is Sthulantra pratibaddha (joined proximally with Sthulantra), Ardha panchangulam (four and half angulas in length), Adhi ardha angula trivalaya sambhuta (formed with three valis, each one and half angula in length) and namely Pravahini, Visarjini and Samvarani.(Su.Ni.2/5)

Guda is Chaturangula ayata (four angulas in diameter), and has three valis, all of which are tiryak, ekangula, ucchrita (lie horizontally, one above the other, in one angula distance). They are like Sankha avartas (the spiral grooves of a Conch), and are Gajatalunibha (like the palate of an Elephant in colour). When seen externally, taking the romas (hair) located at guda pradesha as criteria, from the ending line of romas, one yava, inside is located the 'Gudaoushtha'. From this Gudaoushtha one angula inside is the first Vali, i.e Samvarani. (Su.Ni.2/6-8)

Ashtanga Hridaya says Valis are three in number; the first is Pravahani, in between is the Visarjini and externally lays the Samvarani, from where Gudaoushtha is one angula externally. (As.Hru.Ni.7/4-5)

Susruta and Vagbhata mentioned the length of the guda as four and half anguli. The anguli has been standardised in BHU and it is fixed at about 2 cms. approximately.

Thus the length of the guda includes the whole of the anal canal and lowers 6 cm of the rectum, which extends upto the inferior Houston's valve roughly. The total length of the anorectal canal from the anal margin to the recto sigmoid junction is known to be about 16.5 cm. Out of which 3 cm. is the anal canal itself. Thus guda includes anal canal and a part of rectum. Susruta's opinion about these three valis is anatomical as well as physiological. Middle Houston's valve, internal and external sphincters also take important part in the complete act of defaecation.



Pravahani:

This is the first vali and is situated in the proximal part of gudanika and is 1 & 1/2 inch above the Visarjini. Since it initiates the vega of puresha pravartana (sensation of expulsion) and pushes (pravahana) the puresha downwards, it is called Pravahani. 'Pravahanyastu pravahanam' - (Dalhana on Su.Ni2/5)

This is the middle one third of the rectum or the upper half of the ampullary part of the rectum. The

beginning or the proximal end is indicated by the presence of the second Houston's valve. The distance from the second to the third Houston's valves is about 3 to 4cm. which is similar to the Ayurvedic description. The mucous membrane of this part of the rectum is pale pink in colour, which is semi-transparent and branching radicles of the superior rectal vessels are seen through it. The mucosa normally presents a smooth velvety appearance due to the myriads of tiny opening in to the crypts of Leiberkuhn. In empty condition of the rectum the mucous membrane presents a number of longitudinal folds, which are obliterated when the rectum is distended and are the reason for the maximum diameter of the ampullary part of the rectum, than any other part of the colon. The blood supply is derived primarily from the superior rectal artery, which is the continuation of the inferior mesenteric artery. Some supply is also received from the middle rectal and median sacral arteries. The venous drainage is through the superior rectal (Haemorrhoidal) veins, which drain into the portal system via the inferior mesenteric vein. The superior, middle and inferior rectal veins converge to form the internal rectal venous plexus or haemorrhoidal plexus in the submucosa of the columns of Morgagni and dilatation of this plexus gives rise to internal haemorrhoids. The middle Houston's valve which lies at the upper end of the rectal ampulla and is the largest and the most constant one. Hence Ayurvedic Acharyas had given it great importance and considered as a landmark.

The faecal matter is stored in the Sigmoid colon and at the time of evacuation by mass peristaltic movements it enters the ampulla of the rectum and the person feels the urge for defaecation and 'Prvahanam' or the effort to defaecate occurs. Hence the name 'Pravahan,

Visarjini:

This is the second vali situated between pravahani and samvarani and is about 1 & 1/2 inch and is in the middle portion of guda. It helps in moving the fecal matter forward by its expansion and adds in its expulsion.

'Tasam antaramadhya Visarjini" (Vagbhata As.Hru.Ni.7) Nisrujateeti Visarjini" (Dalhana on Su.Ni.2/5)

This is the last one third of the rectum or the lower half of the ampulla of the rectum. Its beginning or proximal end is indicated by the third Houston's valve and the distal end by the ano-rectal ring, and its length is about 3 to 4cm. and lies anterior to the tip of the coccyx bone and above the pelvic diaphragm. This part is in continuation with Pravahani above and

Samvarani below. The mucous membrane of this part is pink in colour and the tributaries of the superior and middle rectal vessels are seen through it. The mucous membrane of this part contains longitudinal folds similar to Pavahani. The blood supply and venous drainage are same as the Pravahani. This is related - the base of the urinary bladder, terminal parts of the ureters, seminal vesicles, vasa deferentia and prostate and in females with vagina. This description co-relates well with the Charaka's and Susruta's description of Guda and its relations.

Samvarani:

This is the third vali situated below visarjini and 1 inch above the gudaousshtha and is the last vali. Its function is to open when faecal matter comes from above and to close the guda after its expulsion. "Samvaranateeti samvarani" (Dalhana Su.Ni.2/5)

This part is the anal canal with internal and external anal sphincters. It is in continuation with the rectum above and is marked by the Ano-rectal ring. Anal canal is the terminal portion of the large intestine. It begins at the ano-rectal ring and terminates at the anal verge. The length of the anal canal is approximately 3cm and the diameter is also 3cm laterally it is surrounded by ischio-rectal fossa around the sphincters and over its whole length it is surrounded by sphincter ani muscles. The upper half of anal canal is lined by mucous membrane and is in 'Plum' colour owing to the blood in the subjacent internal venous plexus. The blood supply is from superior and inferior rectal arteries of which the superior rectal arteries supply the anal canal and the inferior rectal arteries supply the sphincter muscles and the ischio-rectal fossae. The venous drainage is into Internal and External rectal venous plexuses which communicate with each other and inturn drain into superior and inferior rectal veins. Veins in the three anal columns, situated at 3, 7 and 11 o'clock positions as seen in the lithotomy position, are large and constitute the potential sites for primary internal piles. Anal veins are arranged radially around the anal margin. They communicate with the internal rectal plexus and the inferior rectal veins. Excessive straining during defaecation may rupture on of these veins, forming the subcutaneous perianal haematoma known as 'External piles'.

The internal anal sphincter is involuntary and the external anal sphincter is under voluntary control. Both of these open for defaecation and close after passing out of the faecal matter, hence the name 'Samvarani'.

Guda as a marma and strotas-

Sushruta has described Guda as the mamsamarma which is attached to sthoolantra through which vata

and purisha are excreted. It is considered as sadyapranahara marma ie any injury occurring to this organ results in immediate death. There are 10 snayus in groins and sixty in the pelvis, three Peshis and three Sandhis (Samudga sandhi) in this region(su)

Guda is included in annavahasrotas having opening to exterior that is one among the bahirmukhasorotas. Vascular aspect of Guda-

Among the thirty four siras found in Kosta, eight siras supply to Guda, medra and sroni.

Two dhamanis which are taking downward course can apanavayu, mutra, purush, sukra and arthava to respective organs

Relations-

Basti, Pourushagrandhy, vrushanam and Guda are interrelated and situated in gudasthi vivara.

Physiology of Guda-

Dosha-Apanavayu

Dathu-mainly Mamsa

Mala-Pureesh

Guda is known as karmendriya because it does the functions of defecation.

MODERN ASPECT

Anatomy of rectum and anal canal

The embryonic proctoderm provides the lining of the anal canal. This lining being ectodermal in origin is described to form anal skin. The rectum is derived from the hindgut. Hence the mucosal lining of the rectum is endodermal in origin.

Rectum:

The rectum constitutes the terminal segment of the colon. It's length varies from 12 to 15 cm and possesses a larger lumen than any other portion of the colon. It begins at the level of the third sacral vertebra and ending at the anal canal i.e. from the recto-sigmoid junction above to the dentate line below. The rectum is having total three convex curves; two of the curves to the right side and one convex curve at the left. The rectum from its origin comes down following the concavity of the sacrum and coccyx forming an antero- posterior curve which is called as sacral flexure of the rectum. First it passes downwards and backwards then downwards and lastly forwards to become in continuation with anal canal by passing through the pelvic diaphragm. Above it's junction with the anal canal it pass. through the pelvic floor, which is formed by levator ani muscle. In addition to the antero posterior curve the rectum deviates from the midline at three lateral curves. The upper one is convex to right, the middle one is more convex to left and the lower one is again convex to right. The diameter of the upper part of the rectum in empty state is 4 cm. as at the sigmoid colon

but its lower part is distended to the widest portion known as ampulla of rectum. Peritoneum is related with rectum only to the upper two thirds of it. The upper one third is covered by peritoneum anteriorly and laterally, the middle one third is covered anteriorly only. In males the peritoneum reflects on the bladder and forms recto-vesical pouch whereas in females it reflects upon vagina and uterus which is recto-uterine pouch or the "pouch of Douglas".

The lower portion of the rectum is devoid of peritoneum and is covered by fibrous sheath, which is derived from the true pelvic fascia. In empty condition of the rectum the mucous membrane of its lower part presents a number of longitudinal folds which affect the distension of the rectum.

Houston's valves: These are nothing but three spiral foldings of the mucosal and submucosal layers which are found within the rectum. The lowest valve is seen in the left, the middle one in the right and the upper most one on the left. Each valve arises gradually at one end for the rectal valve extending into lumen of the gut. It then recedes at its other end into the rectal valve. The Houston valves can be seen through the sigmoidoscopy.

The rectal mucosa normally presents a smooth velvety appearance due to the myriads of tiny openings into the crypts of Lieberkuhn. The mucous membrane of the lower part of the rectum is pale pink in colour, which is semi-transparent and branching radicles of the superior rectal vessels are seen through it.

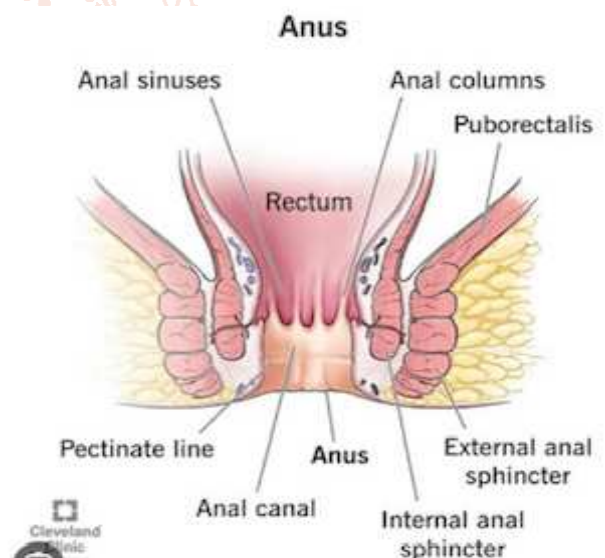
Ano-rectal junction:

The junction of anal canal and rectum is about two to three cm. in front of and slightly below the tip of the coccyx. In males at this level opposite to this there is the apex of the prostate gland. At the anorectal junction the folding back of the gut is known as the perineal flexure.

Anal canal:

Anal canal is the terminal portion of the large intestine. It begins at the ano-rectal ring and terminates at the anal verge. The length of the anal canal is approximately 4 cm. and the diameter is 3 cm. The junction is indicated by the pectinate line (anal valves). It provides voluntary and involuntary sphincters at the outlet of the rectum. The external opening of the anus is situated in the midline, posterior to the perineal body. The empty lumen is puckered into longitudinal folds, the columns of Morgagni and they are 5-10 or 8-12 in number. Posteriorly it contacts with a mass of fibrous and muscular tissue known as ano-coccygeal ligament, which separates the anal canal from the tip of the

coccyx. Anteriorly, it is separated from the perineal body, by the membranous part of the urethra and the bulb of penis in the male and lower end of the vagina in the female. Laterally it is surrounded by ischio-rectal fossa around the sphincters over its whole length it is surrounded by sphincter muscle. The upper half of anal canal is lined by mucous membrane and its colour is plum owing to the blood in the subjacent internal venous plexus. The epithelium in the region is variable in character. The mucous membrane in this p. has 6-10 vertical folds, the anal columns. Each column contains a terminal radicle in these three sites constitute primary internal haemorrhoids. The line along with the anal valves are situated is termed as pectinate line. Sometimes small epithelial projections (anal papilli) are present on the edges of the anal valves. The succeeding part of the anal canal extends for about 15 mm below the anal valves and is known as "transitional zone of pecten". This zone ends narrow and wavy known as White line or Hilton's line. Below the Hilton's line the lower 8 mm or so of the anal canal are lined by true skin which contains sweat gland and sebaceous glands.



Musculature of anal canal:

External anal sphincter:

It is under voluntary nerve control, made up of striated muscle and supplied by inferior rectal and perineal branch of fourth sacral nerves. It surrounds the whole length of the anal canal and has three parts - subcutaneous, superficial and deep. The subcutaneous part lies below the level of internal sphincter and surrounds the lower part of anal canal as a flat band about 15mm broad. It has no bony attachment. The superficial part is elliptical in shape and arises from posterior surface of the terminal segment of coccyx as the ano-coccygeal ligament.

Internal anal sphincter:

It is involuntary in nature, formed by the thickened, circular muscle coat of the gut and surrounds the

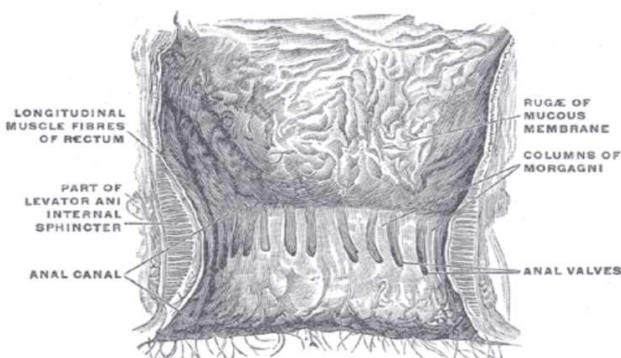
upper 3/4 (3cm) of the anal canal, lies above the subcutaneous part and deep to the superficial and deep parts of the external sphincter, and ends below at the Hilton's white line.

Conjoint longitudinal coat:

It is formed by the fusion of puborectalis with the longitudinal muscle coat of rectum at the ano-rectal junction, between the external and internal sphincters. Soon it becomes fibro elastic and at the level of the white line it breaks up into a number of fibro elastic septa which spread out fan wise, pierce the subcutaneous part of external sphincter and are attached to the skin around the anus. The most lateral septum forms the perianal fascia and the most medial are the anal inter muscular septum that is attached to the white line. In addition, some strands pierce obliquely the internal sphincter and end in the sub mucosa below the anal valves.

Ano-rectal ring:

Ano-rectal ring:



It is a muscular ring of the ano-rectal junction, formed by the finion of the pubo-rectals, deep external sphincter and the internal sphincter. It is easily felt by a finger in the anal canal. Surgical division of this ring results in rectal incontinence. The ring is less marked anteriorly where the fibers of puborectalis are absent.

Surgical spaces:

The tissue spaces are filled with cutaneous tissue and important from the surgical point of view because they are the possible sites of infection. The surgical spaces are as follows.

1. Ischio-rectal space: It is a pyramidal space and comprises of the upper 2/3 of ischio-rectal fossa. This space is crossed by the inferior haemorrhoidal vessels and nerves. Morgagni has showed that the ischio-rectal space is liable to become filled with, in high anal fistula and ischio-rectal abscesses. Count, described that this space connects with the opposite ischio-rectal space through the subsphincteric space and is an important avenue of existence of infection.
2. Peri-anal space: It surrounds the anal canal below the white line. It contains the subcutaneous

external sphincter, the external rectal venous plexuses, and the terminal branches of the vessels and nerves.

3. Sub-mucous space: Sub-mucosa of the anal canal lies above the white line between the mucous membrane and the internal sphincter. It contains the internal rectal venous plexus and lymphatics.
4. Peri-rectal space: This space is a potential space which lies between the pelvic peritoneal floor and levator ani muscle.
5. Intermuscular space: Its medial boundary is internal anal sphincter and external anal sphincter. This space was described by Eisen Hammer.
6. Ischio rectal fossa: It lies between the sidewall of the pelvic and the anal canal and the lower part of the rectum. The apex is above and base is below formed by the perianal skin. Milliganetal described the ischio-rectal fossa as being divided into two spaces by a horizontal fascia i.e., perianal space and ischio-rectal space.

Anal Orifice or Anus:

The anus is the lower aperture of the anal canal and is situated about 4cms below and in front of the tip of the coccyx in the cleft between the buttocks. Surgical anal canal lining:

The surgical anal canal is lined above by mucosa and below by anoderm which is modified skin. The anal crypts are in the upper part of the anoderm. A line at the level of the crypts is the pectinate line or dentate line. Above this line there are number of vertical mucosal folds, the columns of Morgagni, which overline the internal haemorrhoidal plexus. Intermediately above the dentate line or dentate line is an important landmark for surgeons. At the lower part of the anal canal, this line is wavy, whitish, which is known as Hilton's line named by its founder.

Anal sphincter:

The anal sphincter has three distinct "U" shaped loops which have specific mechanism.

1st Loop: In this top loop the deep portion of the external sphincter and the puborectalis are fixed into one muscle. This attaches to the lower part of the symphysis pubis and loops around the upper part of the anal canal with the downward inclination.

2nd Loop: This intermediate loop is the superficial external sphincter which arises from the tip of the coccyx as a tendon and gives rise to strong muscle bundles passing forward to encircle the anal canal below the top loop.

3rd Loop: The third or base loop is the subcutaneous external sphincter. It attaches anteriorly to the

perianal skin in the mid line and passes backward with an upward inclination to loop around the lower part of the anal canal.

Anal Glands: Anal Glands are vestigial structures lined by stratified mucus secreting columnar epithelium and squamous epithelium. Normally there are six to ten glands in the circumference of the anus. Each gland has a duct and discharges into the anal crypt at the dentate line.

Arterial Supply of the Rectum and Anal Canal

1. The superior rectal or Haemorrhoidal artery: It is the continuation of the inferior mesenteric artery and descends posteriorly to the rectum, where it bifurcates to supply the rectum and upper portion of the anal canal.
2. The middle rectal or haemorrhoidal arteries: These arise from the internal iliac artery, on each side and enter the lower portion of the rectum antero laterally at the level of levator ani muscle. They do not enter lateral stalks as previously believed. The arteries anastomose with the branches of the superior rectal artery.
3. The inferior rectal or haemorrhoidal arteries: These arise on each side from the internal pudendal artery, a branch of the internal iliac artery and traverse the ischio-rectal fossa on each side to supply the anal sphincter muscles. There is no evidence of anastomosis between the superior and inferior rectal arteries.
4. The middle sacral artery: It provides an insignificant amount of blood supply to the rectum. It arises posteriorly just above the bifurcation of aorta, descends over the lumbar vertebrae, sacrum and coccyx, and gives only small branches to the posterior wall of the lower portion of the rectum.

Venous Drainage of Rectum and Anal canal

Return of the blood from the rectum and anal canal is via two systems - Portal and Systemic. The superior rectal (Haemorrhoidal) veins drain the rectum and the upper part of the anal canal into the portal system via the inferior mesenteric vein. Primarily the middle rectal veins drain the lower part of the rectum and the upper part of the anal canal. They accompany the middle rectal art, and terminate in internal iliac veins. The inferior rectal veins, following the corresponding arteries drain the lower part of the anal canal via the internal pudendal veins, which empty into the internal iliac veins. Dilatation of the inferior rectal veins leads to external haemorrhoids.

The superior, middle and inferior rectal veins converge to form the internal rectal (haemorrhoidal)

plexus in the submucosa of the columns of Morgangi. Dilatation of this plexus gives rise to internal haemorrhoids.

Venous Plexuses

1. Internal rectal venous plexus:
It lies in the submucosa of the anal canal. It drains mainly into superior rectal vein but communicates freely with the external plexus and thus with the middle and inferior rectal veins. The plexus therefore is an important site of communication between the portal and systemic veins. This is a series of dilated pouches connected by transverse branches around the anal canal.
2. External rectal venous plexus:
It lies outside the muscular coat of the rectum and the anal canal and communicates freely with the internal plexus and is drained by the inferior rectal vein into the internal pudendal vein; the middle part by the middle rectal vein, into the internal iliac vein, and the upper part of the superior rectal vein which continues as the inferior rectal vein which further continues as the inferior mesenteric vein.
3. Anal veins:
These are arranged radially around the anal margin. They communicate with the internal rectal plexus and the inferior rectal veins. Excessive straining during defaecation may rupture one of these veins, forming subcutaneous perianal haematoma, known as external piles.

Lymphatic Drainage of Rectum and Anal canal

Mainly there are three sets of lymphatic channels –

1. Superior rectal lymph nodes:
These run with the Superior rectal vessels. A special group lies just above the Levator ani and dose to the rectal wall in the region of ampulla. They are the para rectal nodes of the aorta. These are larger nodes at the bifurcation of the Superior rectal artery.
2. Middle rectal lymph nodes:
These lie along the lateral ligament of rectum close to the middle rectal vessels. From here they pass to the lymph nodes around the internal iliac artery.
3. Inguinal lymph nodes:
The lower portion of the anal canal and the anus are drained by lymphatics, which pass to the inguinal nodes. Above the pectinate line the lymphatics drain with those of the rectum into the internal iliac nodes. Below the pectinate line the lymphatics drain into the medial group of the superficial inguinal nodes.

Nerve Supply of Rectum and Anal canal

Sympathetic innervation:

Rectum and the upper half of the anal canal derive their sympathetic supply from the lumbar part of the

trunk and the superior hypogastric plexus by means of the plexus on the branches of the inferior mesenteric artery. The sympathetic nerves to the rectum and upper part of the anal canal pass mainly along the inferior mesenteric and the superior rectal arteries and partly via the superior and inferior hypogastric plexuses. The latter supplying the lower part of the rectum and internal sphincter.

Para sympathetic innervation:

This is derived from pelvic splanchnic nerves; for these the fibres pass as long strands from sacral nerves to join the inferior hypogastric plexus. which enter on the sides of rectum, being motor to the musculature of the rectum and inhibitory to internal sphincter. 'The external sphincter is supplied by the inferior rectal branch of the pudendal nerve (S2, S3) and the perineal branch of the fourth sacral nerve. Afferent impulses underlying sensations of physiological distension are conveyed by the para sympathetic nerves, while pain impulses are conducted by both sympathetic as well as para sympathetic nerves supplying the rectum and upper part of the anal canal. Importance of Guda(Ch.su.29/3)

Charaka includes Guda in Dasa Pranayatanas and Susruta in Marmas; Guda is a Mamsa and Sadyo pranahara marma.(Su.sha.6/9)

Vata is controller of all the sharir kriyas, which is divided into five types depending upon the site it occupies. 'Thus 'Apana vata' is the one which occupies below the nabhi in general and pakwashaya in vishesha Apana vayu prakopa produces diseases at guda and vasti pradesha, like Arshas, Astunari, Bhagandara, etc.(Ch.Su.12/8)

According to Charaka. Pakwashaya and Sthula guda are the moolas for Pureesha vaha strotas.(Ch.vi.5/4)

Thus, it is understood that the function of the Guda is Pureesha dharana and Visarjana.

Seated in the pakwashaya the apana vata does the function of 'adho vaha' or bringing downwards of vata. Mutra, pureesha, artava, retas and garbha in time. —Ahara sambhavam vastu deho hi ahara sambhavah" says Charaka. The body is made from ahara and is also maintained by it. This ahara is subjected jatharagni and its pachana takes place after which sara kitta vibhajana occurs. The sara bhaga is absorbed and the kitta bhaga or pureesha is pushed forward to the end part of pakwasaya i.e. guda (uttara guda) where it is stored until its elimination.

Therefore it is said that pakwashaya (uttara guda) and guda (adho guda) are the sthanas of pureeshavaha strotas. When the pureesha accumulates in sufficient quantity (the pramana of pureesha is seven anjalis).

the desire for defaecation occurs. When the desire for defaecation is being felt by an individual. There occurs propulsion of faecal column beyond the Pravahini. At this stage Visarjini relaxes and accommodates the advancing faecal column. Which progresses onwards by induction of pressure of Pravahini by the individual.

The column of the fecal material thus passes through the relaxed internal sphincter (ano-rectal ring) and the external sphincter to the outside. Samvarani comes into action when sufficient column has advanced beyond the external opening and by contraction cuts the fecal column and releases it to be dropped out. Hence physiologically these three levels are very important during the act of defaecation.

The important function of guda is defaecation. Dalhana comments on Susruta regarding the function of the Valis by which they get their name i.e. Pravahana. Visarjana and Samvarana are the functions or actions of Pravahani. Visarjini and Smavarani respectively. These are the different actions exhibited by the Guda for pureesha visarjana.

Mechanism of Defaecation

Defaecation means process of passing faeces from the anus. It is a reflex mechanism which is under voluntary control in the normal condition of the life. Usually the rectum remains empty and faeces are stored in pelvic colon. The urge for defaecation occurs when the faecal matter enters the rectum on increase of the intraluminal pressure of the rectum from 20 to 25mm of water. Faecal matter does not collect elsewhere if defaecation is regular. However, if defaecation is long deferred: the descending colon becomes filled when pelvic colon can hold no more. As a result of mass movement, some faeces enters the rectum when the desire to defaecate occurs while the usual stimulations are - taking food, A glass of warm water, a cup of coffee or tea or smoking may have the same effects. The desire to defaecate may be induced by straining effort which may raise the abdominal pressure to as much as 200mm. of mercury and forces faecal matter into the rectum.

The process of defaecation includes the action of voluntary and involuntary muscles. Which are highly susceptible to emotional stimuli. The reflex centres for defaecation have been located in the hypothalamus, in lower lumbar and upper sacral segments of the spinal cord and ganglionic plexuses of the gut.

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