

AN ANATOMICAL REVIEW STUDY OF GUDAPRADESHA W.S.R. TO BHAGANDARA

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ABSTRACT

Bhagandara is one of the common diseases occurring in Anorectal region. *Bhagandara* is one among the eight *Mahagadas* described by *Acharya Sushruta*, which is very difficult to cure. Fistula in ano implies a chronic granulating track connecting two epithelial lined surface. The anal fistula is a track with an external opening in the skin of perianal region and internal opening in the modified skin or mucosa of anal canal or rectum. It is said that the infection of anal glands or intersphincteric glands is the initiating event in fistula in ano, in a process known as the “Cryptoglandular hypothesis”. This glandular infection results in an inter-sphincteric abscess if the draining duct becomes blocked by infected debris. This abscess may resolve by means of spontaneous drainage into the anal canal or may progress to an acute anorectal abscess. Though this disease is not life threatening it produces inconveniences in routine life. It causes discomfort and pain that creates problem in day to day activities. *Bhagandara* is disease of *Guda* region so it is necessary to take a review of anatomical relation and structures of the *Guda*. In ancient *Ayurvedic* literatures, the systematic description of *Guda* is not described in a collecting form, but is scattered in various *Sthana* as *Nidana*, *Chikitsa* etc. So, a study is done to both collect *Ayurvedic* concepts and correlate it with contemporary knowledge in scientific manner, giving a hawk view of clinical anatomy of *Bhagandara* both in *Ayurvedic* and modern concepts.

Keywords: *Guda*, *Bhagandara*, Fistula in Ano, anatomy of *Guda Pradesha*

INTRODUCTION

Bhagandara is one of the common diseases occurring in Anorectal region. *Bhagandara* is a disease that exists among human beings since the period of *Vedas* and *Puranas*. *Puranas* and *Samhitas* do have abundant evidences regarding the existence and treatment of this disease. The *Bhagandara* is one among the eight *Mahagadas* described by *Acharya Sushruta*, which is very difficult to cure^[1].

The word *Bhagandara* made up by the combination of two terms “*Bhaga*” and “*Dharana*”, which are derived from root “*Bhaga*” and “*dri*” respectively. The meaning of *Bhaga* is, all the structures around the *Guda* including *Yoni and Basti*. The *Darana of BhagaGuda and Basti* with surrounding skin surface called *Bhagandara*. Further he has described that a deep rooted *ApakvaPidika* within two *Angula* circumference of

GudaPradesh associated with pain and fever is called *Bhagandara Pidika*. When it suppurates and burst open, is called *Bhagandara*^[2]. According to *Acharya Sushruta*, *Bhagandara* is a condition after bursting of painful and suppurated *Pidika* within the two *Angula of Guda Pradesh*

Acharya Charaka has told that a painful and suppurated *Pidika* in the region of *Guda*, on bursting leads to *Bhagandra*^[3].

Acharya Vagbhata has described that a *Vrana* in the size of *Pidika* forms at an *Angula* or two from the anus or inside the anus. In this ailment, *Rakta* and *Mamsa* are narrated as *Dushya* resulting into a sinus with the discharge of pus in the region of anus, perineum and bladder^[4]. In *Apakvavastha* the *Sopha* is called *Pidika* and after bursting, it is called as *Bhagandara*.

By definition, a fistula is an abnormal tract that connects two epithelial surfaces. The anal fistula is a track with an external opening in the skin of perianal region and internal opening in the modified skin or mucosa of anal canal or rectum. The anatomic course of an anal fistula will be dictated by the location of the infected anal gland and the anatomic planes and boundaries that surround it. There will usually be an internal enteric opening in the anal canal at the level of the dentate line—that is, at the original site of the duct draining the infected gland. In most cases this is at the 6 o'clock position, because anal glands are more abundant posteriorly (radial positions around the anus are referenced with respect to a clock face, with 12 o'clock being directly anterior).

The fistula can reach the perianal skin by a variety of routes, some more tortuous than others, and by penetrating and involving the muscles of the anal sphincter and surrounding tissues to a variable degree.

Though this disease is not life threatening it produces inconveniences in routine life. It causes discomfort and pain that creates problem in day to day activities. As the wound is located in anal region, which is more prone to infection and persistent pus discharge, irritates the person.

ANATOMICAL CONSIDERATION

Ayurvedic View: *Bhagandara* is disease of *Guda* region so it is necessary to take a review of anatomical relation and structures of the *Guda*. In ancient *Ayurvedic* literatures, the systematic description of *Guda* is not described in a collecting form, but the scattered knowledge through their concepts throw some lights regarding their structures, relation and function.

Guda has been enumerated among with 15 *Kosthanga* of the body by *Acharya Charak* having two parts i.e. *Uttarguda* and *Adharguda*.^[6] The commentator *Acharya Chakrapani* explained *Uttarguda* as seat of fecal collection and *Adharguda* responsible for the evacuation of faeces.

Acharya Sushruta describes, *Guda* in close proximity of *Vasti* attached to the terminal portion of the large intestine meant to excrete faces and flatus.^[7] Other structures described by *Acharya Sushruta* with *Guda* and *Vasti* are umbilicus, posterior abdominal wall, loins, scortum, groin and penis, all lying in the pelvic cavity.^[8]

Embryology: The *Guda* is considered to be originating from *Matrija Bhava of Garbha*.^[9] Essence of *Rakta* and *Kapha* is digested by *Pitta* and penetrated by *Vata*, produces *Guda*^[10].

Location: In the context of anatomical position of *Vasti*, *Sushruta* says that *Basti* is located in between *Nabhi*, *Pristha*, *Kati*, *Mushka*, *Guda*, *Vankshana* and *Shephas* and *Basti*, *Bastishira*, *Vrishana* and *Guda* are all

interconnected with each other. All above mentioned organs are situated in *Gudasthivivara* (pelvic cavity).^[11]

Extent of Guda: *Guda* is an organ which refers to terminal part of intestine. According to *AcharyaSushruta*, the entire length of *Guda* is four and a half fingers^[12]. *AcharyaVagbhata* supported the view of *AcharyaSushruta*^[13]. The measurement of one *Angula* is approximately 2 cm. On the basis of this the total length of *Guda* is 9 cm. The maximum length of the anal canal is in between 3 to 4 cm and the total length of ano-rectal canal from recto-sigmoid junction to anal verge is 16.5 cm. Thus *Guda* includes anal canal plus distal 5 to 6 cm. of rectal segment that means upto middle houston valve. *AcharyaVagbhata* has also told measurement of *Guda* as *Atmapanita-la*^[14].

Three GudaValies:

AcharyaSushruta has described the position of three circular ridges like structures called *Gudavalies* in the wall of *Guda*. The colour of *Valies* resemble with the palate of elephant. These three *Valies* are arranged in a spiral manner like the ridges of conch shell and placed at an interval of one and half *Angula*. *Gudaustha* or anal margin is at the distance of *Yavaardha* (1/2 Finger) from where hair growth ends. Lower most *Vali* (*Samvarani*) is at a distance of one finger from anal verge^[15]. Above described *Gudavalies* are termed *Pravahini*, *Visarjini* and *Samvarani* respectively from proximal to distal part.

Function of these three Valies are *Pravahini*- It pushes the *Malas* (fecal matter) downwards.

- *Visarjini*- It helps in relaxation of that part of *Guda* and thus assists in further propagation of *Malas*. *Samvarai*

- -Discharges the function of contraction of anal orifice

GudaPeshi: Three *Peshis* are present in *Guda*.^[16]

GudaAsthi: There are five bones in the pelvis, four are found in *Guda*, *Bhaga* and *Nitamba* and one in *Trika*.^[17]

GudaSandhi: In *Guda*, *Samudga* type of *Sandhi* is present.^[18]

GudaMarma: *Guda* is a type of *MansaMarma* and *SadyopranharaMarma*.^[19]

Srotasa: *Guda* is a type of *VahyaSrotas*^[20] as well as *Mula of PureeshwahaSrotas*^[21].

Kala: *Guda* is related to the *Pureeshadhara Kala*.

Pranayatan: *Guda* is one among the *DashPranayatan* described by *AcharyaCharaka*^[22].

Sira and Dhamani: *AcharyaSushruta* has stated that out of 34 *Siras* which are found in *Koshtha*, 8 supplies to the *Guda* and *Medhra* in pelvis^[23]. The *Dhamani* taking a downward course carry *ApanVata*, *Mutra*, *Purisha*, *Shukra* and *Artava* to the respective organs such as *Pakvashaya*, *Kati*, *Guda*, *Basti*, and *Medhra*.^[24]

MODERN CONSIDERATION

Embryology: In embryonic life the primitive gut is divided into 3 parts- Foregut, Midgut and Hindgut (cloaca). During first month of pregnancy the anal canal is derived from embryonic proctoderm, hence anal structures are ectodermal in origin. The rectum is endodermal in origin being derived from hindgut. Into embryonic life, here is a common chamber, the cloaca, into which opens the hindgut and the allantosis. The cloaca separates into bladder and post allantoicqu (rectum) by down growth of the septum. About this time, an epiblastic bud, the proctoderm grows in towards the rectum. Normal fusion between these two structures

occurs during the 3rd month of intrauterine life. The hindgut during sixth week of intrauterine life gets divided into by urorectal septum into ventral urogenital sinus and the dorsal rectum. The anal tubercle develops behind urorectal septum and fuses with it to form proctoderm. This is surrounded by mesoderm which terms external sphincter.^[25] The proctoderm and its mesoderm then migrate backward and grow towards the rectum and eventually fuse with it to form anal canal. The dentate line indicates the transition from endodermal hindgut to ectodermal tissue. The dual origin of the anal canal is reflected by differences in arterial supply, venous and lymphatic drainage, innervations and epithelial specialization.

General Anatomy^{[26] [27]}

The rectum begin in front of 3rd sacral vertebra as a continuation of sigmoid colon, it proceeds downward, then downward and forward closely applied to concavity of the sacrum and coccyx for 13-15 cm. It ends 2-3 cm in front of and below the top latter bone by piercing the pelvic diaphragm and becoming continuous with the anal canal. The lower part of rectum that lies immediately above the pelvic diaphragm is dilated to form the rectal ampulla. It develops partly from hidgut and partly from cloaca, both being endodermal in origin.

The Rectal Wall –The rectal wall consists of mucosa, submucosa and two complete muscular layer, inner circular and outer longitudinal. The rectum differs from the sigmoid colon in having no sacculation, appendices epiploice or mesenteries and taenia coli.

Relation of Pelvic Peritoneum to Rectum:

The upper third or soft rectum has complete peritoneal investment except for a thin strip posteriorly where peritoneum is reflected off

it, as the two leaves of the thick short mesorectum, and the lower third or so of the rectum without any peritoneal covering. On the average the anterior peritoneal reflection lies about 8-9 cm. from the perineal skin in male and 5-8 cm. in female.

The Fascial Relation of Rectum:

- 1) On either side of rectum, there are fibrofatty tissues, which are part of the pelvic fascia and connect parietal pelvic fascia on the side wall of the pelvis with the rectum, known as **lateral ligaments of rectum**. It gives some support to this part of bowel.
- 2) **Fascia of Waldeyer** –The sacrum and coccyx are still covered by stronger & rougher layer which is thickened part of parietal pelvic fascia. It fuses with Fascia propia at ano rectal junction.

Relations of the Rectum

- 1) Behind - Fascia of Waldeyer, Sacrum, Coccyx, levator ani muscle, middle sacral vessels & roots of sacral plexus on either side.
- 2) Anterior – Bladder wall

In male

- Extraperitoneal rectum - Prostate, Seminal vesical, Vasa differentia, Ureters, Bladder wall
- Intra peritoneal Rectum - Loops of small gut, sigmoid colon upper part of seminal vesicles & bladder.

In Female

- Extra peritoneal Rectum - Posterior Vaginal wall
- Intra peritoneal rectum - Pouch of Douglas Upper part of Vagina. Uterus.

Laterally

- Intra peritonealy - loops of small gut, uterine appendages, Sigmoid colon.

- Extra peritoneal - side wall of pelvic ureter, Iliac vessels, Fascia of lateral ligaments

The curves of the Rectum

1. Anteroposterior curve
2. Lateral curve - usually there are three of them, both the uppermost and lowermost being convex to the right, the middle one convex to the left known as Houston's **valve** or **Plica transversatis**. These are permanent and most marked in distended rectum folding of mucous membrane continuing circular and sometimes longitudinal muscle coats forms them.
 - a) The upper fold lies near the upper end of rectum and projects from the right or left wall.
 - b) The middle fold that is largest and most constant lies at upper ends of rectal ampulla and projects from the anterior and right wall.
 - c) The lower fold that is inconstant lies 2.3 cm below the middle fold and projects the left wall.

ANATOMY OF ANAL CANAL

The anal canal is the terminal portion of the intestinal tract; it begins at the anorectal junction, is 3-6 cm. in length, and terminates at the anal verge. This short passage though only 3 cm. long, is of greatest surgical importance both because of its role in the mechanism of rectal incontinence and because it is prone to certain diseases. In normal living subject the anal canal is completely collapsed owing to tonic contraction of anal sphincters and the anal orifice is represented by an anteroposterior slit in anal skin.

Relations of Anal canal

1. Posteriorly: coccyx

2. Laterally: Ischioanal fossa which contains fat, inferior haemorrhoidal vessels and nerves.

3. Anteriorly :

- In male: Central point of the perineum, bulk of urethra.
- In female: Perineal body/ lowest border of posterior vaginal wall

Mucocutaneous Lining of Anal Canal

This can be divided into 3 parts

1. **Upper Part:** It extends from anorectal ring to the pectinate line approximately 15 mm long. It is lined by columnar epithelium of endodermal origin. The mucous membranes show anal valves, anal sinuses, anal papillae and pectinate line. Anal glands are 4-8 in number and each has direct opening into apex of anal crypt and occasionally two glands open into same crypt.

2. **Middle part:** The lining of anal canal consists of an upper mucosal and a lower cutaneous part, the junction of the two being marked by the line of anal valves about 2 cm from the anal orifice and opposite the middle or the junction of middle & lower third of internal sphincter. This level is known as **Dentate/Pectinate line** due to its serrated fringe produced by valves? Above each anal valve is a little pit or pocket known as **anal sinus or crypt or sinus of Morgagni**. These sinuses may be of surgical significance as foreign material may lodge in them to cause resulting infection.

Above the pectinate line, the mucosa is thrown into 8-14 longitudinal folds known as **rectal columns or columns of Morgagni**, each adjacent two columns being connected below at the pectinate line by an anal valve. For 1 cm or so above line, the mucosa is a deep purple colour but about the anorectal ring it changes to the pink colour

of rectal mucosa. Below the pectinate line, the anal canal is lined with a modified skin devoid of hair and sebaceous and sweat glands and closely adherent to the underlying tissues.

Anal gland are 4-8 in normal anal canal, each has a direct opening into apex of an anal crypt and occasionally 2 glands open into the same crypt. About half the crypts in any anal canal have no gland communicating with them. These are present most abundantly posteriorly.

The Musculature

1. **Anal internal sphincter:** It is continuous with the circular muscle coat of the rectum and inferiorly it ends with a well-defined rounded edge 6.8 mm above the level of anal orifice and 12-8 mm below the level of anal valves. These are grouped into discrete elliptical bundles which in the upper part of sphincter lie obliquely with their transverse axis running internally and downward. In lower part of the muscle the bundles lie horizontally and some of lower ones even incline slightly upward.
2. **External Anal sphincter:** It is seen to extend further downward than the internal sphincter and lowermost portion curves medially to occupy a position below and lateral to lower rounded internal sphincter and close to skin of anal orifice. This lower most portion is traversed by fan shaped expansion of longitudinal muscle fibers of anal canal which split it up into 8-12 discrete muscle bundles. At its upper end of each sphincter fuses with the puborectalis part of the levator ani muscle.
3. **Longitudinal Muscle Fibers:** The main layer of longitudinal fibers in the anal canal is seen to lie between the internal

and external sphincter. It is continuous with the outer longitudinal muscle layer of rectal wall and is joined by the levator ani. The lower border it diverge fan wise and pass radially through the lower most part of the external sphincter, some of these diverging fibers are attached to skin and perianal region.

4. **The levator-ani muscle** it constitutes part of sphincter mechanism of anal canal. It is broad; thin muscle attached peripherally to inner surface of the side of pelvis and united medially to form the floor of pelvic cavity. It consists of 3 parts.
 1. **Illiococcygeus:** It arises from the ischial spine and posterior part of white line of pelvic fascia. The fibers run downward, backward and medially and are inserted into last two sacral vertebrae, anococcygeal raphae of levator muscle.
 2. **The Pubococcygeus:** This arises from the back of pubis and anterior part of obturator fascia lies horizontally superior to innermost fibers of iliococcygeus region. It inserted into 1st piece of coccyx and last segment of sacrum.
 3. **Puborectalis:** It arises from the lower part of the back of symphysis pubis and the superior fascia of urogenital diaphragm runs backward alongside the anorectal junction and form a strong U-shaped loop which slings the return to pubis.

Anorectal ring: Functionally important ring of muscles surrounds the junction of rectum & anal canal. This is composed of upper border of int & ext sphincters which completely encircle the junction and posterior & lateral aspect of strong puborectalis sling. The ring is stronger on posteriorly and laterally than it is anteriorly.

Tissue spaces in relation to Anal Canal

1. Ischiorectal Fossa: On either side of anal canal & lower part of rectum intervening between them and the side wall of the pelvis is the ischio-rectal fossa. This is pyramid shaped, apex of which is above where the levator muscle joins the fascia an obturator internus, the base below formed by perianal skin. The medial wall consists of external anal sphincter and the obliquely lying levator ani muscle. The lateral wall of the ischium is covered by the obturator internus and its overlying parietal pelvic fascia.

In lateral wall there is an 'Alcock's canal' which contains the internal pudendal vessel & pudendal nerve. Anterior to fossa is the back of urogenital diaphragm and transversus perinei muscle. Behind the fossa is bounded by sacrotuberous ligament and inferior edge of gluteus maximus. Ischiorectal space comprises upper 2/3rd of ischio-rectal fossa. It has an important extension forward above the urogenital diaphragm which is liable to become filled with pus in ischio-rectal abscess or high anal fistula. Posteromedially ischio-rectal space connects under cover of anococcygeal raphe of ext. anal sphincter through **Retro Sphincteric Space of Courtney** with the opposite ischio-rectal fossa.

2. The Perianal space: This space contains finely lobulated fat, laterally it becomes continuous with the subcutaneous fat of buttocks medially it extends into lower part of anal canal, where is lined by modified skin. It contains lower external sphincter and external haemorrhoidal plexus. In this space perianal abscesses and anal haematoma form. Sub-

cutaneous and low anal fistulae traverse this space.

3. Pelvirectal space / Supralelevator space This is a potential space between pelvic peritoneal floor and levator ani muscle. Either side of this area is occupied by the loose connective tissue of lateral ligament of the rectum. **The central space** It is situated between the lower end of longitudinal intersphincteric muscle & external sphincter. It communicates externally with ischio-rectal space, inferiorly & internally with perianal & submucous spaces and superiorly with intersphincteric spaces.

4. The intersphincteric space the space lies between external & internal sphincter and is important in genesis of abscesses in region of anus & anal canal, because the anal intermuscular gland terminate in this space.

Blood supply

Arteries

- (1) The rectum and anal canal are supplied by lower sigmoid and terminal superior haemorrhoidal branches of inferior mesenteric artery.
- (2) Right and left middle haemorrhoidal; branches internal iliac artery.
- (3) Right & Left inferior haemorrhoidal arteries, branches of internal iliac vessels.

Venous Drainage

1. **Superior Haemorrhoidal vein** drains into inferior mesenteric and portal system. It lies in submucosa of upper part of anal canal and lower 2 cm of rectum
2. **Middle & inferior haemorrhoidal plexus** enter systemic venous circulation via internal iliac vein. Inferior haemorrhoidal vein drains external haemorrhoidal venous plexus which lies

under the skin of anal orifice and lower part of anal canal.

Lymphatics: There are three main routes of lymphatic drainage.

1. Upward through the lymphatics and glands accompanying the superior haemorrhoidal and inferior mesenteric vessels essentially to aortic glands.
2. Laterally along the middle haemorrhoidal vessel on either side to internal iliac gland on corresponding side wall of pelvis
3. Downward through perirectal lymph glands on back of rectum and along lymphatic plexuses in anal canal, perianal skin, and anal sphincter ischio-rectal fat to reach inguinal lymph gland or the glands along the internal iliac vessels.

Nerve supply: Colon & Rectum are innervated by the autonomic nerves system with sympathetic and para sympathetic components.

- **Sympathetic supply-**

1. Inferior mesenteric plexus – upper part of rectum.
2. Presacral or hypogastric nerve -lower rectum. This arises from 3 root, one central root from aortic plexus and 2 lateral root by junction of lumbar splanchnic nerve.

- **Parasympathetic supply-** This is derived from small twigs known as nervi erigentes or sacral autonomic which spring from second, third, fourth sacral nerves on either side as they emerge from anterior sacral foramina.

DISCUSSION

The occurrence of the above said disease is a consequence of the complex anatomy & physiology of the ano-rectal region. The anal canal is essentially a cylinder surround-

ed by two muscular sphincters, the internal and external anal sphincters, which are composed of smooth and striated muscle, respectively. The external sphincter has posterior attachments to the anococcygeal ligament and anterior attachments to the perineal body and urogenital diaphragm (and bulbocavernous muscle in boys and men) and merges proximally with the sling like puborectalis muscle (which defines the ano-rectal junction), which itself merges with the levator plate of the pelvic floor.

The internal sphincter is the distal termination of the circular muscle of the gut tube. The rectal longitudinal smooth muscle interdigitates between the internal and external sphincters and is thought to have no obvious sphincteric effect. Rather, its role is probably to bind the anus together. The intersphincteric space is the surgical plane of dissection between the internal and external sphincters and is most frequently found between the longitudinal muscle and external sphincter, where it exists as a sheet of fat containing loose areolar tissue.

The fat-filled ischioanal fossa lies lateral to the sphincter complex, and is traversed by a network of fibro-elastic connective tissue. With regard to the lining of the anal canal, the proximal half is characterized by longitudinal mucosal folds, the anal columns of Morgagni. The distal aspect of each column is linked to its neighbor by a small semilunar fold (the anal valves), which in turn forms small pockets (the anal sinuses, or crypts of Morgagni). The distal undulating limit of these valves is the dentate (pectinate) line, which also marks the most distal aspect of the anal transitional zone, a histologic junction between anal squamous epithelium and rectal columnar epithelium. The dentate line lies approximately 2 cm

proximal to the anal verge and is a crucial landmark in fistula in ano because the anal glands empty into the crypts that lie proximal to the valves.

These glands were first linked to the genesis of fistula in ano by Chiari, who suggested that they were the source of infection. Their purpose is unclear, although they may help lubricate the anus by secreting mucus into the anal crypts. The origin of the anal glands within the surrounding tissues is variable. For example, they are present in the sub-epithelium and may be present in the internal sphincter, and approximately one-third of these glands are deeply sited within the intersphincteric space. Most authorities believe that it is infection of these intersphincteric glands that is the initiating event in fistula in ano, in a process known as the "crypto glandular hypothesis". Furthermore, lymphoid aggregates surround the anal glands, which may partly explain the increased incidence of anal fistula in Crohn disease.^[28]

CONCLUSION

The occurrence of the *Bhagandara* is a consequence of the complex anatomy of the ano-rectal region. It is believed that gland infection results in an intersphincteric abscess if the draining duct becomes blocked by infected debris. This abscess may resolve by means of spontaneous drainage into the anal canal or may progress to an acute ano-rectal abscess, which is a common acute surgical emergency and is familiar to all general and coloproctologic surgeons. Treatment generally consists of incision and drainage of the most fluctuant part of the abscess, however this procedure does not pay due attention to the source of infection in the intersphincteric space, with the result that as many as 87% of patients with an

acute abscess may subsequently develop a fistula.^[29] Thus this study will help the students as well as surgeons in understanding the etiological and anatomical cause of *Bhagandara*, helping them in error free surgical treatment.

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