



ISSN 2456-3110

Vol 7 · Issue 11

December 2022

Journal of
**Ayurveda and Integrated
Medical Sciences**

www.jaims.in

JAIMS

An International Journal for Researches in Ayurveda and Allied Sciences



Maharshi Charaka
Ayurveda

Indexed

An anatomical approach to *Grahani* on the basis of Cadaveric Dissection - A Cadaveric Case Study

Arvind Kumar Yadav¹, Rita Marwaha², Pankaj Gupta³, Niraj Gole⁴, Ravindra Singh Baghel⁵

^{1,5}Post Graduate Scholar, PG Department of Rachna Sharir, Pt. Khushilal Sharma Government Autonomous Ayurved College and Institute, Bhopal, Madhya Pradesh, India.

²HOD, Prof & Co-Guide., ³Reader, PG Department of Rachna Sharir, Pt. Khushilal Sharma Government Autonomous Ayurved College and Institute, Bhopal, Madhya Pradesh, India.

⁴Lecturer, Dept. of Rachna Sharir, R N Kapoor Memorial Ayurvedic Medical College & Hospital, Indore, Madhya Pradesh, India.

ABSTRACT

Ayurveda is the ancient medical science of the world. It is first focuses on maintain health of human beings. Maintaining of health by proper using of *Ahara* (diet), *Vihara* (daily routine). *Ahara* or *Anna* are maintain health by proper metabolism, *Ahara* known as *Prana*. In *Ahara Paka* (digestion) take place in different stage at different parts of body. In this process *Grahani* is the special part of digestion system part and it is the specialized part of the *Mahasrotas*. *Pittadara Kala* is situated at the site of the site of the *Grahani*, and also site of the *Pachaka Pitta* which help in the the *Ahara Pachana*. According to *Ayurveda* the 6th *Pittadhara Kala* is situated in between the *Amashaya* and *Pakwashaya* and situated above the *Nabhi*. *Grahani* is the site of *Agni* and does *Grahana* of *Anna* and it is supported and nourished by the strength of *Agni*. This study is an attempt to elaborate and compare both ancient and modern concept of *Grahani* and its clinical significance with the help of cadaveric study.

Key words: *Grahani*, *Mahasrotas*, *Pittadhara Kala*, *Duodenum*, *Small intestine*.

INTRODUCTION

Ayurveda, being a medical science, deals with the human body. There are many concepts in *Ayurved*, regarding human body. Concept of *Kala* is one of them. *Kala* are defined as a structure between *Dhatu* and *Ashaya*. These *Kalas* are not only mere anatomical structures but also, they perform some specific functions and possess specific properties. *Kala Sharir*

gives us information about the important membranes and layers of the body. They also produce and hold the *Dhatus*. They can be understood by their functions in the body. There are 7 types of *Kala* described in *Ayurveda* by different *Acharyas*, specific *Kalas* are located at specific sites one of them is *Pittadhara Kala*. It is situated between *Pakwamashaya*. *Pittadhara Kala* can be compared as mucous membrane of small intestine. It plays major role in digestion in our body.

Thus, a precise knowledge of *Kala* is important for physicians to make a diagnosis at the right time & also to know if the disease is at the level of *Kala*. In *Ahara Paka* (digestion) take place in different stage at different parts of body. In this process *Grahani* is the special part of digestion system part and it is the specialized part of the *Mahasrotas*. *Pittadara Kala* is situated at the site of the site of the *Grahani*, and also site of the *Pachaka Pitta* which help in the *Ahara Pachana*.

Address for correspondence:

Dr. Arvind Kumar Yadav

Post Graduate Scholar, PG Department of Rachna Sharir, Pt. Khushilal Sharma Government Autonomous Ayurved College and Institute, Bhopal, Madhya Pradesh, India.

E-mail: yadav.drarvind4@gmail.com

Submission Date: 12/10/2022 Accepted Date: 18/11/2022

Access this article online

Quick Response Code



Website: www.jaims.in

Published by Maharshi Charaka
Ayurveda Organization, Vijayapur,
Karnataka (Regd) under the license
CC-by-NC-SA

AIM AND OBJECTIVES

Aim of the study to identify and determine the exact location, dimension and related anatomical structures at the site of "Grahani" with the help of cadaveric dissection.

MATERIALS AND METHODS

The Literary and conceptual study of "Grahani" had been done with the help of Classical *Ayurveda* books like *Brihathtrayi's*, *Laghutrayi's* and other *Ayurvedic* books including dictionaries and correlated, analyzed and interpreted with the knowledge of contemporary science on the subject. Dissection of abdomen on 5 cadavers performed in the department of *Rachana Sharir, Pt. Khushilal Sharma Govt. Ayurved College & Institute, Bhopal* to explore the underlying structure on the sites of "Grahani". Observations & findings were collected correlated and analyzed scientifically in the view of *Ayurveda* description of "Grahani" with the help of modern science. Cadaveric dissection was conducted as per "Grant's Dissector" and with the help of "Cunningham's Manual of Practical Anatomy."

Grahani in Ayurveda

According to *Charaka Grahani* is the seat of *Agni* and it is situated above *Nabhi*. It is not only the seat of *Agni* but it is also supported and strengthened by *Agni* and, it receives food. *Susrutha* opines that, the sixth *Kala*, is described as *Pittadharakala*, and situated between *Amashaya* and *Pakwashaya* and it is named as *Grahani*.^[1]

According to the modern anatomy

The small intestine or small bowel is an organ in the gastrointestinal tract where most of the end absorption of nutrients and minerals from food takes place. It lies between the stomach and large intestine and receives bile and pancreatic juice through the pancreatic duct to aid in digestion. The small intestine has three distinct regions the duodenum jejunum and ileum. The duodenum, the shortest, is where preparation for absorption through small finger-like protrusions called villi begins. The jejunum is specialized for the absorption through its lining by

enterocytes, small nutrient particles which have been previously digested by enzymes in the duodenum. The main function of the ileum is to absorb vit-B12, bile salts, and whatever products of digestion were not absorbed by the jejunum.

The small intestine begins at the pyloric sphincter of the stomach, coils through the central and inferior part of the abdominal cavity, and eventually opens into the large intestine. It averages 2.5 cm (1 in.) in diameter; its length is about 3 m (10 ft) in a living person and about 6.5 m (21 ft) in a cadaver due to the loss of smooth muscle tone after death.^[2]

Most digestion and absorption of nutrients occur in small intestine. Because of this, its structure is specially adapted for these functions. Its length alone provides a large surface area for digestion and absorption, and that area is further increased by circular folds, villi, and microvilli. It is divided into An upper, fixed part, called the duodenum, which measures about 25 cm in length; a lower, mobile part, forming a very long convoluted tube.

The proximal one and a half parts of duodenum, including liver, gallbladder and pancreas, develop from foregut.

Cadaveric Study^[3]

The dissection of five cadavers were carried out in the P.G. department of *Rachana Sharir* at *Pt. Khushilal Sharma Govt. Ayurved College and Institute, Bhopal* as per Grant's dissector. With the help of dissection instruments as per as dissectors.

Made a midline skin incision from the xiphisternal junction to pubic symphysis, encircled the

umbilicus. Made an incision from the xiphoid process along the costal margin to a point on the midaxillary line. Made a skin incision beginning 3 cm below the pubic crest. Extend this incision laterally, 3cm inferior to the inguinal ligament to a point 3 cm below the anterior superior iliac spine, continued the incision posteriorly, 3cm below the iliac crest to a part on a midaxillary line. Made a vertical skin incision along the midaxillary line. Made a transverse skin incision from the umbilicus to the midaxillary line. Reflected the skin

from medial to lateral, detached it along the midaxillary line, and placed it in the tissue container. Used a probe tear through the superficial fascia about 7.5cm lateral to the midline, identified the superficial epigastric artery and vein are in the superficial fascia in this area.

Scholar had been dissected through the superficial fascia down to the aponeurosis of the external oblique muscle and Scholar have removed the superficial fascia and observed that its deep surface is fibrous connective tissue containing relatively little fat (scar, fascia) and the more superficial last is compared entirely of fat. Scholar saw the anterior cutaneous nerve that enter the superficial fascia about 2-3 cm lateral to the midline, cleared are anterior cutaneous nerve. Identified the lateral cutaneous nerve. Cleared any remnants of the superficial fascia from the surface of the external oblique muscle and place them in the tissue container. Observed the external oblique muscle and Scholar saw its fiber course from superolateral to anteromedial. In the inguinal region, used blunt dissection to cleared the aponeurosis of the external oblique muscle. Identified the superficial inguinal ring.

Scholar saw the external oblique aponeurosis and its features.

- Lateral crus
- Median crus
- Inter crural fibers
- Inguinal ligament

Scholar saw the ilioinguinal nerve emerges at the superficial inguinal ring anterior to the spermatic cord. Identified the lacunar ligament. Scholar saw the lacunar ligament is formed at the medial end of the inguinal ligament by fibers then turn posteriorly attach to the pectin pubis. Made a vertical cut through the external oblique muscle beginning at the anterior superior iliac spine and ending at the level of umbilicus, inserted finger in to cut and direct, it medially to separate muscle layers. Use scissor, made a horizontal cut across the external oblique muscle. Inserted fingers in to cut and direct them inferiorly toward the inguinal ligament, separated the external oblique muscle from

the underlying internal oblique muscle. Used scissor cut the external oblique aponeurosis along the semilunar line down to the superficial inguinal ring. Reflected the flap of external oblique muscle internally revealed the inguinal position of the internal oblique muscle. Identified the external oblique muscle, Scholar saw the proximal attachments of the internal oblique are thoracolumbar fascia, the iliac crest and the lateral half of the inguinal ligament. The distal attachment of internal oblique muscle are interior border of ribs 10-12, the linea alba, pubic crest and pectin pubis. Between external oblique muscle and internal oblique muscle identified the ilioinguinal nerve and iliohypogastric nerve. Located the ilioinguinal nerve near the superficial inguinal ring and followed it laterally until it disappears in to the surface of the internal oblique muscle.

Used a probe, split the fibers of the internal oblique along the course of the ilioinguinal nerve. Inserted finger through the split and into the plane between the internal oblique and transverse abdominis muscle. Pushed finger internally and medially to separate the muscle layers and identified the transverse abdominis muscle. Identified the spermatic cord and retracted it.

Used a probe to lift the arching fibers of internal oblique & transverse abdominis muscles. Observed the inferior epigastric vessels through the transversalis fascia, Scholar saw the inferior epigastric vessels are located within the layer of extraperitoneal fascia. Repositioned the internal oblique and external oblique muscle. Made a transverse cut across the anterior surface of the rectus sheath at the level of the umbilicus, begin the cut approximately 2.5 cm lateral to the umbilicus and continued laterally or as far as the semilunar line. Used scissors cut the rectus sheath along the medial border of the rectus abdominis muscle, this cut extend in a superior direction, about 2.5cm from the midline. Extended the vertical cut internally along the medial border of rectus abdominis muscle, cut the about 1.2cm from the midline and stop the pubic crest. Inserted fingers in to vertical cut and separate the anterior wall of the rectus sheath from the anterior surface of the rectus abdominis muscle.

Observed the anterior wall of the rectus sheath is firmly attached to the anterior surface of the rectus muscle by several tendinous intersections. Along the lateral side of the rectus abdominis muscle, observed that the branches of six nerves (T7-T12) entered the rectus sheath and penetrated the deep surface of the rectus abdominis muscle. At the level of the umbilicus, transected the rectus abdominis with scissor, reflected the two levels superiorly and inferiorly. Scholar saw the sets of vessels on the posterior surface of the rectus abdominis muscle:

1. Superior epigastric artery and vein
2. Inferior epigastric artery and vein

Identified the arcuate line, which is located midway between the pubic symphysis and the umbilicus. Inferior to the arcuate line, observed the transversalis fascia deep to the transversalis fascia, observed a layer of extraperitoneal fascia and parietal peritoneum. Identified the linea alba. Reflected the halves of the rectus abdominis muscle superior and internally. On the left side of the umbilicus, used scissor to create a small hole (2.5cm) through the posterior wall of the rectus sheath, extra peritoneal fascia and the parietal peritoneum. Use scissor to make a vertical cut through the linea alba to xiphoid process. Extended the cut internally as far as the pubic symphysis. At the level of the umbilicus, placed are hard through the vertical cut and raise the abdominal wall from the abdominal contents.

On the right side of the abdomen, used scissors to cut the posterior wall of rectus sheath, extraperitoneal fascia and peritoneum in the trans umbilical plane. The scissor passed through the previous transverse cut that was made in the rectus abdominis muscle and external oblique muscle. Extended the cut laterally through all three flat abdominal muscle as far as the midaxillary line. Repeated this transverse cut on the left side of the abdomen. Scholar opened the flaps of the abdominal wall. Identified the falciform ligament, medial umbilical fold and lateral umbilical fold. Opened the flaps of the abdominal wall. Identified the liver, the liver occupies the right upper quadrant and extends across the midline in to the left upper quadrant. Identified the gall

bladder, gall bladder also in the right upper quadrant. Identified the stomach, its lies in the left upper quadrant it is continues with the esophagus proximally and the abdomen distally. Identified the spleen, it is in left upper quadrant it is found posterior to the stomach and may be difficult to find unless it is enlarged. Identified the greater omentum, the greater omentum is attached to the greater curvature of the stomach.

Identified the small intestine. The small intestine begins at pyloric end of the stomach. It has three parts:

1. Duodenum
2. Jejunum
3. Ileum

Observed the four Parts of the duodenum. Identified superior (first) part of the duodenum, at the L1 vertebral level. Recognize the descending (second part) of the duodenum, at the L2 vertebral level. Determined the horizontal (third) part of the duodenum, at the L3 vertebral level. Identified the ascending (fourth) part of the duodenum, ascends to the L2 vertebral level.

Identified the pancreas within the band of the duodenum. Identified the parts of the pancreas like head, neck, body and tail. Used a probe to dissect into the anterior surface of the head pancreas and Scholar had found main pancreatic duct. Identified the accessory pancreatic duct joins the superior side of the main pancreatic duct.

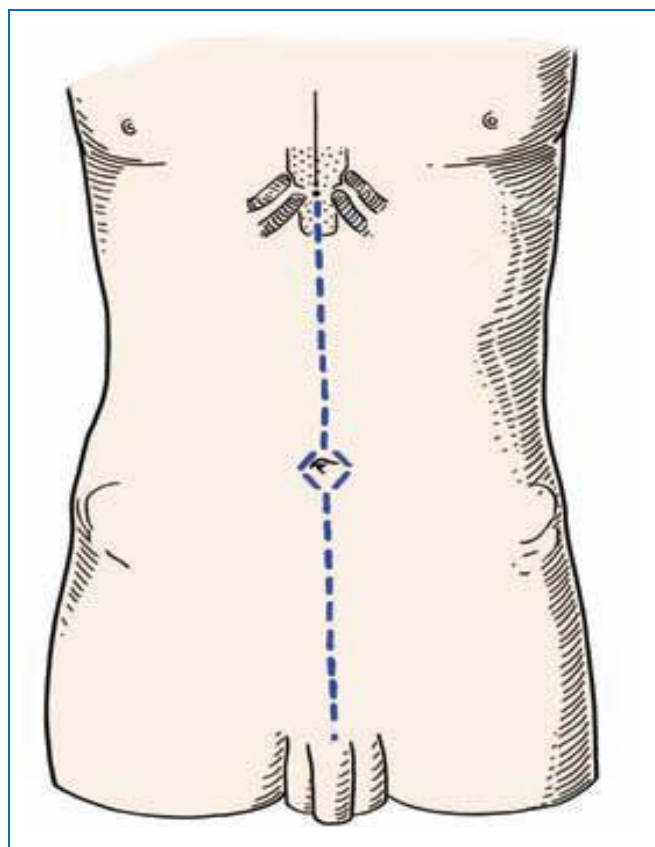
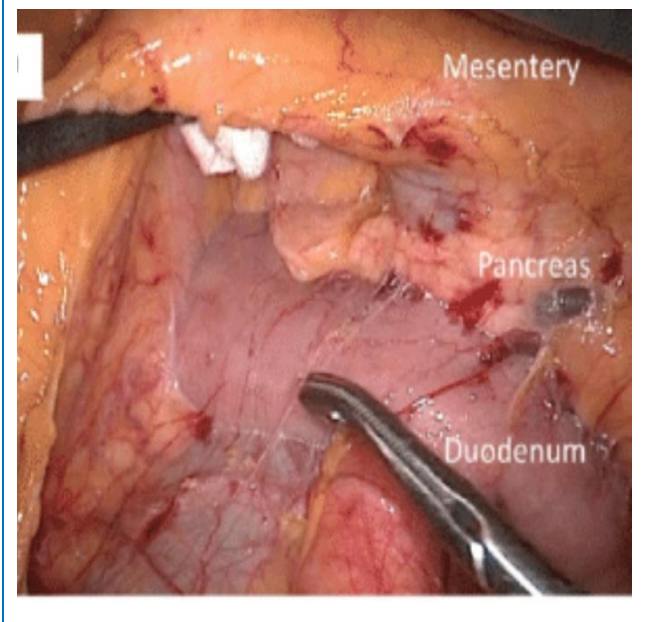
Observed the main pancreatic duct is joined by the bile duct near the left side of the descending part of the duodenum. Identified the posterior and anterior superior pancreaticoduodenal arteries. Inferior pancreaticoduodenal artery is usually the most proximal branch of the superior mesenteric artery. Determined the inferior pancreaticoduodenal artery enters the inferior portion of the head of the pancreas. Returned to the celiac trunk and followed the splenic artery as it passes to the left along the superior border of the pancreas. Identified the splenic artery branches:-

1. Dorsal pancreatic artery
2. Greater pancreatic (pancreatica magna) artery.

Followed the splenic artery to the hilum of the spleen and identified the left gastro-omental artery. The veins of pancreas correspond to the arteries. They drain into the superior mesenteric and splenic veins and ultimately are tributary to the hepatic portal vein. Identified the hepatic portal vein. Superior mesenteric vein and splenic vein join to form the hepatic portal vein posterior to the neck of pancreas. The splenic vein coursed posterior to the pancreas and it's inferior to the splenic artery, used a probe to dissect posterior to the body of the pancreas and Scholar had been found the splenic vein. Followed the splenic vein to the right, where it is joined by the superior mesenteric vein, this is the origin of the hepatic portal vein.

Used scissors to cut the suspensory ligaments of duodenum close to the duodenojejunal junction. Insert fingers posterior to duodenum and free it and head of pancreas, from posterior abdominal wall.

Used scissors to open the stomach. Extended the cut into the first part of duodenum. Rinsed the mucosa and observed major duodenal papilla and minor duodenal papilla.



DISCUSSION

Ayurveda classics define the location of *Pittadhara Kala*, found in "*Pakwa-Amashaya Madhya*". Discussion is being done previously on *Pakwashaya* and *Amashaya*. That is why scholar has considered both the views *Ayurveda* and modern science.

Acharya Sushruta has stated that responsible factor for the generation of heat in the body is known as *Pitta*.^[4] There are five types of *Pitta* and *Pachaka Pitta* is one of them.^[5] *Pachakagni* is described by *Acharya Sushruta*. *Pitta* is often referred to as *Agni*.^[6]

Thus, referring to all the alternative words used for *Agni*, the *Pitta* can also be called as *Anala*, *Pachakagni*, *Jatharagni*.

A careful analysis of the foregoing present for distinct views offered by modern authorities on Ayurveda viz,

- *Grahani* is pyloric orifices.
- *Grahani* is duodenum.
- *Grahani* is small intestine epithelial layer and
- *Grahani* extends from pylorus to ileo-cecum including the two sphincters.
- *Grahani* extends from *Amashaya* to *Pakwashaya*

Charaka Samhita|| According to *Ayurveda Acharya Prof. Dhamodar Sharma Gowda*, *Grahani* may be called as: *Agnisthana*, *Agniadhisthana*, *Agnaashaya*, *Anthrani*, *Antrashaya*, *Kshudrantra*, *Kshudrantavayava*, *Grahani*, *Grahaninadi*, *Tejapata*, *Dahanashaya*, *Pakwamashayamadyampachhamanashaya*, *Pachakashaya*, *Pittadharakala*, *Pittashaya*, *Purithat*. The anatomy, physiology and pathology of *Grahani* may be summarized as follows- According to Dr. Bynarjee Anatomically *Grahani* is situated

1. Above the *Nabhi*
2. Between the *Pakwashaya* and *Amashaya*
3. At the gate of *Pakwashaya*
4. It is like a membrane (*Kalaa*). Physiologically
5. Seat of *Agni* (*Agyadhisthanam*)
6. Receptor of food

7. It activates and suppresses the strength of the *Agni*
8. Forcibly separates and digests the undigested food
9. Evacuates the fully digested food by side. Pathologically
10. Evacuates the undigested food before being digested. All these indicate the seat of *Grahani* to be in the small intestine.^[7]

CONCLUSION

By considering all authors view about *Grahani* (*Pittadharakala*) is *Agnisthana* and is also called *Agnaashaya* and *Kshudrantara*, *Pakwaamashaya Madhyam*. *Pittadharakala* is nothing but where the *Pachaka Pitta* secrets. According to *Chakrapani*, *Adhoamaashaya* means small intestine up to ileo-cecal junction. *Grahani* means small intestine. According to *Sushrut Pittadharakala* is present in *Amashaya* and *Pakwashaya* means it is a epithelial layer present in stomach and small intestine and cecum and ascending colon, which is nothing but lining epithelial of intestine. This layer helps for digestion and absorption. The plica circularis play very important role to hold make the area 8 times more distension and helps for *Grahana* (*Grahanathgrahani*). *Sharangadhar* says - *Pittadhara Kala* lies between *Amashaya* and *Pakwashaya* ||. Dr.B.N.Bynarjee - *Grahani* means the whole of small intestine||. As per the *Grahaniroga / Tropical Spure*.

Usually atrophy of small bowel ulceration and erosions of the ileum or destruction of the internal villi or secondary changes. It may be stated that in general *Grahanidosa* may represents the function of small bowel in ileum or changes in the structure or small intestine. *Nabhi* means umbilicus, diaphragm, heart, umbilical region, centre point, *Kostanga* as per reference.

Grahani is not a *Kostanga* by three main authorities, *Charaka*, *Susruta*, and *Vagbhata*. Above *Nabhi* (*Nabhirupari*) is not a seat of duodenum.

On the basis of discussion, it is clear that anatomical structure *Kshudrantra* i.e., small intestine is the particular structure where *Pittadhara Kala* lies i.e., *Pakwashaya - Amashaya Madhya*. Anatomically

Pittadhara Kala is extended from the distal end of stomach upto the ileocaecal junction.

So, it can be concluded that in *Ayurveda*, *Pachaka Pitta* with the help of *Samana Vayu* and *Kledaka Kapha* performs the *Pachana Karma*. *Kledaka Kapha* helps in binding of the food particle to villi and microvilli and *Pachakagni* provides energy or ATP for active transport in process of absorption. These two process *Kledaka Kapha* and *Pachakagni* are assisted by *Samana Vayu*. It resembles with the process of digestion described in modern science. The factors are responsible for *Shoshan* in *Pittadhara Kala* (i.e., *Kshudrantra*) are *Samana Vayu*, *Pachakagni* & *Pachaka Pitta*. *Plicae circulares*, villi, and microvilli enormously present in small intestine. It means greater the surface area, greater the absorption of nutrients will take place. *Pakwam Cha Vimunchati* is propagating remaining *Kitta Bhaga* (unabsorbed material) of residual part which is left behind absorption of *Sara Bhaga* (*Ahara Rasa*) and sending it further for next process at *Pakwashaya*.

REFERENCES

1. Shastri Ambikadutta, Sushruta Samhita Ayurveda Tattva Sandipika, 1st edition Varanasi: Chaukhambha Sanskrit Sansthan; 2104. Vol. I, Su. Sharir 4/18 page 40.
2. Tortora Gerard J & Grabowski Sandra Reynolds. Principles of Anatomy and Physiology: eighth edition, 1996. Chapt 24. p783
3. Patrick W. Tank, Grant's dissector 15th edition, Lippincott Williams & Wilkins, a Wolters Kluwer business, Two Commerce Square, 2001 Market Street Philadelphia, PA 19103, page-107.
4. Shastri Ambikadutta, Sushruta Samhita Ayurveda Tattva Sandipika, 1st edition Varanasi: Chaukhambha Sanskrit Sansthan; 2104. Vol. I, Su. Sutra 21/5 page 112.
5. Kaviraj Atridev Gupta, Astang hradaya, Vidyotini hindi Commentary, edition 2018 Chaukhamba prakashan 2018, astang hradaya sutra- 12/10 Page-121.
6. Shastri Ambikadutta, Sushruta Samhita Ayurveda Tattva Sandipika, 1st edition Varanasi: Chaukhambha Sanskrit Sansthan; 2104. Vol. I, Su. Sutra 21/10 page 115.
7. Bynarjee Dheku. Parishabdha shabdhartha shariram. Ayurveda Sharira Prusta 282.

How to cite this article: Arvind Kumar Yadav, Rita Marwaha, Pankaj Gupta, Niraj Gole, Ravindra Singh Baghel. An anatomical approach to Grahani on the basis of Cadaveric Dissection - A Cadaveric Case Study. J Ayurveda Integr Med Sci 2022;11:238-244.

Source of Support: Nil, **Conflict of Interest:** None declared.
