

A CRITICAL STUDY OF UDARMARMA W.S.R. TO SADYAHAPRANHARA EFFECT OF ABDOMINAL TRAUMA

[Navneet Kaur](#)

Assistant Professor, Dept. Rachna Sharir
Guru Nanak Ayurvedic Medical College and Hospital, Sri Muksar Sahib, Punjab, India

Corresponding Author: rajbirgrover11@gmail.com

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ABSTRACT

Marma Vigyana is like an ocean full of the knowledge of vital points, their *Ayurvedic* and modern anatomy, and its applied aspect of traumatology. *Marmas* are complex anatomical sites, where definitive physiology rests & produces specific traumatic results. An even partial injury to a vital spot could entail death or any complication, and injury to the neighboring part by cutting, breaking, burning, and tearing should be known to have features similar to those of *Marma*, so a surgeon has to consider their location and measurements carefully before carrying out surgical procedure. In this regard the present study entitled “A critical study of *Udar marma* with special reference to *Sadhya pranhara* effect of abdominal trauma” has been conducted to rehabilitate faith in ancient observations.

Keywords: *Marma, Udar marma, Guda, Vasti, Nabhi*, Abdominal trauma, Peritonitis, Shock.

INTRODUCTION

The ancient healthcare system is the mother of sciences and played a large role in the integration of early culture. *Marma Vigyana* is like an ocean full of the knowledge of vital points, their *Ayurvedic* and modern anatomy, and its applied aspect of

traumatology. The description of *Marma* is only mentioned in *Ayurvedic* anatomy. The specific points on the body, which are a confluence of *Mamsa, Sira, Snayu, Asthi, and Sandhi* and are very vulnerable to trauma, are known as *Marma*. Any trauma to these

places may lead to death and many other complications regarding physiological and anatomical functions. Even diseases affecting these vital parts have a bad prognosis. Trauma is a frequent cause of death in the first four decades of life, and it remains a major public health problem in every country regardless of socio-economic development. The abdomen is the third most common injured region, with surgeries required in 25% of cases. A surgeon or physician needs to know the important structures that are extremely vital and special consideration is to be taken while performing any surgical procedure like *Ksharkarma*, *Agnikarma*, *Siravedha*, *Vish prayoga*, because a person even with torn and mutilated trunk and skull, body parts injured with weapons or leg, arm, foot and hand severed completely can survive if injuries are not inflicted on *Marmas*.

MATERIAL AND METHODS

Udar marmas are the *Sadhyapranhara Marmas* i.e., proved to be fatal when subjected to trauma in *Ayurvedic* texts. So many studies were done on individual *Marma* of *Udara* by research scholars but there is a need to prove whether these body parts are fatal in the present scenario where there is a lot of surgical or technological advancement in managing traumas and their complications. Considering these factors, a critical study of *Udarmarma* with special reference to *Sadhyapranhara* effect of abdominal trauma has been planned to rehabilitate faith in ancient observation. In this work, the structural limitation of *Udarmarma* has been done based on classical literature and a correlation has been set up with modern literature. Structures present under *Marma* have been clarified by dissecting a cadaver. To justify the ancient observations of *Sadyahapranhara* effect of *Udarmarma*, traumatic effects of abdominal trauma and *Marmaghata Lakshana* of *Udarmarma* have been compared by reviewing available post-traumatic data. By reviewing various texts and observations it is ascertained that even though the advances in modern surgery have reduced mortality and also reduced the percentage of defects of trauma. The *Sadhyapranharatav* of *Udarmarma* still holds the relevance even today.

UDARMARMA: CRITICAL REVIEW

During the *Vedic* period, the knowledge of *Marma* was the subject of martial art, King's warriors, and was used on battlefields but later on it was developed as a field of research during *Samhita* period as healing therapy during Buddhism and now a day is important for the preventive purpose for both trauma and disease. In *Ayurvedic* literature, the term *Udara* is used for *Kukshi* i.e., for the abdomen. *Udarmarma* are the *Marma* or vital points of the abdomen named *Guda*, *Vasti* and *Nabhi*. The determination of the location of *Marma* can be done based on its *Panchvidha* classification. For measurement of *Marma*, the scale is *Anguli Pramana*. *Acharya Charaka* has clarified that the size and measurement of every *Marma* should be measured by using the breadth of his finger and named it "*Swanguli Pramana*"⁽¹⁾. Practically, it may be taken as 2 cm. Another important parameter to locate the exact site of *Marma* is *Marmabhighata Lakshna* i.e., the symptoms produced after injury on that particular point.

Guda: *Guda* is described anatomically and physiologically as *Pranayatana*⁽²⁾ ⁽³⁾ *Koshtanga*⁽⁴⁾, *Purishvaha Srotasa*⁽⁵⁾, *Karamindrya*⁽⁶⁾, *Bahirmukh Srotasa*⁽⁷⁾, *Sthana* of *Apan Vayu*⁽⁸⁾, *Mamsamarma*⁽⁹⁾. *Ashtanga Sangraha* named *Guda* as *Dhamani Marma* instead of *Mamsa Marma*⁽¹⁰⁾.

Panchvidha classification of Guda Marma

1. *Shadanganusaar - Udara Marma*
2. *Rachna - Mamsa (Sushtuta), Dhamani (Vagbhata)*
3. *Parimaan - Svapanitala (Acharya Sushruta), Atampanitala (Vagbhata), 4 anguli (Acharya Dalhan)*
4. *Parinaam - Sadyahapranhara*
5. *Panchbhoutik – Aagneye*

Location: All the *Samhitas* stated that *Guda Marma* is attached to the large intestine which expels flatus and feces and injury to it leads to a quick death.

Limitation of Guda Marma

According to the description in *ayurvedic* literature, *Guda* is divided into two parts named *Uttaraguda* and *Adhraguda*. *Uttarguda* is a place where fecal matter is collected and may be considered as rectum while



Adharguda expels feces and takes as anal canal. But the *Parimaan* of *Guda* as *Marma* is "*Swapanitala*" which is equal to four *Anguli* clarified by *Acharya Dalhan*. The total length of the anorectal canal from the anal verge to the rectosigmoid junction is 16.5 cm. Thus, *Guda Marma* may be considered as a distal 7-9 cm anorectal segment, including a 3-4 cm anal canal.

Cadaveric dissection

The dissection of the rectum and anal canal reveals that the area of *Guda Marma* includes the structures from the anal verge up to the middle Houston valve. These include external musculature, external and internal anal sphincters, anal valve and sinuses forming dentate line, terminal branches of superior and inferior rectal arteries, and corresponding venous plexus and the distal third of rectum up to middle Houston valve.

Traumatic Effects of *Guda Marma*

The instant death due to injury in this region can be possible under two circumstances, the extensive primary neurogenic shock; turns into peripheral vascular failure, and this may lead to death. Because injury to the muscles around the *guda* may damage sympathetic (L₁-L₂) and parasympathetic (S₂, S₃&S₄) nerves through the superior rectal plexus. Sympathetic nerves are vasoconstrictor, inhibitory to the rectal musculature, and motor to the internal sphincter. Parasympathetic nerves are motor to the musculature of rectum and inhibitory to the internal sphincter. Any injury to this area may cause severe pain and shock which may lead to death. Death following hemorrhagic shock is due to profuse bleeding from rich venous plexus around *guda*, internal rectal venous plexus lies in loose submucosa of the anal canal and external from the level of the dentate line to the

anorectal ring. The six collecting venous plexus unite to form the superior rectal vein- an important tributary of the portal vein, which pierces the rectal wall approximately 7.5 cm above the anus. The lower part of the external rectal venous plexus drains into an external pudendal vein and thence into the internal iliac vein ultimately connected to the portal system. Secondly, hemorrhage due to arterial bleeding has to be considered the cause of death. The anal canal is supplied largely by an inferior rectal artery which is a continuation of the internal pudendal artery branching from the internal iliac artery. The superior rectal artery supplying the lower third of the rectum is a direct continuation of the inferior mesenteric artery (systemic artery). An injury to these may cause profuse bleeding leading to shock and death. Wounds of the colon and anorectal region are one of the most severe groups of injuries. After control of hemorrhage and shock the greatest mortality results from sepsis. The level of peritoneal reflection on the rectum is approximately 7.5 cm from the anorectal junction. Any penetrating injury in this region may cause severe peritonitis which may result in death.

VASTI:

Vasti is described as one of *Trimarma* ⁽¹¹⁾, *Dashpranyatna* ^{(2) (3)}, *Koshtanga* ⁽⁴⁾, *Mutrashya* ⁽¹²⁾, *Mutravahasrotasa* ⁽¹³⁾, *Pranayana* ⁽¹⁴⁾, *Pratyanga* ⁽¹⁵⁾ and one of *Mahamarma*. The shape of *Vasti* is mentioned as that of *Alabu* (gourd), a reservoir of urine covered with a network of *Sira* and *Snayu* and considered "*Pranayatanamuttamam*" ⁽¹⁶⁾.

Location: *Vasti Marma* is explained as a *Snayu Marma* with scanty musculature and blood, situated inside the pelvis, is the receptacle of urine and injury leads to immediate death.

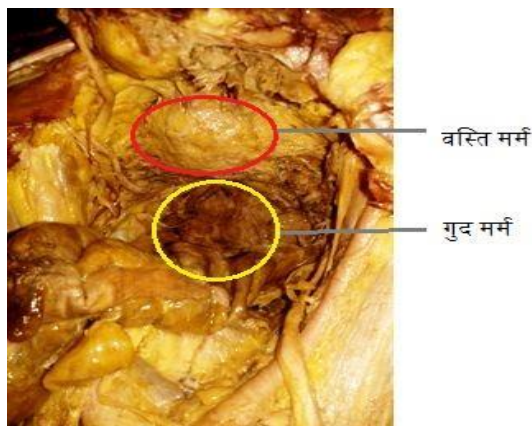
Panchvidha classification of *Vasti Marma*

1. *Shadanganusaar* - *Udara Marma*
2. *Rachna* - *Snayu*
3. *Parimaan* - *Svapanitala* (*Acharya Sushruta*), *Atampanitala* (*Vagbhata*), 4 *anguli* (*Acharya Dalhan*)
4. *Parinaam* - *Sadyahapranhara*
5. *Panchbhoutik* – *Aagneye*

Limitation of Vasti Marma: The overall description found in classics confirms that *Vasti* is *Mutrashya* or reservoir of urine and is situated in the pelvis, below the *Nabhi*. Hence, we may consider it as the urinary bladder.

Cadaveric Dissection

The dissection of the urinary bladder confirms that *Vasti Marma* comprises a urinary bladder having one orifice directing downwards, the base is related to seminal vesicle and vas deferens on each side and the superior surface is covered with peritoneum and anteriorly is related to the bones of the pelvis.



Traumatic Effects of Vasti Marma: Peritonitis due to rupture of the bladder is the leading cause of death in urinary bladder injuries. Intraperitoneal rupture of the bladder may be produced generally due to blunt trauma at the posterior and upper surface by blows, crushes or kicks on the hypogastric region especially when it is distended with urine. Sometimes very slight violence may rupture the bladder without any external sign of injury. Extraperitoneal rupture of the bladder is due to pelvic fractures most often occurring from contusion to the lower abdomen or the symphyseal region. Death may occur suddenly from shock but usually occurs in three to seven days from peritonitis due to extravasations of urine in the peritoneal cavity. The untreated ruptured bladder has a higher (100%) mortality rate. *Acharya Sushruta* had given special attention to the traumatic effects of *Vasti Marma* during extraction of calculi, if it is injured on both sides the person does not survive, if injured on one side an ulcer develops through which urine flows out, it

heals with difficulty after great efforts. Even in the modern practice of surgery, surgeons are instructed to give an incision at 2.5 cm above pubic symphysis, because there is no peritoneum at this level, and the approach to the bladder is safe.

NABHI

Nabhi is described as *Tundkupi*, *Udravrta*, chief, *Chkarmadhyam*, *Kshatriya*, *Pranangam*, *Mrignabhi*, *Chakarpindika*, *Tundi*, *Tundika*, *Kasturi*, and navel⁽¹⁷⁾ -⁽²⁴⁾ as one of the *Pranayatana*⁽²⁾ ⁽³⁾ and *Koshtanga*⁽⁴⁾, as a *Pratyanga*⁽²⁵⁾. *Nabhi Marma* is situated between the intestines and stomach, is the seat of origin of blood vessels, and leads to immediate death on injury⁽²⁶⁾. It is said to be the seat of origin of both *Dhamani* and *Sira*⁽²⁷⁾, as the seat of *Agni*⁽²⁸⁾ and *Prana*⁽²⁹⁾.

Location: *Nabhi Marma* is situated between *Pakvashya* and *Amashya*, is the seat of origin of blood vessels, and injury leads to immediate death.

Panchvidha classification of Nabhi Marma

1. *Shadanganusaar - Udara Marma*
2. *Rachna - Sira*
3. *Parimaan - Svapanitala (Acharya Sushruta)*, *Atampanitala (Vagbhata)* 4 *anguli (Acharya Dalhana)*
4. *Parinaam - Sadyahapranhara*
5. *Panchbhoutik - Aagneye*

Limitation of Nabhi Marma:

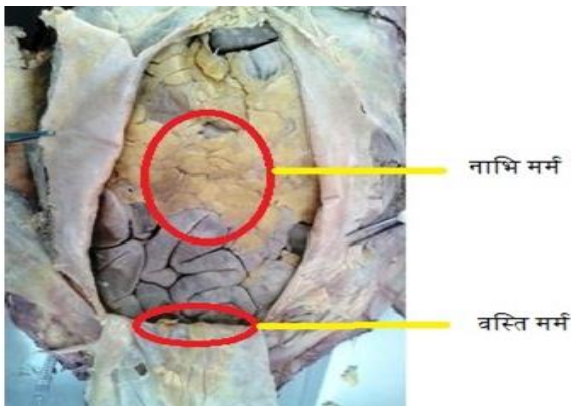
Nabhi Marma is termed *Sira Marma* located between *Pakvashya* and *Amashaya*. It is *Sadyahapranhar Marma* of four *Anguli* in extent. It is the root of all the *Siras* and is a coiled landmark over the center of the abdomen and is "*Mandlakar Chakrmadhayasya*" i.e., like the rounded central point of the wheel. This denotes *Nabhi* as the umbilicus. This description belongs to the fetal life, because of umbilical vessels. There are arteries and veins both of which play a vital role in fetal nutrition. After birth, there is no apparent relation between *Nabhi* and blood vessels. But there are certain structures such as the pancreas, part of the duodenum, transverse colon, coils of the small intestine, and major blood vessels behind *Nabhi* which may result in a fatal response. The umbilical region is 9.5 cm in length. *Nabhi* as the *Marma* may be

considered as the region extending in the premises of four *Anguli Pravistar* of the umbilicus.

Cadaveric dissection

The dissection of the abdomen comprises those structures under *Nabhi Marma* are:

- Skin and superficial fascia, cutaneous vessels, aponeurosis of abdominal muscles, anterior rectus sheath, rectus abdominis, posterior rectus sheath, anastomosis of superior and inferior epigastric vessels, peritoneum, ligamentum teres (rudiment of an umbilical vein), lateral umbilical ligament (rudiment of umbilical artery).
- Contents of abdominal cavity- a part of pancreas and duodenum, section of transverse colon, coils of the small intestine, lower aspects of left and right kidney, abdominal aorta and its branches, inferior vena cava and its tributaries, celiac ganglion, and plexus.



Traumatic Effects of Nabhi Marma: The foremost cause of death due to injury at umbilical region is hemorrhage resulting from major vascular injuries i.e., abdominal aorta and inferior vena cava. Penetrating injuries to aorta and branches are difficult to treat due to excessive hemorrhage. Due to its deep location and heavy pressure, it is difficult to ligate. A typical case of portal venous system injury required about 12 units of blood if immediately treated. Other visceral penetrating injuries are highly lethal, even blunt trauma can cause death. Duodenal and pancreatic injuries have more vulnerability than other viscera, due to close association with great vessels, and oozing of material in the peritoneal cavity may cause chemical

peritonitis. The liver is easily lacerated and ruptured even from mild violence if it is fatty congested, enlarged, or diseased. The damage is usually fatal as bleeding from the organ is hard to stop. Bowel injury is more common in domestic violence. The jejunum is the commoner site of rupture followed by the ileum, duodenum, caecum, and large intestines. Blunt trauma over there has higher mortality due to greater problems in diagnosis and penetrating trauma may cause the release of content in the peritoneal cavity having a higher risk of contamination which may lead to death due to septic shock.

Sadyahapranharatav of Udarmarma

Non-perception of sense objects, perversion of mind and intellect, and severe pain of various types appear when *Sadyahapranhara Marma* is injured⁽³⁰⁾. Following are the facts mentioned in *Ayurveda* to elucidate *Sadyaharahara* effects of *Marma*:

- *Sadyahapranhara Marmas* are *Aagneye* in nature as qualities of *Agni* are extinguished quickly the patient dies immediately⁽³¹⁾.
- The four types of blood vessels which maintain the body by nourishing ligaments, bones, muscles, and joints are generally present in *Marma*. On the injury to *Marma*, the aggravated *Vayu* pervades these blood vessels all around, produces severe pain in the body, and causes loss of consciousness leading to death^{(32), (33), (34)}.
- Blood vessels around *Marma* if injured, depletion of *Dhatu*(tissues) takes place due to copious loss of blood; by that *Vayu*, getting increased produces severe pain, causes an increase of *Pitta* which in turn produces thirst, emaciation, toxicity, severe perspiration, weakness and looseness of the body; such a body gets carried away by death⁽³⁵⁾.
- Generally, *Kapha*, *Vata*, and *Pitta* as well as *Rajas*, *Sattva*, and *Tamas* along with souls stay in *Marma* that is why patients do not survive if injured on *Marmas*⁽³⁶⁾.
- The predominance of all the five constituents such as *Mamsa* etc., in a *Marma*, makes it a *Sadyahapranhara*, absence of one of them or presence in less proportion will make it naturally belong to other kinds in respective order⁽³⁷⁾.

In the case of the trauma of *Marma* areas of *Udara*, hemorrhage is the cardinal feature that reflects its vulnerability, but all depends upon the model, size, extent, and intensity of trauma, the time elapsed between trauma and hospitalization, and its management. If *Sadyahapranhara Marma* is pierced at the end of the margin it leads to death after some time⁽³⁸⁾. *Udarmarma Abhighata* is often presenting with hemorrhagic/ hypovolemic shock associated with serious infections. If emergently hemorrhagic shock is treated with great effort, peritonitis may result in septic shock which is more difficult to treat. In such cases, mortality can be delayed by skilled clinical assistance. Sometimes serious postoperative complications may occur, in such consequences patient may succumb in weeks to months if not treated properly and *Sadyahapranhara Parinaam* may change into *Kalantarpranahara*.

Clinical Correlation

Kapil Chhabra et al⁽³⁹⁾ observed in a study of abdominal trauma that at the time of admission, 32% of patients were in hemorrhagic or septicemic shock and the mortality rate among them was 15.6%. Hemorrhagic shock was present in 10 out of 12 patients who eventually died. This indicates that the mortality rate is significantly greater in patients with hemorrhagic shock at the time of admission. Kulkarni et al⁽⁴⁰⁾ conducted a study of traumatic perforation peritonitis at Bharati Medical College Sangali, Maharashtra in which 102 cases of perforation peritonitis due to trauma were analyzed. The type of trauma, age of the patient, the time duration between trauma and hospitalization, presence of shock on admission, associated pre-existing illness, site of perforation and its treatment, and postoperative complications were noted. The risk factors for mortality were evaluated as: The incidence of trauma was more in males and younger age group of 21 to 40 years. Seventy-one patients had blunt and thirty-one had penetrating trauma. Ileal perforation was the most common i.e., 48 cases followed by jejunal 29, colonic 10, gastric 8, duodenal 5, and rectum 2. Twelve patients out of 22 above fifty succumbed; six patients

expired out of eleven patients who had delayed admission after 12 hours of trauma. Eight patients had pre-existing illnesses out of which six expired. Ten patients expired out of eighteen who were admitted in shock. The presence of pelvic or spine fractures increased the mortality as three out of five patients expired. Nine out of eleven patients expired who had postoperative complications.

DISCUSSION

Definitely, in present days, the management of surgical cases has much improved or has been made easy. No doubt the advancement in surgical techniques like the invention of minimally invasive surgery such as laparoscopy, in case of abdominal trauma can help in treating acute surgical problems and made an easier approach yet the anatomical importance of *sadyahapranhar* remains, particularly when such cases do not get proper and instant ambulatory help or when pre-hospital management is not available. The post-traumatic stage has achieved a lot of progress through research and experience, which has changed the scenario of the traumatic result. Those which were instant fatal have been replaced by recovery, but the residual post-traumatic effect cannot be overruled. This further confirms the findings of *Sushruta* that a *marma* of one *parinama* may change into the other i.e., *sadyahapranhara* to *kalantarpranahara* as per insanity of trauma, the kind of inflecting instrument used, loss of tissue suffered, the time elapsed between trauma and medical aid and kind of service including the status of the hospital with medical force available to the patient. The alteration in any above condition will influence post-traumatic *parinaam*. Hence, these *sadyahapranhar marmas* still hold relevance even today. This is an appreciation for ancient *acharyas*, who had made such a keen observation in the absence of modern advances in surgery and provided a better approach to surgical or medical practices. It is important to have not only the structural knowledge or morphological details of *marma* area, but the knowledge of minute details of gross and microscopic anatomy is also required to become a good surgeon. The knowledge of *marma* never goes in vain but it

keeps the practitioner all the time careful and conscious while performing any treatment like *shastrkarma*, *ksharkarma*, *agnikarma*, and *panchkarma* procedures.

CONCLUSION

By discussing the whole, it can be concluded that even though the advances in modern surgery have reduced mortality and also reduced the percentage of defects of trauma. The majority of people cannot receive immediate advanced treatment after trauma, especially in rural regions or people below the poverty line are unable to afford the expensive gadgets for advanced treatment. Even with advances in modern technology, all depends upon the skills of the surgeons, who play a major role in all branches including healthy status but mortality due to iatrogenic causes persist especially in abdominal surgeries. Hence, we cannot think of missing the knowledge of *udarmarma*, only because of the latest knowledge and treatment, and should not forget the principles laid down by ancient *acharyas*.

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