



ANATOMICAL & PHYSIOLOGICAL CONCEPTS OF *BASTI* (URINARY BLADDER) IN AYURVEDA

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ABSTRACT

The term *basti* has been frequently used in Ayurveda. *Basti* has been studied as an anatomical structure which is related to *mutra* (urine) as well as *basti* has been described as a procedure in *panchkarma* used frequently in *vata* predominant disorders. Here the *Basti* which will be reviewed is the human anatomical structure or *mutrashaya* (Urinary Bladder) by its classical and modern concepts.

KEYWORDS: *Basti, mutashaya, mutravaha srotas, mutra.*

INTRODUCTION

The human anatomical structure *basti* has been mentioned vastly in ayurveda texts. *Mutrashaya* is the another term which has been used side by side in various places for *basti*. *Basti* has been named as *moola* (basis) of *mutravaha srotas* by both *Charaka*^[1] and *Susruta*.^[2] It has been mentioned as a one of the *kosthanga* in total fifteen *kosthangas*³ by *Charaka* and its development has been understood from maternal elements (*matrij bhav*).^[4] *Susruta* has considered it as a *pratyanga* and one of the seven *ashayas*.^[5] It has been included in three main *marmas* (*trimarmas*)^[6] and has been instructed to protect this part including *shira* (head) and *hridaya* (heart). *Susruta* has classified *basti* region wise under *kosthagata marma*, structural wise under *snayu marma* and result wise (according to traumatic effect) in *sadya pranhar marma*.^[7] *Charaka* and *Vagbhatta* has considered *basti* in ten *pranayatana*s.^[8,9] In *Astang Sangrah* it is also included in seven *mahamarmas*.^[9] *Susruta* has included *basti* in the eight *marmas*^[10] along with *sewani, sukravaha srota, mushka srota, guda, mutra praseka, mutravaha* and *yoni* which should be preserved during surgery along this area. . It is seat of *prana*^[11] and superior *pran ayatana*. *Basti* has been related to urinary disorders in ayurveda including *mutrakriccha, mutraghat* and *prameha*.

Synonyms: *Basti, Mutrashaya, mutraputa. Mutraputaka, mutradhar, maladhar*

Anatomico-physiological view of Basti in Ayurvedic Classics

1. Development

- *Basti, aantra* (intestine) and *guda* (rectum) are the hollow structures formed from the essence of *rakta* & *kapha* which undergoes *paka* by *pitta* associated with entrance *vata* in them at the same time.^[12]

2. Location

- In *Charaka Samhita* the basis of *mutra* is said as the area in between *basti, sthool guda, muska, sewani, sukravaha srotas* and *mutravaha srotas*.^[6]
- *Vagbhatta* says the location is in the space between the *gudasthi*^[13] and in *kati* region.^[14]
- *Susruta* has also located it in space between *gudasthi* as well as in between *nabhi, pristha, kati, andakosha, guda, vanshana* and *shefa*.^[15]
- *Sharangdhar* has located it below *malashaya*.^[16]

3. Shape

- *Vagbhatta* compares it with shape of a bow.^[14]
- *Susruta* compares it to the shape of a gourd.^[15]

4. Orientation-

- *Susruta* and *Vagbhatta* said that Its mouth (exit) is single and is directed downwards.^[14,15,17]
- *Vagbhatta* mentioned that urine input is from sides thus entrance of urine is bilaterally into it.^[17]

5. Anatomical relations

- In *Astanga Hridaya basti*, *bastishira*, *mehana*, *kati*, *vrishana* and *guda*, all these structures are related to each other anatomically were situated in the space between *gudasthi*.^[13]
- According to *susruta bastishira*, *paurush granthi*, *vrishana* and *guda* are related to each other in between *gudasthi* as they are located along with it.^[15]
- *Mutrapraseka* is the part which is related to mouth of *basti*.^[10]

6. External and internal features

- Both *Susruta* and *Vagbhata* said about it to be less muscular and less vascular.^[14,15]
- Its walls are very thin.^[14]
- It contains a network of *siras*, *snayus*.^[15]
- *Susruta* has mentioned two *peshi* (muscles) in relation with *bastisirsha* (neck of *basti*).^[18]
- The *snayu* which is related with *basti* is of *sushir* type.^[18]

7. Physiology

- *Susruta* described that urinary channels which are related to *pakvashaya* tends to form *mutra* (urine) and continuously fills the bladder like rivers which continuously fill the sea. These urinary channels are minute and have their more minute mouths which are not visible by naked eye (microscopic). These channels bring or form urine continuously and fills *basti* subsequently irrespective of person is awake or asleep. Thus the way urine tends to fill *basti*, the same way when the *doshas* (*vata*, *pitta* and *kapha*) are vitiated they also enter the *basti* and cause *dosha* specific urinary symptoms.^[15]

8. Applied aspects

- *Susruta* has also said that as *vata* is responsible for proper urinary functions, when it gets misdirected due to vitiation, then it causes urinary diseases like *mutraghata*, *prameha*, *sukra dosha* etc.^[15]
- *Charaka* has said that when there is a trauma to the *basti* part then there is cessation in functions of excretion of urine, fecal matter and flatus with pain and discomfort in *vanshana*, *mutrendriya*, *basti* and related area and certain development of certain

pathological conditions such as *bastikundalika*, *udavarta* and pelvic stiffness.^[6]

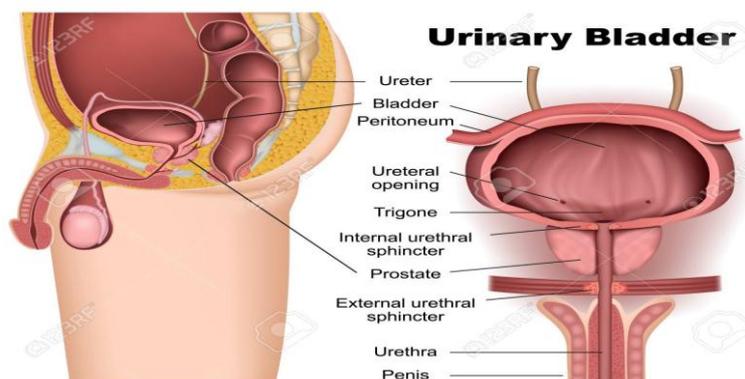
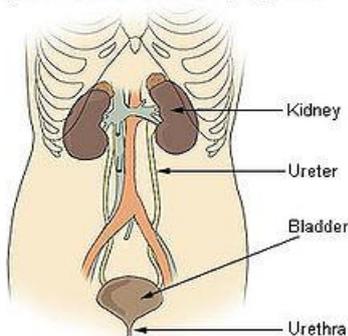
- In development of *prameha* there is vitiation in *dosha* residing in *basti* as well as vitiated *doshas* from other part comes and involve *basti* to increase the frequency of urine abnormally and affecting its nature.^[19]
- If one gets trauma bilaterally in the region related to *basti* (other than surgical cut for *ashmari*) then it is potentially life threatening. Unilateral lesion can be treated with difficulty.^[20]

DISCUSSION

In modern anatomy^[21,22,23,24] we see that urine is formed in kidney and is then stored in urinary bladder through right and left ureters. Kidneys and origin of bilateral ureters is in posterior abdominal wall. Both right and left ureters as they descends into the pelvis are related to several structures before they reach the urinary bladder (*basti*). The right ureter is related to third part of duodenum and left ureter is related to sigmoid colon (*sthoola guda*) and mesocolon which lies anterior to ureter. In pelvis the ductus deferens (part of *sukravaha srotas*) crosses the ureter superiorly and the seminal vesicle lies below and behind the ureter. Post urinary bladder urine is carried by urethra. In males urethra has prostatic and penile part. Penile urethra is inside penis (*shepha*) and structure nearby urethra are inguinal region (*vanshana*) scrotum (*mushka*) and part behind scrotum (*sewani*).

Urinary bladder lies in pelvis and extends upwards as it fills. Pelvis has its anterior wall consisting of pubic symphysis and adjoining parts of the left pubic bones. Posteriorly pelvic wall has sacrum (*kati*), coccyx and anococcygeal raphe. Lateral wall of pelvis has body and ramus of ischium, both ramus of pubis and small triangular surface of ilium. These structures in lateral pelvis wall part of *gudasthi*. *Basti* is situated in the space between this *kati* region and *gudasthi*. As bladder fills it ascend upwards into abdomen and fully filled can reach upto umbilicus (*nabhi*). Sigmoid colon (*malashaya*) lies above urinary bladder. Here we see that the structures which are related to *mutra* and location of *basti* in ayurveda resembles closely as the modern anatomy.

Components of the Urinary System



The shape of urinary bladder is tetrahedral. It has an apex which is directed forwards, base or fundus which is directed backwards and neck (*bastishira*) which is the lower most fixed part of the bladder. In Ayurveda also the mouth of bladder has been written to be directed downwards with one exit. The neck of urinary bladder continues to from urethra (*mutrapraseka*). The ureters open inside bladder on to the base at posterolateral angles of trigone. Rectum (*guda*) lies posterior to bladder in males separated by a peritoneal pouch called rectovesical pouch. The seminal vesicles and ductus deferens also lies between urinary bladder and rectum. The prostate gland (*paurush granthi*) in males lies below neck of urinary bladder.

The ligaments of urinary bladder consists of true and false ligaments

- True ligaments- These are the condensation of pelvic fascia around the neck and base of bladder. Their names are-
 1. Lateral true ligament
 2. Median umbilical ligament
 3. Medial puboprostatic ligament (male) or Medial pubovesical ligament (female)
 4. Lateral puboprostatic ligament (males) or Lateral pubovesical ligament (female)
 5. Posterior true ligament
- False ligaments- These are peritoneal folds, which do not form any support. Their names are-
 1. Median umbilical fold
 2. Medial umbilical folds
 3. Lateral false ligament
 4. Posterior false ligament

The interior of urinary bladder is lined by mucous membrane which is attached loosely to the underlying muscle. In the empty bladder, the mucosa shows numerous folds. These folds get stretched out when the bladder distends. However, on the posterior wall of the bladder is a triangular area where the mucous is adhered to the underlying muscle layer and is smooth. This area is called the trigone of the bladder. The ureters open in this trigone on its upper lateral corners. The urethral sphincters are two muscles used to control the exit of urine from urinary bladder into urethra. The two muscles are either the male or female external urethral sphincter and the internal urethral sphincter. The external urethral sphincter originates at the ischiopubic ramus and inserts into the intermeshing muscle fibers from the other side. The internal sphincter is located at the bladder's inferior end at the junction of the urethra with the urinary bladder. It is continuation of the detrusor muscle and is made up of smooth muscle. In Ayurveda also susruta has mentioned two muscles related to basti (urinary bladder).

The arterial supply of urinary bladder is superior and inferior vesical arteries, obturator artery and branches of the anterior trunk of the internal iliac artery. In females

arterial supply is also from uterine and vaginal arteries instead of inferior vesical.

Venous drainage is to the vesical venous plexus, which is situated along the the space of Retzius (space around inferolateral surface). Most of the lymph supply of the bladder terminate in the external iliac lymph nodes.

Nerve supply of urinary bladder is through vesical nerve plexus derived from the inferior hypogastric plexus. Parasympathetic efferent fibres of this plexus are motor to the detrusor muscle and inhibitory to the sphincter vesicae. Sympathetic efferent fibres are inhibitory to the detrusor and motor to the sphincter vesicae. Voluntary supply to the sphincter urethrae is through pudendal nerve. Sensory impulses of pain are carried through lateral spinothalamic tract and awareness of bladder distension is mediated through the posterior columns.

In modern science we know that there are millions of nephrons per kidney and it is the functional and structural unit of nervous system. Urine is formed in them by filtering blood (glomerular filtration) followed by tubular reabsorption and selective tubular secretion. Then this urine is transported from collecting ducts to pelvis and then respective ureters to be taken to urinary bladder. In ayurveda also while describing formation of urine *Susruta* has mentioned that there are millions of small channels which are not visible through naked eye and they continuously fill the urine bladder.

The diseases mentioned in Ayurveda in relation to *basti* like *prameha*, *ashmari*, *mutraghata*, *bastikundalika*, *sukadosha* etc are all related to *mutavaha* and *sukravaha srotas* having problems of either urine frequency, or deficiency or nature of urine. These all symptoms and conditions are closely related to the *basti* (urinary bladder).

CONCLUSION

Basti which is one of the three *trimarmas* (vital part) in ayurveda is beautifully described in its anatomical and physiological concepts. The knowledge of urinary bladder in modern science closely resembles with the description of *basti* in classical ayurvedic texts. Appropriate knowledge of anatomico-physiological concept of *basti* is necessary for correct diagnosis of disorders of *mutra vaha srotas*.

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