

Relevance of Teaching Methodology of Human Anatomy as Described in Suśruta Saṁhitā

Dr. Jyoti Gangwal¹, Dr. Vikash Bhatnagar², Dr. Sandeep M. Lahange³, Dr. Sanjay Kholiya⁴

^{1,4}PG Scholar, ^{2,3}Associate Professor,

^{1,2,3}Department of Sharir Rachana, ⁴Department of RSBK,

^{1, 2, 3, 4}National Institute of Ayurveda, Jaipur, Rajasthan, India

ABSTRACT

Ayurveda, the science of life which deals with the maintenance of physical, mental and spiritual well-being of an individual has its origin thousands of years ago from *Vedic* period. Among the four *Vedas*, *Atharva Veda* contributes more to *Ayurveda*. *Ayurveda* is also considered as fifth *Veda* or *Upaveda*. According to modern system of medicine, Gray's Anatomy is the anatomical basis of medicine and surgery. But in fact the ancient system of Indian medicine *Ayurveda* has described the detail dissection methodology, nomenclature of human anatomy, clinical anatomy, analogy, method of teaching anatomy which is preliminary for dissection as well. *Sushruta* is called as the father of surgery, but if we undergo the *Ayurveda* books, principals of human anatomy are very specifically mentioned by *Sushruta*, so *Sushruta* should also called as the father of human anatomy. Various *Vedic* texts and other classical literature of Indian civilization provide the evidences for existence of knowledge of anatomy before the upliftment of modern anatomy. Till date, very little is known to the western world about the profound description of the subject present in ancient texts of Indian medicine. Anatomy is widely admired as being one of the foundations of medical field. Studying anatomy by the dissected cadaver is observed as the uniquely explain property of medical courses. Explosion of knowledge in the area of medicine was suitable due to examination of human body by human cadaver dissection. *Acharya Sushruta* was a strong promoter of human dissection as confirm from his *Samhita*. Systematic procedure for the dissection of the human dead body (cadaver) is included by him in his books. *Sushruta* is called as the father of surgery in present era also, but *Sushruta* should also call as the father of human anatomy because he described the essentials of human anatomy very precisely. Present article is my thesis work of Postgraduate degree. In this context some basic concepts are collected and arranged *Sthan* wise to show that scientific and teaching knowledge of human anatomy was very well known to ancient *Acharya*. These are following-

KEYWORDS: *Ayurveda*, *Sushruta*, *Anatomy*, *teaching knowledge*, *human dissection*

INTRODUCTION

Sushruta Samhita is the first and the most authentic text of *Ayurveda* in the specialty of *Shalya Tantra* (Surgery). *Ayurveda* is divided into these eight branches for better understanding of the subject and basic concepts. The basic concepts of any science are fundamental on which it stands. So *Acharya Sushruta* focuses on both theoretical knowledge and practical application of the same. Today, the teacher of *Ayurveda* is awaited not only to be well trained in the theoretical books but also in practical concepts. Now *Ayurveda* has become 'understanding oriented' teaching rather than 'memory oriented'. There are several methods of teaching available but the main objective must be the method selected by the teachers and it should enable the students to learn. In ancient times the main method of teaching was by the demonstration of procedures which may be surgical or other like Rhinoplasty, *Karna Sandhana* etc, prior to which understanding the anatomy is must and hence the teaching methodology adopted by *Acharya Sushruta* is

analysed. The roots of the modern anatomy lie in history of Indian civilization. The present research work is taken to show the eternity of our ancient science. In this we will discuss specifically about the facts of modern human anatomy which were already mentioned in very scientific manner by the *Acharya* of *Ayurveda*.

AIMS AND OBJECTIVES:-

1. To analyze the technique of teaching methodologies prevailed in ancient times and compare it with modern techniques of teaching.
2. To determine the tools adopted for teaching by *Acharya Sushruta*.
3. Scope of ancient anatomy teaching techniques in present scenario.

MATERIALS AND METHODS:-

References related to title will be collected from classical texts of *Ayurveda* especially *Sushruta Samhita*. Various

How to cite this paper: Dr. Jyoti Gangwal | Dr. Vikash Bhatnagar | Dr. Sandeep M. Lahange | Dr. Sanjay Kholiya "Relevance of Teaching Methodology of Human Anatomy as Described in Suśruta Saṁhitā" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-4 | Issue-4, June 2020, pp.156-168, URL: www.ijtsrd.com/papers/ijtsrd30938.pdf



IJTSRD30938

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publications, internet, books related to the history of modern Anatomy, research papers and proceedings of seminars related to the topic are collected and their critical analysis and evaluation is done. Relevant ideas from allied sources on the subject will also be supplemented if required. Humble and honest effort will be made to find some clear concept in anatomy.

NEED OF STUDY:-

Ayurveda, the ancient system of Indian medicine has mentioned about the teaching methodology, dissection methodology, classification and terminology of human anatomy and clinical anatomy in detail. This is a partial view of history of anatomy according to Gray's Anatomy. Various *Vedic* texts, other classical literature of Indian education and *Ayurveda* give the evidence of presence of knowledge of anatomy before the exposition of modern anatomy. The roots of the modern anatomy lie in history of Indian education. The present research work is taken to show eternity of our ancient science about the technique of teaching methodologies, tools adopted for teaching by *Acharya Sushruta* and the scope of ancient anatomy teaching techniques in present scenario.

REVIEW OF AYURVEDIC & MODERN SCIENCE LITERATURE & DISCUSSION OF BOTH THE POINTS-

When we list out the contribution of *Ayurveda* in *Shalya Tantra*, in all first's *Sushruta's* name is seen, like first to describe dissection. The classics of *Ayurveda* have described about the various means to achieve the knowledge which is helpful for the teacher as well as the learner both. In this section some basic concepts are collected to show that scientific knowledge of human anatomy was very well known to ancient *Acharya*.

➤ *Ashtanga Ayurveda*-

Such as *Shalya* (surgery), *Shalakya* (supraclavicular management), *Kayachikitsa* (general medicine), *Bhutvidhaya* (dealing with spirits or micro-organisms), *Kaumarabhrtya* (pediatrics), *Agadatantra* (toxicology), *Rasayanatantra* (promotive therapy) and *Vajikaranatantra* (dealing with aphrodisiacs).

- **Objectives of Ayurveda-** *Ayurveda* have two objectives- Alleviation of disorders in the diseased and maintenance of the health.

WHO goal & objectives- To improve equity in health, reduce health risks, promote healthy lifestyles and settings, and respond to the underlying determinants of health.

To develop and implement multisectoral public policies for health, integrated gender and age-sensitive approaches that facilitate community empowerment together with action for health promotion, self-care and health protection throughout the life course in cooperation with the relevant national and international partners.

➤ **Definition of Swastha-**

Acharya Sushruta told that a healthy person has physical and mental state of equilibrium and has cheerful mind, intellect and sense organs. In present times definition of health given by WHO resembles *Sushruta's Swastha Purusha*.

Health definition-World Health Organization (WHO), defined Health as being "a state of complete physical, mental, and

social well-being and not merely the absence of disease or infirmity". Where mental health is "a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community".

➤ **Definition of Swastha Purusha-**

One whose *Dosha*, *Agni* and functions of *Dhatu* and *Mala* are in the state of equilibrium and who has cheerful mind, intellect and sense organs is termed as '*Swastha*' (healthy).

➤ **Shishyopanayaniyam according to Acharya Sushruta-** '*Upanayanam*' (upa + nayanam) means 'to lead the pupil close to the teacher.' Study even if completed (by reading, but not interpreted with ideas proves only tiresome like the load of sandalwood for an ass. As ass carrying the load of sandalwood feels only the load and not the (fragrance of) sandal, similarly those who gone through many scriptures but ignorant of their ideas only carry like ass.

Today teachers can present the subject to their students with more 3-D images, sequence of images and videos and therefore enhance the educational value. Teachers use board and chalk as the major tool of teaching over the dissection as a standard course of teaching. Plastinates or models are capable to convey far more than man-made, 3-D models, simply because they have come into being via the natural, individual growth of human bodies-models. Most of the students liked the use of PowerPoint presentations (ppt), visual aids along with the use of chalk and board to simply concepts.

➤ **Qualities of a surgeon-**

Fearlessness, swift action, sharpness of instrument, absence of perspiration, trembling and confusion - these are the qualities of surgeon performing the surgical operation.

➤ **Application of instrument (Yantra)-**

Instruments are one hundred and one in number, They are of six types such as - *Swastik Yantra* (cruciform instruments), *Sandansh Yantra* (dissecting forceps or tongs), *Taal Yantra* (spoon-shaped instruments), *Nadi Yantra* (tubular instruments), *Shalaka Yantra* (rod-like instruments) and *Upayantra* (accessory instruments).

➤ **Application of sharp instruments (Shastra)-**

There are twenty sharp instruments such as *Mandalagra* (round-tipped curette), *Kharapatra* (saw), *Vridhipatra* (scalpel), *Nakhashastra* (nail parer), *Mudrika* (ring knife), *Utpalapatraka* (lancet), *Ardhadhara* (single-edged knife), *Suchi* (needle), *Kushapatra* (grass-blade bistury), *Atimukha* and *Shararimukha* (types of scissors), *Antarmukha* (curved bistury), *Trikurchaka* (three-edged knife), *Kutharika* (chisel), *Vrihimukha* (trocar), *Ara* (awl), *Vetasapatraka* (a type of scalpel), *Badisha* (sharp hook), *Dantashanku* (tooth scaler) and *Eshani* (sharp probe).

➤ **Ashtavidha-shastraKarma & Yogya-sutriyam (Principles of practical instruction in surgical operations)-**

According to *Acharya Sushruta*, though a practitioner has fully understood all surgical parameters, but he cannot be competent without *Yogya*. He will fail to conduct surgical methods in human. To solve this problem and to acquire

knowledge as a surgical scholar, he has explained and demonstrated various kinds of *Yogya Vidhi*. *Acharya Sushruta* indicated eight kinds of surgical procedures which are as follows:-

1. *Chedana* (excision)- It means complete removal of a part. For the practice of this method, use different objects like bottle-gourd, pumpkin-gourd, cucumber, water melon etc. Eg. Piles.
2. *Bhedana* (incision)- It means made a cut during surgery. So to learn this procedure, incision should be practiced on a leathern pot or urinary bladder, leather bag filling full of water and mud.
3. *Lekhana* (scaping)- It means to remove from surface by rough instrument forcefully. *Lekhana Karma* should be performed on part of hairy skin for clinical experience
4. *Vedhana* (puncture)- In this method perforation done by pointed instrument. So, this method should be applied on the lotus stalks (*Kamalnaal*) which are smooth, spongy in nature and veins of animal.

5. *Eshana* (probing)- In this method flexible, long, cylindrical surgical instrument used to explore body cavity or lesion. This method should be applied on bamboos, holes in parts of wood damage by moths and opening of dried gourd.
6. *Aharana* (extraction)- This method used to pull out or drag out something. This technique can be applied on fruits having seeds like pulp of *Bilwa* or jack fruit, the dead animal's teeth.
7. *Visravana* (draining)- This method used to remove fluid from cavity by letting it. This procedure should be applied on a part of *Shalmali* wood covered with beeswax.
8. *Sivana* (suturing)- This method used for wound healing by stitching both the ends of wound. This method should be applied on the edges of smooth leather and on the edges of fine nearly tied cloths.

-Application of *Agni* (cautery), *Kshara* (alkaline substance), *Badhana* (bandaging) etc.

➤ *Anjali Parimana of Dosha, Dhatu and Mala-*

According to *Acharya Charaka Anjali Pramana of Dosha, Dhatu and Mala* are as follows-

Dosha, Dhatu and Mala	Anjali Pramana	Dosha, Dhatu and Mala	Anjali Pramana
Udaka	10	Mutra	4
Rasa	9	Vasa	3
Rakta(Shonita)	8	Meda	2
Purisha	7	Majja	1
Shleshma	6	Mashtishka / Shukra / Apar Oja	½
Pitta	5	-	-

➤ *Nasika-sandhana-vidhi-*

Taking leaf of a tree of the size of the nose a flap of the same size adhered from the side of the cheek should be taken out and placed on the tip of the nose after scraping it and unified carefully, when it is unified well, it should be observed with two tubes while elevating if then the powder of *Patanga*, *Yastimadhu* and *Rasanjana* should be sprinkled thereon and the part be covered with white cotton irrigating frequently with sesamum oil. The patient should be given ghee to take in followed by purgation as recommended when he is uncted properly. When it is fully unified and healed the remaining half should be cut off, if it is deficient it should be enlarged and if over grown it should be brought to proper size. Similar is the procedure of unification of the lip except application of tubes. One who knows all this is eligible to become a royal surgeon.

RHINOPLASTY- A rhinoplasty is made up of:-

1. A septoplasty or a submucous resection operation which corrects the septal deformity either by repositioning or by excision.
 2. Osteotomies of the nasal bones which completely mobilize them allowing them to be repositioned or narrowed.
 3. A tip rhinoplasty by which tip deformities are corrected by remodelling the lower lateral cartilages and the caudal end of the septum.
- Reduction rhinoplasty-This is performed for a nasal hump. If it is bony, cutting off the hump with an osteotome will broaden the nose and so it will have to be narrowed by osteotomies. Cartilaginous humps are removed by separating the upper lateral cartilages from the septum and trimming both of these structures to the required height. Details of operations to reduce the height, length or breadth of the nasal tip are outwith the scope of this book.
 - Augmentation rhinoplasty- A saddle nose is seldom bony. It is either cartilaginous only, in which case it can be corrected by a free cartilage graft inserted in the dorsum, or both bony and cartilaginous, in that case a bone graft from the iliac crest is required. Operations to heighten or lengthen the nasal tip are often required to correct the deformities left by a cleft lip and palate. It is seldom necessary, however, to broaden a nasal tip.

➤ *Type of Bandages-*

There are fourteen patterns of bandaging- *Kosha* (finger bandage), *Daam* (sling), *Swastika* (spica), *Anuvellita* (spiral), *Mutoli* (winding), *Mandal* (circular), *Sthagika* (stump), *Yamak* (twin), *Khatwa* (four-limbed), *Chin* (eye-bandage), *Vibandha* (multi-tailed), *Vitan* (cephaline), *Gophana* (T-bandage) and *Panchangi* (five-limbed bandage). Their shapes are almost clarified by the names themselves.

➤ *Pramana Sharir*

Pramana Sharir is defined as the knowledge related to the body in relation to life- span, measurement of parts and sub-parts of the body. The body has been related (regarding measurement) with own fingers. The whole body is 120 *Angula* in vertical

length and if vertical height of the body is same to the horizontal length in position when arms are abducted up to 90 degrees, then it is in *Sama Pramana*. *Sushruta* told about the characters of *Dirghayu Purusha* related to *Sharir Pramana*. In *Ayurveda*, the concept of *Pramana* is used widely in various branches like *Dravya Guna*, *Panchakarma*, *Bhaishajya Kalpana*, *Sharir Rachana* etc. in different ways. Anthropometry is a new branch of modern science which is developed by the concept of *Pramana*. The difference is that in *Ayurveda* the measurements were taken with help of *Swa-Angula*.

➤ Characters of *Dirghayu Purusha*-

He is known as having long life-span who possesses hidden joints, blood vessels and ligaments; compact body parts, firm sense organs and successively better physical areas. Briefly, he should be known as having long life-span who is free from diseases since intra-uterine life and develops gradually with physical and mental qualities.

Characters of *Madhyam-Ayu Purusha*- The characters of one with medium life-span are person with distinct and extensive two, three or more linear marks are present below clavicles; feet and ears are fleshy, tip of the nose raised and streaks in upper portion of the back-he enjoys maximum life-span of seventy years.

Characters of *Alpayu Purusha*-The features of the short life-span; he lives only for twenty five years whose phalanges are short, penis enormously big, criss-cross hairs in chest, back not broad enough, ears positioned upwards from its normal place, nose higher and gums visible while laughing or talking and who looks bewildered.

➤ *Shadanga Sharir* (Concept of regional anatomy)-

Acharya Sushruta has divided the whole body into six regions- four extremities, trunk the fifth and head as the sixth one. Similar to *Sushruta Samhita*, the regional anatomy is considered as key parts or segments of body composition as per modern science. Mainly body divided into head, neck and trunk; trunk further sub divided into thorax, abdomen, back and pelvis and paired upper limbs and lower limbs.

➤ *Sankhya Sharir*-

Acharya Sushruta has described categorical classification and distribution of body parts and sub parts in *Sharir Sthan*. Enumeration of limbs, body organs, regional derivatives (*Pratyanga*), their numbers, *Asthi* (bones), *Sandhi* (joints), *Snayu* (ligaments), *Peshi* (muscles), vessels, differences between organs of men and women, reproductive organs etc. mentioned in this part. For a practitioner, the anatomical knowledge is very essential.

➤ ***Ashaya***-According to *Acharya Sushruta* *Ashaya* is the empty structure of the body having capacity to store some matter in it. In modern science –

1. *Vatashaya* can be considered as pelvic cavity, rectum and anus.
2. *Pittashaya* can be considered as pancreas.
3. *Kaphashaya* can be considered as pair of lungs.
4. *Raktashaya* can be considered as liver and spleen.
5. *Amashaya* can be considered as Stomach.
6. *Pakwashaya* can be considered as intestines and rectum.
7. *Mutrashaya* can be considered as Urinary bladder.
8. *Garbhashaya* can be considered as uterus.

➤ Concept of *Bahirmukha Srotas* (External opening)-

The external openings of body are mentioned in *Ayurveda* under heading of *Bahirmukha Srotas* in *Sushruta Samhita*. These openings also used as routes of drug administration that time. These are two ears, two eyes, one mouth, two opening of nose, one anus and one opening for penis or urethra for male; in females, however, there are three additional openings. These are two in breasts and one for vagina carrying the menstrual blood.

Yogwahi Srotas- The roots (*Moola*) (originating points) of *Srotas* (channels) are-carriers of *Prana* (air), *Anna* (food), *Udaka* (water), *Rasa*, *Rakta*, *Mamsa*, *Meda*, *Mutra* (urine), *Purisha* (faeces), *Shukra* (semen) and *Artava* (menstrual blood).

Name of Srotas	Moola Sthan	Name of Srotas	Moola Sthan
<i>Pranavaha Srotas</i>	<i>Hridaya</i> (heart) and <i>Rasavahi Dhamani</i> .	<i>Medovaha Srotas</i>	<i>Kati</i> and <i>Vrikka</i> (kidneys)
<i>Annavaha Srotas</i>	<i>Amashaya</i> and food carrying <i>Dhamani</i>	<i>Mutravaha Srotas</i>	<i>Basti</i> (urinary bladder) and <i>Medhra</i> (penis)
<i>Udakavaha Srotas</i>	<i>Talu</i> (palate) and <i>Kloma</i> (trachea)	<i>Purishavaha Srotas</i>	<i>Pakwashaya</i> (large intestine) and anus
<i>Rasavaha Srotas</i>	Heart and <i>Rasa</i> -carrying <i>Dhamani</i> .	<i>Shukravaha Srotas</i>	<i>Stana</i> (breasts) and <i>Vrishana</i> (testicles)
<i>Raktavaha Srotas</i>	liver, spleen and blood carrying <i>Dhamani</i>	<i>Artavavaha Srotas</i>	uterus and <i>Dhamani</i> carrying menstrual blood
<i>Mamsavaha Srotas</i>	<i>Snayu</i> (ligament), skin and blood carrying <i>Dhamani</i>	----	----

➤ **Asthi Sharir-**

Acharya Sushruta has given detailed description about *Asthi* (bone) in *Sharir Sthan Sharir-Sankhya-vyakarana-shariram* chapter. According to him total *Asthi Sankhya* are three hundred. According to modern anatomy, bones are 206. Bone is one-third connective tissue. It is impregnated with calcium salts which constitute two-thirds part. In the *Sushruta Samhita* *Asthi* is classified on the basis of fracture in them. Bones are traumatized in different ways. Acharya Sushruta has given due attention to this fact and observed that not all bones show the same effects of trauma or injury. Acharya Sushruta has specifically described the types of fractures occurring in each type of bone.

S. N	Asthi types	Fracture type and Nirukti	Meaning of Bhagna	Bone example as per modern	Common fracture	Word meaning/ meaning of fracture
1.	Kapalasthi	Vibhidhyante-Vidha Vidhane	Fissure, gap, cleaving, perforating, tearing.	Flat bones like skull bones, hip bone, scapula.	Linear, depressed diastatic, basilar.	Widen the suture, displaced inward, transverse break in the full thickness of the skull.
2.	Ruchakasthi	Sphutayante- Sputa Vikasane/ Sputa Bhedene	to burst, split, cracked.			
3.	Tarunasthi	Namayante- Nama Prativatve shabde Cha	To bow, to bend, curve, tear, destroy by pulling down.	Cartilaginous or bones of child (which are not fully ossified).	Green stick fracture.	Bone bends and breaks.
4.	Valayasthi	Sphutayante- Sputa Vikasane/ Sputa Bhedene	Burst, split, cracked.	Ribs	Break in the rib (detach).	Separation, cracking.
5.	Nalakasthi	Bhajayante- Bhajayante Amardane/ Bhujo kautilye	Shatter, break to pieces.	Various long bones like femur, humerus etc.	Transverse, oblique, spiral, communitied.	Perpendicular to the long axis, at an angle, bone fragments scatter.

➤ **Sandhi Sharir-**

Acharya Sushruta described two types of *Sandhi* - *Chala* (movable) and *Achala* (fixed) *Sandhi*.

Achala Sandhi further divided in to eight types- *Kora*, *Ulukhala*, *Samudga*, *Pratara*, *TunnaSevani*, *Vayasatunda*, *Mandala* and *Shankhavarta*. On the basis of the structure and function *Ayurveda* and modern science both are having same classification. Total numbers of joints between bones (*Asthi-Sandhi*) are 210 mentioned in *Ayurveda*.

Name of Sandhi	Modern co-relation	Position	Name of Sandhi	Modern corelation	Position
Kora	Hinge joint	fingers, wrists, ankles, knees and elbows	TunnaSevani	Sutures	bones of skull and pelvis
Ulukhala	ball and socket, gomphosis	axilla, hip and teeth	Vayasatunda	temporomendibular joint	both sides of jaw
Samudga	acromioclavicular, sacrococcygeal, pubic symphysis, and sacroiliac joint	scapula, anus, perineum and pelvis.	Mandala	presents between Peshi (muscles), Snayu (tendons), Sira (vessels)	tubes of throat, eye, and Hridaya-Kloma (trachea)
Pratara	intervertebral joint.	neck and vertebral column	Shankhavarta	cochlea and region of nasal conchae	Shringatakas of ears

➤ **Snayu (ligament)**-The description of ligament is defined in *Ayurveda* as *Snayu*. Acharya Sushruta very well known about the *Snayu* or ligament that time, he told that all the joints of body are bounded by ligaments.

S. N.	Types of Snayu	Meaning	Structure	Place
1.	Pratanvarti	a tendril, a shoot, a low spreading plant, branched	Ligaments, nerves	All extremities and all joints.
2.	Vritta	Round or circular	Tendon, large nerve cord	All circular ligaments should be known as <i>Kandara</i> (tendon). <i>Kandara</i> found in feet, hands, neck and back.
3.	Prithu	Flat, Broad, large or great	Fascia, Aponeurosis	Found in end of stomach and intestines and also urinary bladder.
4.	Sushira	Porous, hollow, cavity	Sphincters	present in sides, chest, back and head

- **Peshi Sharir** - Acharya Sushruta has classified *Peshi* on the basis of covering joints, bones, blood vessels etc. and according to their size, shape, action and also how felt on touching. In modern science the nomenclature of muscles is also based on shape, size, structures etc. These are following:-

S. N.	Peshi type	Shape, type and size	Example in modern science
1.	<i>Bahala</i>	Huge/ Large	Quadriceps femoris, Latissimusdorsi
2.	<i>Pelava</i>	Scanty	Plantaris,Pyramidalis
3.	<i>Sthula</i>	Thick	Gluteus mucle
4.	<i>Anu</i>	Thin	Platysma
5.	<i>Prithu</i>	Flat / Broad	Muscles of skull like Occipitofrontalis, External oblique muscle
6.	<i>Vritta</i>	Round, circular	Orbicularisoculi, Diaphragm
7.	<i>Hrisva</i>	Short	Adductor brevis, Pectoralis minor
8.	<i>Dirgha</i>	Long	Longissimus, Sartorius
9.	<i>Sthira</i>	Hard/ Firm	Coccygeous and Layrengal muscles
10.	<i>Mridu</i>	Soft	Cardiac muscles
11.	<i>Shlakshana</i>	Smooth	Intrinsic muscles of eye
12.	<i>Karksha</i>	Rough	Erector spinae, Lumbaricales, Serratus anterior

➤ **Description of Mukha Avayava (Oral cavity)**

According to Sushruta *Mukha Roga* are sixty five and occur in seven locations such as- *Oshtha* (lips), *Dantamula* (gums), *Danta* (teeth), *Jivha* (tongue), *Talu* (palate), *Kantha* (throat) and whole *Mukha* (entire mouth). As per modern science Oral cavity is bounded laterally by the cheeks, superiorly by the palate and inferiorly by floor to which the tongue is attached. The structures present in the oral cavity are-lips, teeth, teeth root, palate, tongue and oral cavity proper.

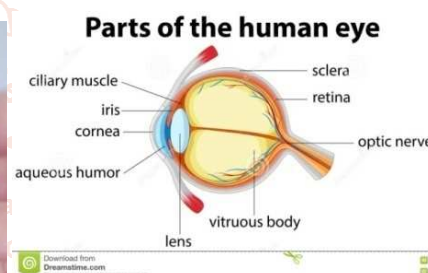
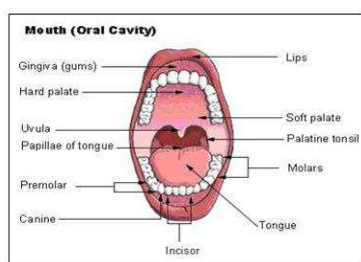


Figure no. 1) Mouth (Oral Cavity) 2) Human Eye ball and its parts

➤ **Description of Nayana Budbuda (eyeball)-**

In Ayurveda eye ball measures two fingers, with the unit of one finger measured by the middle portion of own thumb, inside and two and a half fingers on all sides. It is spherical, shaped like '*Suvrittam Gostanakaram*' means round and resembles the nipple of a cow. The eyeball is the organ of sight. The camera closely resembles the eyeball in its structure. It is almost spherical in shape and has a diameter of about 2.5 cm.

➤ **Mritsanrakshana padhhati-**

According to *Sushruta*, human dead body (cadaver), having all its parts in natural condition not extra or less in number. According to *Sushruta* person whose body going to be preserved must not died by poison. Because of due to poison body parts are affected and body does not remain in its natural state. According to *Sushruta* person whose body going to be preserved should not have died by chronic diseases because these type of diseases damage the body parts. *Sushruta* refuses to take old person's body as well as children's body. Because old person's body parts are get degenerated. On other hand in children body parts are not properly developed. According to *Sushruta* intestine along with faeces should be removed because many bacteria present here and they fastly decomposed the dead body. According to *Sushruta* dead body should be well tied and kept in river which has slow running stream so that dead body has continuous contact with water and skin get soft and moist and prevent body from bad odour. *Sushruta* told that Dead body should be placed inside a cage to protect it from water animals. Dead Body should be wrapped either with *Munja*, *Valkala* (inner barks of trees), *Kusha* (grass part of *PanchTrinamoola*), *Shana* (hemp) or any such material. These materials have property like Antiseptic, Anti-inflammatory, Antioxidant, Antibacterial, Antimicrobial, etc. So these plants help to prevent decomposition of body. And also the reason behind this wrapping is to protect body from small water animals like fish etc. According to *Sushruta* dead Body should be kept in hidden dark place and allowed to undergo decomposition. The reason is the water of that dark place not to be seen by people or not used by people so that infection through water didn't spread to the people. After seven days knowing that dead body has become properly putrified, it should be taken out and wrapping is removed. Scrubbing the dead body slowly with brushes made from *Usheer* (grass), *Bala* (hairs), *Venu* (bamboo), *Valkala* (inner bark of trees), *Kurcha* (grass part of *PanchTrinamoola*) or any other similar material and then the body with all the external (*Bahya*) and internal (*Abhyantara*) parts like the skin, muscles etc. should be fully observed by eyes (*Pratyaksha*). The reason behind slow scrubbing of dead body is to see the minute structures of body parts and different skin layers mentioned by *Acharya Sushruta*.

Procedure of embalming in modern science- In the present day, preservataion of cadaver is usually accomplished by inserting tubes into a large artery (usually the femoral artery), washing out the blood, and then infusing a mixture of formalin (40%

solution of formaldehyde), industrial alcohol, phenol, and glycerin. This mixture ensures that the body is both sterilized and preserved. Glycerin prevents the tissues from becoming excessively hardened, thereby facilitating the process of dissection.

➤ **Sira-**

In our *Vedas* anatomical organization of *Sira* has been described. There is description of hundreds of *Sira* in *Atharva Veda*. These *Sira* are coppery red in color, carry *Ashuddha Rakta* (deoxygenated blood) resembles the venous system of body. Various synonyms and terminology of *Sira* are described in our classics. Different *Acharya* mentioned different synonyms which indicates the features of *Sira* like- A tubular composition like *Nadi*. Some have apertures like *Strotas*. It having blood like *Dhamani*. Origin of *Sira* and *Snayu* is same. Few *Sira* are very fine.

Modern consideration of 4 kinds of *Sira* – In *Vatavaha Sira* perceive the *Aruna Varna* (crimson red color) and fill up by *Vayu* (pulsating property) character indicates that in modern anatomical science these are the characteristics of artery. If we focus on the work of balancing the sense organs and the intellect, then it is suggested that in modern science these functions are normally done by the nervous system. In *Pittavaha Sira* perceive the *Neela Varna* (blue) color, it can be considered as vein in modern pathy vein's color is blue because they convey deoxygenated blood. In *Kaphavaha Sira* perceive the *Gora Varna* (white) color, it can be considered as lymphatics in modern pathy their color is white because they convey clear fluid lymph. In *Rakthavaha Sira* perceive the *Rohini* (red) color and it nourishes the *Dhatu*, so can be considered as capillary in modern pathy because their color is red and interchange the nutrients at tissue level. In *Ayurvedic* texts the nervous system has not been mentioned but the work of the nervous system described by the blood vessels. *Vayu*, which moves in blood vessels, responsible for the functions of nervous system. So, it shows that *Sushruta* involves the nervous web in the circulatory system. So the term *Sira* is considered with lymphatics and the blood vessels is not fanciful and doubtful.

➤ **Dhamani-**

Acharya Sushruta has defined two different origins (*Moola*) of *Dhamani* in his text. He has mentioned *Hridaya* as a *Moola* of *Dhamani* in *Sutra Sthan* and *Nabhi* in *Sharir Sthan*. The reason behind different origin may be that *Dhamani* are the vessels which originate from *Nabhi* during foetal life only although they are directly related with the *Hridaya* after the birth. *Dhamani* means "pulsation", which indicates *Acharya* knows that *Dhamani* (artery) are blood vessels that carry blood away from the heart to whole body. To perform this function *Dhamani* (artery) requires high speed of blood flow and more pressure. Due to this high blood pressure we can feel its pulsation. *Sushruta* has not described about puncturing of *Dhamani* in his text. It shows that he knew that arteries are mostly deeply located in the body and the blood moves with pressure in it so these cannot be punctured easily and if punctured blood will ooze out like fountain in a large area all around the artery.

➤ **Garbha Sharir (Concept of developmental embryology) -**

Garbhashaya (Uterus)- According to *Acharya Sushruta Yoni* (genital tract), resembling in shape with the interior of conch shell, *Yoni* has three folds (*Avarta*), uterus is positioned in the third *Avarta*. Uterus has shape of mouth of the *Rohita* fish. Similar to *Sushruta Samhita*, modern science has given more details about uterus. The uterus is a hollow pyriform muscular organ situated in the pelvis between the bladder in front and the rectum behind. The cervix is the lower, cylindrical part, bounded above by the internal os and below by external os. The cervical canal opens into vagina by external os. In nulliparous woman the external os is circular and small but gets split during delivery, so in multiparous woman the external os is bounded by anterior and posterior lips, both of which are in contact with the posterior wall of vagina. This appearance of external os is a little bit similar to *Rohita Matsya Mukha* which is described in *Ayurveda*.



Fig. no. 4 (A) Cervix of multiparous woman 5,6) (B,C) Mouth of *Rohita Matsya*. 7,8) (D,E) Dissection of uterus showing *Rohita Matsya Mukha* of *Garbhashaya*.

➤ **Garbha Sambhava Samgri-**

A healthy progeny depends on *Ritu*- woman's period of ovulation; *Kshetra*- *Garbhashaya* (uterus); *Ambu* -pervading *Rasa Dhatu* formed by digested food; *Bija* -*Artava* (ovum) and *Shukra* (sperm) of woman and man. Similar to *Sushruta Samhita* modern science also indicates that if there is fusion of healthy sperm and healthy ovum in healthy uterus at appropriate time with proper nutrition, the progeny will be healthy.

➤ **Masanumasika Vriddhi-**

MONTHS	SUSHRUTOKT MASANUMASIK VRUDDHI	ORGANOGENESIS ACCORDING TO MODERN
1st Month	<i>Kalala</i>	Primary germ layers, Blood vessels formation begins, Heart forms & begins to beat, Placenta formation begins, Primitive gut, pharyngeal arches, Limb buds develop.

2nd Month	<i>Pinda/ Pesi/ Arbuda</i>	Heart becomes four chambered, Bone formation begins, Blood cells starts to form in liver, Internal organs continue to develop
3rd Month	5 body parts become conspicuous	Brain continues to enlarge, Bone formation continues, Red bone marrow, thymus and spleen participate in blood formation
4th Month	All the body parts become clear & <i>Chetana</i> appear (double hearted)	Rapid development of body system, Kidney start to work, Passes urine, Nervous system developing, Allowing muscles in your body's limb to flex.
5th Month	<i>Mana</i> becomes enlightened	Vernix caseosa and lanugo cover fetus, Brown fat forms and is site for heat production
6th Month	<i>Buddhi</i>	Gain weight, Skin is pink and wrinkled Brain, lungs and digestive system are formed; CNS is developed to control breathing and body temperature.
7th Month	All the body parts develop	Skin begins to look less wrinkled and much smoother, Fetus 33 weeks and older usually survive if born prematurely.
8th Month	Un-stability of <i>Oja</i>	Body fat is 60% of total mass, CNS and some other system continue to develop.
9th Month	period of parturition	Body fat is 16% of total body mass. Even after birth, an infant is not completely developed; an additional year is required, especially for complete development of the nervous system.

➤ **Garbhotpattikrama-**

Acharya	Organ
<i>Shaunaka</i>	Head
<i>Kritavirya</i>	Heart
<i>Parasharya</i>	Umbilicus
<i>Markandeya</i>	Hands and feet (extremities)
<i>Subhuti Gautama</i>	Trunk (<i>Madhya Sharir</i>)
<i>Dhanvantari</i>	All parts and sub-parts arise simultaneously

➤ **Kala-**

According to *Acharya Sushruta* the *Kala* has been described as interior receptacles for *Dhatu* and act as a separator of *Dhatu* from their *Ashaya*. Types of *Kala* are as follows-

- MamsadharaKala** - The first one is *Mamsadhara* (muscle-supporting/fascia), in which, *Mamsa* (flesh/bodily substance of the *Kala*), *Sira* (veins), *Snayu* (fibrous tissue), *Dhamani* (arteries) and other *Strotas* (channels) are found to spread and branch out.
- Raktadhara** - it is situated inside the *Mamsa* (muscle) and found especially in veins (*Sira*) and in such viscera of the body as the liver and spleen. The epithelial layers of the blood vessels, the hepatic cells, splenic cells and the entire haemopoietic system shall be considered as *Raktadhara Kala*.
- MedodharaKala** - The third one is *Medodhara* (fat-supporting /adipose tissue). *Meda* (fat) is present in abdomen of all persons as well as in the cartilage (small bones).
- ShleshmadharaKala** - it is situated in all joints of living beings. It secretes synovial fluid and lubricates the joints.
- PurishadharaKala** - it is situated in intestines, separates waste products within the bowels. It is situated inside *Kostha* mainly in *Pakwashaya*. The large intestine as a whole and caecum in particular with their inner layers and the mechanism involved with segregation of essentials and non essentials should be considered as *Purishadhara* or *Maladhara Kala*.
- PittadharaKala** - it holds the four kind of solid and liquid foods (in the *Pitta-Sthanam* or biliary region) propelled from the stomach (*Aamashaya* or *Grahani Nadi*) and on its way to the (*Pakwashaya*) intestine for the proper action of the digestive juices upon it. The stomach and duodenum, their inner layers and all the secretions including acids and digestive enzymes draining into these organs should be considered as *Pittadhara Kala*.
- ShukradharaKala** - The seventh one is *Shukradhara* (semen-supporting) which pervades the whole human body of all living creatures. The group of cells of Sertoli and the Tubuli Seminiferous of the testes secretes semen.

➤ **Description of Twacha-** According to *Acharya Sushruta*, *Twacha* has seven layers.

S. n.	Name	Measurement	Disease	Skin layer in modern science
१.	<i>Avabhasini</i>	1/18 <i>Vrihi</i>	<i>Sidhma</i> and <i>Padmakantaka</i>	Stratum corneum
२.	<i>Lohita</i>	1/16 <i>Vrihi</i>	<i>TilaKalaka</i> , <i>Nyaccha</i> and <i>Vyanga</i>	Stratum lucidum
३.	<i>Shweta</i>	1/12 <i>Vrihi</i>	<i>Charmadala</i> , <i>Ajagalli</i> and <i>Mashaka</i>	Stratum granulosum
४.	<i>Tamra</i>	1/8 <i>Vrihi</i>	vitaligo and leprosy	Stratum spinosum
५.	<i>Vedini</i>	1/5 <i>Vrihi</i>	leprosy and erysipelas	Stratum basale
६.	<i>Rohini</i>	1 <i>Vrihi</i>	cyst, scrofula, tumour, elephantiasis and goiter	Papillary layer
७.	<i>Mamsadhara</i>	2 <i>Vrihi</i>	fistula-in-ano, abscess and piles	Reticular layer

➤ **Origin of Organ in Ayurveda**

Name of Organ	Utaptti
Apara	Artava which obstructed below and reaches upwards in Garbhashaya and further develops Apara.
Yakrita, Pleeha	Rakta
Phuphphusa	Rakta Phena
Unduka	Rakta Mala
Antra, Guda, Basti	Rakta, Kapha, Pitta, Vayu
Jivha	Rakta, Kapha, Mamsa
Peshi	Pitta, Vayu, Mamsa
Sira	unctuous portion of Meda with Mridu Paak
Snayu	unctuous portion of Meda with Khara Paak
Ashaya	Vayu
Vrikka, ,	Rakta, Meda Prasadjam
Vrishana	Mamsa, Rakta, Kapha, Meda Prasadjam
Hridaya	Rakta, Kapha Prasadjam

➤ **Enumeration of Anga-Pratyanga**

Anga-Pratyanga	Number
Twaka	07
Kala	07
Ashaya	07
Dhatu	07
Sira	700
Peshi	500
Snayu	900
Asthi	300
Sandhi	210
Marma	107
Dhamani	24
Dosha	03
Mala	03
Sevani	07
Sanghata	14
Simanta	14
YogavahaSrotas	22
Antra	02
Srotas	09
Kandara	16
Jala	16
Kurcha	06
Rajju	04

➤ **Defination of Marma-** In Ayurveda, Marma (vital points) are described as the meeting points of five structures- Mamsa, Sira, Snayu, Asthi, Sandhi. Acharya Sushruta has mentioned 107 Marma on basis of anatomical as well as diagnostic approach in his text. Any injury occurring to these vital structures or organs leads to deformity or death. Sushruta mentioned one of the classification of Marmas based on injury results. These are Sadhyapranahara, Kalantarapranahara, Vaikalyakara, Vishalyaghna and Rujakara Marma.

In present time, the knowledge and importance of Marma is seen in the many sports like cricket eg. Wearing thigh pads, abdomen guards, leg pads, hand gloves, helmets etc. to protect the vital points like Janu, Indrabasti, Gulpha etc. In Chinese medicine the science of accupressure, art of Kungfu

is the outcome of our old art of Marma (vital points) and its therapy respectively. Kalari Payattu (martial arts) is also practiced in Kerala which is equivalent to the Marma Vigyan (science of vital points). Similarly acupuncture found in the Chinese medicine, the art of puncturing the vital points with the fine needles to treat the specific disease.

➤ **Mamsadi Marma-**

Marma	Number
Mamsa Marma	11
Sira Marma	41
Snayu Marma	27
Asthi Marma	08
Sandhi Marma	20
Total	107

Types of Marma according to effect, Panchbhautika composition & Fatal period -

Marma	Numbers	Panchbhautika composition	Fatal period
Sadhya Pranahara	19	Agni	Death within a week
Kalantara Pranahara	33	Agni + Jala	Death by a fortnight or a month
Vishalyaghna	03	Vayu	Death after extraction of the foreign body
Vaikalyakara	44	Jala	Death if injured severely
Rujakara	08	Agni + Vayu	-

➤ **Kostha/Kosthanga-**

Acharya Sushruta has mentioned about Kostha in Sadhyavrana-chikitsitam Adhyaya in Chikitsa Sthan. They are eight in number. Kostha, Kosthanga and Ashaya are interlinked. Kostha can be considered as body cavity, Kosthanga as organs and Ashaya is a place where one or more organs used to live. (e.g. Kaphashaya is place of pair of lungs.) Pathology in any one of above will affect each other. The eight Kostha of Sushruta may be considered as follows-

- Amashaya can be considered as Stomach.
- Agnashaya can be considered as pancreas.
- Pakwashaya can be considered as intestines and rectum.
- Raktashaya can be considered as liver and spleen
- Mutrashaya/ Basti can be considered as Urinary bladder.
- Hridaya (heart)
- Unduka (caecum)
- Phupphus (lungs)

Description of Hridaya (Heart)-

➤ ह-हरति- Takes द-ददाति- Gives य-यच्छति- Move

Heart resembles Pundarika (lotus-bud) and is pointed downwards. If we see heart along with arch of aorta and thoracic aorta, it looks similar to the description mentioned in Ayurveda about Hridaya. The heart is a conical hollow muscular organ situated in the middle mediastinum. It is enclosed within the pericardium. It pumps blood to various parts of the body to meet their nutritive requirements.

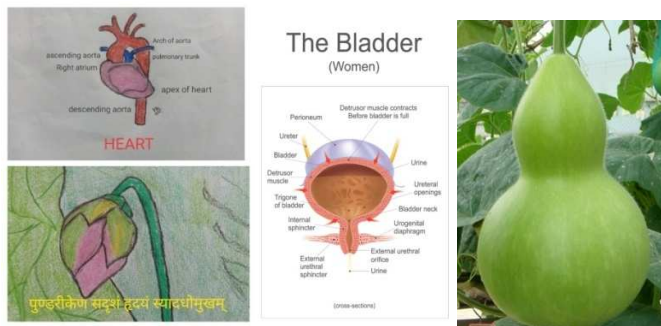


Fig no. 9) Resemblance of Heart with Pundarika 10,11)
Resemblance of Basti with gourd

Description of Basti (Urinary bladder)-

Basti (urinary bladder) is situated in the space surrounded by *Nabhi* (umbilicus), *Pristha* (back), *Kati* (waist), *Mushaka* (scrotum), *Guda* (rectum or anus), *Vankshana* (groin), and *Shepha* (penis) and has single opening, thin wall and facing downwards. *Basti* is like bottle-gourd in appearance and provided with vessels and ligaments. It is the receptacle of urine, base of excrements and an important vital organ. Urinary bladder is the temporary store house of urine which gets emptied through the urethra. The urinary bladder is a muscular reservoir of urine, which lies in the anterior part of the pelvic cavity.

Description of Amashaya (Stomach)- *Amashaya* is located between the *Nabhi* (umbilicus) and *Stanah* (breasts or mammary glands or thorax). *Amashaya* is the seat of *Pitta* and root of *Annavaha Srotas* (channels carrying the food). The stomach is a muscular bag forming the widest and most distensible part of the digestive tube. It is connected above to the lower end of the oesophagus, and below to the duodenum. It acts as a reservoir of food and helps in digestion of carbohydrates, proteins and fats. The shape of the stomach depends upon the degree of its distension and that of the surrounding viscera.

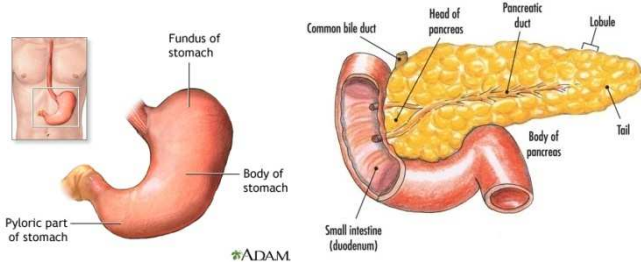


Figure No. 12) Human Stomach 13) Human Pancreas

Description of Agnashaya (pancreas) -

Agnashaya is usually simulated with *Agni Sthana* (place of digestive fire). So, the primary digestion and the onset of metabolism take place in *Agnashaya*. By location, *Agni Ashaya* appears to be the Pancreas. *Agni* means fire, the site of fire is *Agnashaya* or pancreas, the secretions of pancreas i.e. digestive enzymes and hormones like insulin can be compared to *Agni*. The pancreas {*pan* = all; *kreas* = flesh} is a gland that is partly exocrine and partly endocrine. The exocrine part secretes the digestive pancreatic juice; and the endocrine part secretes hormones, e.g., insulin. It is soft, lobulated and elongated organ.

Description of Raktashaya (Ykita, Pliha)-

The *Raktashaya* is located in *Ykita* (liver) and *Pliha* (Spleen). They are called *Raktashaya* because they are haemopoietic organs taking part in the formation and

maturation of blood cells. **Liver** -The liver is a large, solid, gland situated in the right upper quadrant of the abdominal cavity. In the living subject, the liver is reddish brown in color, soft in consistency, and very friable. The liver is the largest gland in the body. It secretes bile and performs various other metabolic functions.

Spleen- Spleen is a lymphatic organ connected to the blood vascular system. It acts as a filter for blood and plays an important role in the immune responses of the body.

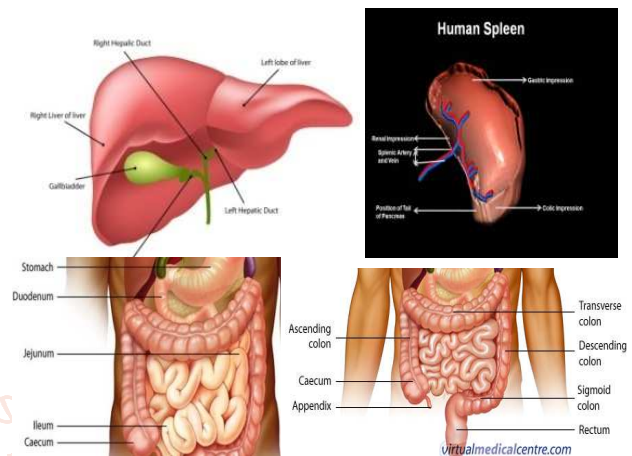


Figure no. 14, 15) Human liver and Spleen 16,17)
Human Small and Large intestine

Description of Pakwashaya -

According to *Acharya Sushruta* the *Pakwashaya* is located above *Vata Sthan* or *Guda* and below *Nabhi* (navel). So the region of Large Intestine located between the anus and navel region is *Pakwashaya* i.e. intestine and rectum.

Intestine- The intestine, which is the longest part of the digestive tube, is divided into long, less distensible, small intestine, and shorter, more distensible large intestine. Food has to be digested, metabolised and stored for expulsion in the intestines. The proximal one and a half parts of duodenum, including liver, gall bladder and pancreas, develop from foregut. The distal two and a half parts of duodenum, jejunum, ileum, caecum, appendix, ascending colon and right two-thirds of transverse colon develop from midgut. Lastly, the left one-third of transverse, colon, descending colon, pelvic colon and proximal part of rectum develop from hind gut.

Description of Guda-

Guda is continuation of large intestine (descending colon) and measures four and a half fingers. Therein are three folds, at the intervals of one and a half fingers, four fingers broad and all risen obliquely up to one finger-they are named as *Pravahani*, *Visarjani* and *Samvarani*. rectum is the distal part of the large gut. It is placed between the sigmoid colon above and the anal canal below. Distension of the rectum causes the desire to defaecate.

anal canal -The anal canal is the terminal part of the large intestine. Anal canal is situated below the level of the pelvic diaphragm. The anal canal is 3.8 cm long. It extends from the anorectal junction to the anus.

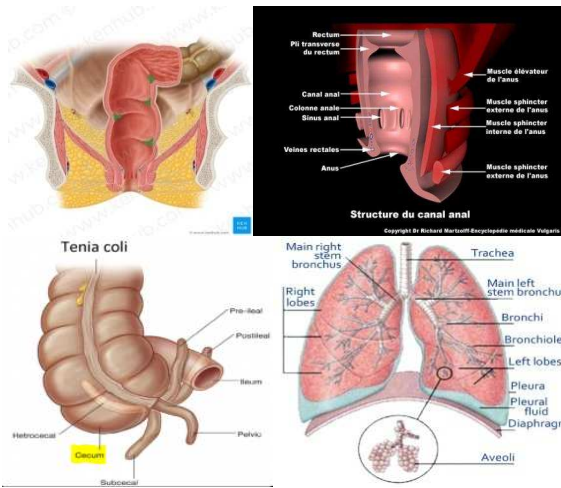


Figure no.18, 19 Human Rectum and anal canal, 20) Human Caecum, 21) Human Lungs

Description of Unduka (caecum)-

Unduka (caecum) is formed by *Rakta Mala Bhaga* (excrete of blood). It is also called *Purishadhara*. Caecum is a large blind sac forming the commencement of the large intestine. It is situated in the right iliac fossa, above the lateral half of the inguinal ligament. It communicates superiorly with the ascending colon, medially at the level of the caecocolic junction with the ileum, and postero-medially with the appendix.

Description of Phupphus (lungs)- Lungs are formed by *Rakta Phena* (frothy blood). The lungs occupying major portions of the thoracic cavity leave little space for the heart, which excavates more of the left lung. The two lungs hold the heart tight between them, providing it the protection it rightly deserves.

Concept of surface anatomy- Surface anatomy (topographic or superficial or visual anatomy) is one of the branches of anatomy. Surface anatomy is a very important part of clinical anatomy for general and systemic examination of patient. *Acharya Sushruta* has described position of some organs like *Amashaya*, *Hridaya*, *Phupphus* etc.; looking at these, it can be said that he also knew about the concept of surface marking of organs.

➤ **History of Anatomy-** The detail study of history of anatomy has been treated under the following heads: (A) Remains of anatomy or anatomy of prehistoric age (B) Anatomy of ancient time [Anatomy of antiquity (Ancient Greece and Rome)], (C) Anatomy of early civilization, (D) Anatomy of primitive period, (E) Anatomy of modern times. Here history of procuring cadaver, cultic preservation of bodies and modern embalming method is described. Besides these, history of anatomy in India is described in following sections: Pre-Vedic period, Vedic period, Post-Vedic period and in modern times.

CONCLUSION

➤ Teaching methodology –

- Learners can understand anatomy quickly and it will be easy to them for learning with the help of power point presentations.
- Dissection method deliver 3-dimensional image of the object and make the students more convenient for learning anatomy.

- Board and Chalk method is mostly old but sometimes it is necessary for learning anatomy in an easy way and it is followed nowadays also.
- *Acharya Sushruta* was the first person who described the human dissection to understand body structures in detail. He also noted the characteristics of various structures and described them accurately by the unique method of scrapping the body layer by layer.
- *Mritasanshodhan Paddhati* [preservation method of cadaver] according to *Acharya Sushruta* has a scientific base at each and every step of preservation like keeping body in water or choosing the plants for wrapping the body, which have the properties of antiseptic, anti-inflammatory, antioxidant, antibacterial, antimicrobial, wound purifying and healing and astringent, which helps to preserve the body.

- The concept of *Shadanga Sharir* of *Sushruta Samhita* considers as the regional anatomy of modern science.
- '*Yogyasutriya Adhyaya*' is an introductory brainstorming context hence new surgical practitioners can grow his surgical capability in a safe and regulated atmosphere.
- *Acharya Sushruta* was the first person who classified *Asthi* (bone) on the basis of their shape or structure and also on basis of particular fracture occurring commonly in them which is mentioned in *Nidan Sthan* of *Sushruta Samhita*.
- *Acharya Sushruta* was classified *Peshi* and gave nomenclature of them on the basis of their size, shape, action which is similar to modern classification and nomenclature of muscles.
- *Acharya Sushruta* has described position of some organs like *Amashaya*, *Hridaya*, *Basti* etc. So, it can be said that he was very well known about the concept of surface marking of organs and its clinical importance.
- In *Ayurveda*, the concept of *Pramana* is used widely in various branches like *Dravya Guna*, *Panchakarma*, *Bhaishajya Kalpana*, *Sharir Rachana* etc. in different ways. Anthropometry is a new branch of modern science which developed the concept of *Pramana*. The difference is that in *Ayurveda* the measurements were taken with help of *Swa-Angula*.
- *Acharya Sushruta* is called the "Father of Plastic Surgery." The concept and procedure of reconstructive surgery has been explained in *Sushruta Samhita* as *Karna Bandhana Vidhi*, *Nasika Sandhan Vidhi* and *Aushtha Sandhan Vidhi*. The lack of anaesthesia in *Ayurveda* has been a nail in the wheel for progress and development of surgery. *Sushruta* has given the base for the surgery and opened the door to develop the field.
- All the eight types of surgical procedures (*Ashta Vidha Shashtra Karma*) and suturing techniques mentioned in the *Ayurveda* are also practiced in modern science.
- The concept of *Garbha Sambhava Samgri* and *Masanumasika Vridhhi* in *Garbha Sharir* given by *Acharya Sushruta* is similar to the developmental embryology of modern science.
- *Acharya Sushruta* was classified *Sandhi* and gave nomenclature of them on the basis of their structure and function which is similar to modern classification of joints.

- *Siravedhana* is considered as half treatment of *Shalya Chikitsa*. Thus, having detailed anatomical knowledge of *Sira* is important. The word *Sira* uses for passage or channels by which matter flow. Generally this word uses for blood vessels. *Sushruta* has used this term in the means of nerves (*Vatavaha*). In the modern Anatomy the *Vatavaha Sira* can be mentioned as the arteries and nerves, The *Pittavaha Sira* can be correlated as the veins and *Kaphavaha Sira* can be correlated as the lymphatic pathway and *Raktavaha Sira* are considered as the capillaries of the body.
- *Marma* are vital points on the body where *Prana* resides. A good clinician having knowledge of *Marma* can make prognosis after seeing the location of injury and can also perform successful surgery without developing any complications. He knew about the important and delicate structures of the body. Any injury occurs to these vital structures or organs leads to deformity or death.
- *Acharya Sushruta* has defined *Srotas* in the relation of injuries. *Srotas* are all the macroscopic and microscopic channels in body through which transportation of *Rasa*, *Raktadi Dhatu*, *Mala* etc. takes place. *Moolasthan* is the place which controls the entire functional dealings and processes of that specific *Srotas*.
- *Acharya Sushruta* has described categorical classification and distribution of body parts and sub parts in *Sharir Sthan*. *Sankhya Sharir* constitutes of an explanation of *Sharira* (human body) on the basis of *Panchamahabhuta*, the number and measurements of organs and constituting structures. For a practitioner, the anatomical knowledge has been very essential. Therefore, *Acharya Sushruta* was highly acknowledged this part particularly for the surgeons.

With the progress of time, science is expanding its wings in every field but the basic Principles were always unchanged. That's why modern science also follows all these ancient principles so the knowledge generally found in modern medical literature is nothing but the modification of *Ayurvedic* knowledge or literature.

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