ejpmr, 2018,5(1), 155-162

SJIF Impact Factor 4.161

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Review Article

ISSN 2394-3211

EJPMR

A LITERARY STUDY OF ABDOMINAL SURGICAL INTERVENTION IN SUSHRUTA SAMHITA

***Dr. Neelam Sajwan**

Assistant Professor Cum Consultant, *Shalya Tantra,* UAU, Main Campus, Harawala, Dehradun, India.

***Corresponding Author: Dr. Neelam Sajwan**

Assistant Professor Cum Consultant, *Shalya Tantra,* UAU, Main Campus, Harawala, Dehradun, India.

Article Received on 14/11/2017 **Article Revised on 04/12/2017** **Article Accepted on 24/12/2017**

ABSTRACT

Acharya Sushruta, our ancient Indian surgeon, describes in Sushruta samhita over 120 surgical instruments, 300 surgical procedures, classifies human surgery in 8 categories, and describes various surgical procedures viz. Cosmetic, ophthalmic, dental, orthopaedic and abdominal operations. He describes eight kinds of surgical procedures viz. *Chedya* (excision), *bhedya* (incision), *lekhya* (scarification), *vedhya* (puncturing), *esya* (probing), *aharya* (extraction), *vishravya* (evacuation) *and seevya* (suturing), which have withstood the test of time. All the operative manoeuvres carried out by the present day surgeon involve one or more of these techniques only and not anything beyond these. *Acharya Sushruta* has divided the procedures in to three parts: *poorva-karma, pradhan karma and paschat karma. Poorva- karma,* which are required for the proper conduct of main procedures, "the preparation"; *pradhan karma* are those which are to be done, "the execution"; *paschat karma* are those needed to prevent any danger of the main action and ensures success, "the protection".

KEYWORDS: *Acharya Sushruta, vishravya* (evacuation) *and seevya* (suturing).

INTRODUCTION

In surgical context, the peri-operative procedures can be classified as *poorva-karma* (pre- operative), *pradhan karma* (operative) and *paschat karma* (post-operative). Pre-operative procedures include: *aptarpana, aalepa, pariskeka, abhyanga, sweda, vimlapana, upnaha, pachan* etc; operative or main procedures contain: eight surgical procedures, *sandhan, peedan, sonit-sthapana, nirvapana, utkarika, kshara, agni, Krishna karma, pandu karma* etc; post operative includes *aahar and rakhsa vidhan*. In other words, all the procedures or actions which are performed before the commencement of the disease are included in *poorva- karma*. Once disease is confined with it's all the signs and symptoms, procedures performed at this time are *pradhan karma* and after recovery from the disease, all the rejuvenating actions performed to prevent the disease, to gain strength, to stimulate the *agni* and enhance the immunity of the patient come under the *paschat karma*.[1]

AIM AND OBJECTIVE

To elaborate, evaluate, discuss and the abdominal surgical techniques described in Sushruta Samhita and its co-relation with modern surgical techniques.

MATERIAL AND METHODS

The data have been collected from the ancient ayurvedic literatures, modern text book of surgery, authentic research journals and various websites related to the topic.

[2]Pre operative

1. Suitable diet, since after having food patient will not lose his consciousness.
2. Patients who are not able to bear the pain during operation and are non-alcoholic, they must have *tikshana madhya*. After having *tikshana madhya,* the patient will not feel pain during the procedure.
3. In the following conditions operative procedures must be done with empty stomach- obstructed labour, Haemorrhoids, Bladder stone, Fistula-in-ano and oral diseases.

The surgeon desirous of performing the procedures should collect the materials required such as- blunt instruments, sharp instruments, caustic alkali, fire for thermal cautery, leeches, metal rods, horn of animals, pieces of cloth, swab, lint, thread, leaf, cloth or leather band, honey, ghee, milk, oil, decoction of drugs, paste of drugs, fan, pots, drums for cold and hot water and also attendants who are affectionate, steadfast and strong.[3]

Types of incision[4]

In eyebrows, cheeks, temporal region, forehead, eyelids, lips, gums, axilla, abdomen and inguinal region incision should be oblique.

1. In upper and lower limbs, incision should be circular or moon shaped.
2. Half moon shaped incision should be applied over the anus and penis.

Ideal incision[5]

The incision made by the surgeon should be broad, even (devoid of elevation and depression), well divided (edges clearly separated) and not situated over the *marma* places. The incision should be done at the proper time is the ideal incision.

Suturing material[6]

Thin threads of *asmantaka* bark, flax, jute, linen, ligament, hair, *murva* fibre, or *guduchi* fibres.

Types of suture[7]

1. Gophanika
2. Tunnasewani
3. Riju granthi
4. Any kind which is appropriate to the particular place

Suturing needle[8]

1. Round and of two *angula pramana* (for places with less muscles and over the joints)
2. Triangular needle with three *angula pramana* (for fleshy places)
3. Curved like a bow (for suturing at vital points, scrotum and abdomen) In this way, suturing needles are of three kinds

a. They should have sharp point.
b. Manufactured nicely
c. Their hind tip resembling the stalk of *malti* flower and round.

Permission from the higher authority

1. In *Ashmari* reference, *Acharya Sushruta* says that without surgery death is inevitable and even after performing surgery there is doubt about the successful procedure, so a wise surgeon must take consent from the higher authority.[9]
2. In *Moodgarbha chikitsa, Acharya* says that extraction of obstructed labour is very difficult procedure. Since in this procedure the surgeon has to perform the surgery as well as he has to protect the pregnant lady and the foetus. So the surgeon has to take permission from the authority.[10]

Operative procedures

On the day and time having auspicious stellar constellation, *agni, brahmana* and physician should be worshiped first, then offer oblation, perform sacrificial rites and chant hymns of benediction; the patient is then given light food and made to sit east facing; after restraining him, the surgeon sitting opposite to him, insert the knife in the direction of hairs avoiding vital spots.[11]

1. In case of omentum comes out from the abdomen, sprinkle the *kashaya bhasama* and *krishan mritika* powder over the *medovarti*, and excise it with honey coated red hot *shastra* after ligation. For *sandhan karma* and to prevent the further infection and bandage it properly. Apart from internal oleation, milk processed with *sharkara, mulethi, lakh, gokhsharu* and *eranda* eliminate pain and burning sensation. If excision of medovarti is not done, it will lead to flatulence, pain in abdomen and even death.[12]
2. *Vaman karma* (Emesis) in indicated, in case of stomach is filled with blood.[13]
3. In *pakwashaya-stha-rudhir, virechana karma* (purgation) is indicated; decoction enema without adding oil prepared from purgative drugs should be given warm.[14]
4. In case of torrential haemorrhage or rupture of organs intake of blood in indicated to replenish the loos of blood.[15]
5. If unruptured intestine comes out from the abdomen mixed with blood, grass and dust, properly cleaning of the intestine must be done with cow milk, apply cow's ghee and re fix in the abdomen gradually.[16]

If the intestine does not place in its normal location properly, do the following procedures –

a. Touch the patient's throat with finger.
b. Sprinkle water over the patient to stimulate him.
c. Grasp patient's both hands and foot, shake/ move the patient in such a way that his intestine re-enters in its normal position.
d. In case the abdominal wound is small or there are multiple wound, excise the intestine accordingly, re-enter into the abdomen and suture the skin properly. Improperly placed or twisted intestine kills the patient.

6. If the intestine is ruptured, let its cut ends be grasped with big ants just like fine suture and allow it to enter in the abdomen.[17]
7. Displaced or twisted intestine is dangerous. After placing it in its normal position and untwisting, the wound is properly covered and *ghritseka* in done. For stool softening and *vata-anulomana*, castor oil mixed lukewarm ghee is given to the patient.[18]
8. In *Ashmari* reference, *Acharya Sushruta* has mentioned that if stone is not dissolved by *ghrita, kshar, kashaya, milk* and *uttar-basti*, then excision and extraction should be performed.

After proper positioning of the patient, massage the umbilical region and compress the patient's left lateral part up to below the umbilical region until the stone comes down. Now lubricate the clean and trimmed middle and index finger of left hand with oil and insert into the patient's anal canal. Below the natural suture/ urethro-coccygeal raphe, by digital manipulation, bring the stone in between the anus and penis.

After grasping the stone, if following conditions occur, do not try to remove the stone:

a. Wide open eyes
b. Unconsciousness
c. Tilt the neck like a dead body
d. Motionless like a dead body.[19]

If the above conditions are not there, go for the incision equal to the length of the stone, leaving the natural suture in *yavamatra pramana* in the left lateral part. Do not try to crush or break the stone, if do so, it will lead to stone formation again. So stone should be removed by the curved forceps *(agravakra).*

After removing the *shalya*, patient is advised to sit in hot water tub, by doing so blood is not collected in the bladder. If bladder is filled with blood, *ksheera vriksha kashaya vasti* is given. Patient is advised to avoid the following acts up to one year: horse and elephant riding, swimming, heavy diet, climbing tree or mountain and sex.[20]

9. In intestinal obstruction after proper oleation and sudation patient's abdomen is anointed, incision is made below the umbilicus on left side leaving four finger breadths from the central line and four finger breadth of intestine is taken out. After proper examination causes of obstruction stone, hairs, faeces or other material are removed. After applying honey and ghee over the intestine and reinserting it into its normal position, the abdominal wound is sutured.[21]
10. In intestinal perforation similar procedure of intestinal obstruction up to removal of the *shalya* is followed. After removing the *shalya*, the ruptured intestine is approximated and black aunts are made to bite the ruptured ends of the intestine. Once aunts grasp the two ends of the intestine, cut their body from head and removed but not their heads. Later on close the abdominal wound properly. In air- free place patient is allowed to sit in oil or ghee filled tub and advised to take milk only.[22]
11. In ascites, the abdomen is punctured below the umbilicus on left side leaving four finger breadth from the mid- hair line through trocar. The length of the penetrating wound should be equal to the pulp of the patient's thumb. A tube made up of tin or other metal or by using bird's feather with double sided opening is used for removing the collected fluid.

Entire abdominal fluid should not be removed in one sitting because it may lead to thirst, body ache, fever, diarrhoea, asthma and burning feet or asthenic patient's abdomen may again filled with excessive fluid. So, abdominal fluid is removed gradually with the gap of three, four, five, six, eight, ten, twelve, or sixteen days. After taking out the excess fluid, abdomen is tied with leather, silk or other cloth, it prevents *vatakopa.*

Diet up to one year

1. Food along with milk or meat of forest animals (being light in digestion) up to six months.
2. Food along with milk mixed with half water, sour fruit juice or meat-soup of forest animals up to three months.
3. Light and suitable food in the last three months.[23]

12. When the ten actions (utkarshana, upkashana, sthan upvartana etc.) are not successful in obstructed labour, surgery is advised. *Acharya Sushruta* says that live foetus should not be excised because it can lead to death of the mother and foetus both. If the abnormality is not manageable, it is better to abort the foetus. In such cases the pregnant lady should be protected.

Surgeon should lubricate his hand with slimy materials such as *shallaki, shalmali*, or ghee and introduce it into the vagina and try to pull the foetus out.

After convincing the lady, divide the foetal head with circular or finger knife and extract the head with bones, by using *shanku yantra*, grasp the foetal chest or axilla and take out the foetus.

The foetal part which is obstructing must be excised completely and life of the lady must be saved with full efforts.[24]

13. In hydrocele bandaging is applied after fomentation and puncture through trocar in the lateral side of the raphe, let the fluid comes out through cannula. After fluid removal *sthagika bandh* is applied. If *vridhi* is because of intestine, surgery should not be performed.[25]
14. The haemorrhoidal mass which is protruding out greatly and filled with increased doshas should be treated with therapies such as sudation, anointing, oleation, tub bath, warm poultices, bloodletting and topical application of medicines, alkali cautery, thermal cautery and surgery without the use of the speculum.[26]
15. Perianal fistula is managed by *Aushadha*, Kshar, *Agni* and *Shastra* according to the dominant doshas. The patient of anal fistula is advised to avoid physical exercises, copulation, anger, animal riding, and foods which are hard for digestion for one year after healing of the fistula wound.[27]
16. When the scrotum has been torn and the testes are protruding out partly, testes pushed inside near the scrotal raphe, scrotum sutured and *gophanika* bandage is applied, tying it to a control fastened round the waist.[28]
17. In *Guda Bhransha*, the prolapsed portion of the rectum should be anointed, given fomentation and pushed in slowly, then a *gophanika* bandage with a hole in its centre for expulsion of flatus should be tied and fomentation is given frequently. *Mushika* oil used for drinking and anointing externally cures *Guda Bhransha*, though difficult.[29]
18. In *Niruddha Prakasha*, a tube with opening at both ends made from either iron, wood or *lac*, and smeared with ghee should be introduced into the urethra, bathing the penis should be done with either fat or marrow of *sisumara* or *varaha*; or with *chakra* oil boiled with vata mitigating drugs. Thicker tubes should be inserted after three days thereby widening

the urethral orifice and patient is asked to take unctuous foods or the raphe under the penis should be cut open and then treated like a wound.[30]

19. *Sannirudha Guda* should be treated after intimating its incurability and the treatment described for *Niruddha Prakasha should* be adopted.[31]
20. In Parivartika, the penis is anointed with ghee and warm poultice tied warm poultice tied. It is anointed once again, the prepuce is pulled forward slowly and the glans penis pushed in. After the *mani* has gone into the skin, warm poultice prepared from *vata* mitigating drugs or *salvana upnaha* should be tied for three or five days. Vata mitigating enemas should be administered and the patient is advised to have unctuous food.[32]
21. In *Upadansha,* after proper oleation and sudation venepuncture of the dorsal vein of the penis is done or blood is taken out using leeches. In aggravated dosha, elimination of dosha done by emesis and purgation.

    Dusta Vrana management should be done in *Tridoshaja Upadansha.* Putrefying part of the penis should be excised and cauterization of the remaining part of the penis should be done using *jambavostha.[33]*

22. In *Plihodar* management, Acharya has described *Siravedha* and *Agnikarma* both.

a. After proper oleation and sudation venepuncture of the left arm inside the elbow joint is done and spleen is pressed hard with the hand for making more blood to come out.
b. The wrist of the left arm is flexed and the vein near the left thumb is cauterised with a red hot arrow.[34]

23. *Yakridalaudar* is managed by venepuncture of the right arm inside the elbow joint.[35]
24. In *Vridhi* (except the *Antra Vridhi*), the ripened swelling is cut open avoiding the scrotal raphe and afterwards wound management is followed. *Vridhi* caused by *antra* should be rejected, when the intestine has not reached the scrotum treatments to mitigate vata are beneficial; when localised in the groin it should be burnt with semilunar iron rod to block its passage into the scrotum; and if it has descended in to the scrotum it should be rejected. The skin in the middle of the thumb should be incised and burnt in the opposite part (thumb opposite to the side of the swelling).

Vata-kaphaja Vridhi should be treated by these methods and cauterisation of the part should be done with great care.[36]

Post operative measures[37]

1. After completing the procedure, a little quantity of water is sprinkled on the patient and to destroy the witch and for removing the fear of demons. After performing the protective ritual, the patient should be taken into a special room and advised to adhere to the regimen.

The room for the patient should be auspicious and in accordance to the *vastu shatra,* free from dirt, direct sunlight and air, the patient will not suffer from physical, mental and traumatic disorders.

2. The wounded person should sleep on a wide bed, convenient for easy movements of body parts, head placed to the east; since god resides in the east, the head of the person should be kept in that direction as a sign of worship. The wounded person should not sleep during day, by sleeping during day itching in the wound, feeling of heaviness of the body, swelling, pain, redness and exudation will increase to a great extent.
3. The patient should protect the wound during his/her daily activities such as raising, sitting, turning, walking, speaking loudly etc. Since too much indulgence in these activities will aggravate *vata* and eventually lead to body ache.
4. He should always remain devoid of undesirable nails and hairs; be clean, wear white dress, resort to observance of auspicious rites, devoted to god, *brahmanas* and teachers.
5. Fumigation of the patient's room should be done for ten days, twice a day, using *sarsapa, nimb* leaves added with ghee and salt. The wounded person who adheres to this regimen obtains health and long life surely, just like the words of Lord *Dhanvantari.*
6. Fumigation of the ulcer should be done by exposing the wound to the smoke coming out from the box of two earthen saucers. By exposing the ulcer to smoke, there will be relief of pain, cleanliness, and mitigation of exudation.[38]

DISCUSSION

1. *Acharya Sushruta* was not only one of the earliest pioneers in surgery in the world but also the earliest one to study the human anatomy. He was the first medical man to have conducted dissection of the human dead body and described the anatomy of the human.
2. He states, he who desires of removing foreign bodies, should obtain undoubtful knowledge by examining a dead body and observing all the organs and understanding them fully. The knowledge observed by direct perception and that obtained by the study of science, both together make for the enhancement of one's knowledge.[39]
3. He was the first surgeon in the world to insist on training the students in surgical techniques using fruits, vegetables, veins of dead animals, piece of wood eaten by moths, broad sheets of leather with hair, stalk of lily plant, animal's urinary bladder, *shalmali* wood smeared with bee wax and artificially prepared parts of the human body.[40]
4. *Acharya* also advocated the use of wine as an anaesthetic agent. Although the use of henbane

(Cannabis indica), Sanjiwani and sammohini are reported at a later period.[41] Later his knowledge is accepted by surgeons to establish anaesthesiology as a separate branch of medical science.

5. Acharya Sushruta describes all aspects of surgery, pre-operative measures, method of operation in detail and post operative care.[42] Sushruta has described surgery under eight heads *Chedya* (excision), *Bhedya* (incision), *Lekhya* (scarification), *Vedhya* (puncturing), *Esya* (exploration), *Ahrya* (extraction), *Vsraya* (evacuation) and *Sivya* (Suturing).[43] These are the basis of all the surgical techniques and are followed today.
6. *Acharya Sushruta* suggest that incision should be made by inserting the knife in the direction of hairs (langer's line) avoiding vital spots, veins, ligaments, joints, bones and arteries and in a single stroke.[44] In general lacerations or incisions that parallel the tension lines usually heal well with little scaring because there is minimal disruption of fibers.[45] Acharya also quotes four types of incisions in perianal fistula viz. *Ardhlandlaka*, *langlaka*, *sarvatobhadra* and *gotirthaka*. These incisions in perianal fistula are not practiced nowadays because of greater success rate of kshar sutra.
7. In *Ashmari and Moodgarbha chikitsa, Acharya Sushruta* says that during the surgical procedures there is always doubt about the success of the procedure, so a wise surgeon must take consent from the higher authority**.**

Every human being of adult years and sound mind has a right to determine what shall be done with his body; and a surgeon who performs an operation without his patient's consent commits an assault, for which he is liable in damages....except in cases of emergency, where the patient is unconscious and where it is necessary to operate before consent can be obtained.[46]

8. When stomach is filled with blood, *vaman karma* in indicated.[47] Similarly gastric lavage is performed in case of alcohol or non-corrosive poisoning or in haematemesis.[48]
9. In *pakwashaya-stha-rudhir, virechana karma is* indicated.[49]

In the same manner cleansing enema is used to empty the lower intestine or the colon.[50]

10. *Sushruta Samhita* advocates intake of blood, in case of severe bleeding because of organ rupture, it can be correlated with blood transfusion.[51] Approximately 14 percent of all inpatient operations include blood transfusion. The most common indication of blood transfusion in the surgical patient is the restoration of circulating blood volume.[52]
11. If the intestine is ruptured, let its cut ends be grasped with big ants just like fine suture and allow it to enter in the abdomen. Intestinal perforation treatment includes exploratory laprotomy and closure of perforation with peritoneal wash.[53]
12. After removing the *shalya*, in case of intestinal perforation, the ruptured intestine is approximated by clinching the head of black aunts. The concept of absorbable suture material in anastomosis of the ruptured intestine is originally derived from the ancient sage *Acharya Sushruta.*
13. In intestinal obstruction, incision is made below the umbilicus on left side leaving four finger breadths from the central line and four finger breadth of intestine is taken out. After proper examination causes of obstruction stone, hairs, faeces or other material are removed.

[54]Treating an intestinal obstruction depends on the condition causing the blockage.

1. Lysis of adhesions
2. Hernia repair
3. Resection with end-to-end anastomosis
4. Resection with ileostomy or colostomy.

14. Displaced or twisted intestine is dangerous. After placing it in its normal position and untwisting, the wound is properly covered and *ghritseka* in done.

In non-operative management of intussusception, barium or saline is infused into the rectum through a catheter. Under fluoroscopy, reduction can be observed. If reduction does not occur, laprotomy is done under G/A. By gently milking out the intussusception with warm packs, it is reduced.

In volvulus, sigmoidoscope is passed, if intestine derotates, patient will pass flatus and faeces; distension reduces. If derotation does not occur sigmoidopexy is done.[55]

15. Lateral perineal lithotomy as described by Acharya Sushruta for vesical calculus is obsolete in present time. Suprapubic lithotomy is the advanced form of lateral perineal lithotomy and performed nowadays.
16. Abdominal paracentesis and caesarean section are actually the modified form of fluid tapping as described in *jalodar chikitsa* and *moodgarbha chikitsa* respectively.
17. The haemorrhoidal masses which are protruding out greatly and filled with increased doshas are treated with therapies such as sudation, anointing, oleation, tub bath, warm poultices, bloodletting, and topical application of medicines, alkali cautery, thermal cautery and surgery.[56]

Treatment of haemorrhoids

1. Symptomatic- advice about defaecatory habits, stool softeners and bulking agents.
2. Injection of sclerosant.
3. Banding.
4. Haemorrhoidectomy.[57]

18. *Bhagandara* is managed by *Aushadha*, *Kshar*, *Agni* and *Shastra* according to the dominant doshas.[58] Treatment of perianal fistula includes fistulotomy, fistulectomy, setons, advanced flaps and glues.[59]
19. When the scrotum has been torn and testes are protruding out partly, testes pushed inside near the scrotal raphe, scrotum sutured and *gophanika* bandage is applied.

Testicular trauma management

1. Adequate debridement of necrotic or devitalized tissue
2. Copious irrigation
3. Meticulous attention to haemostasis 4.Closure of the tunica albuginea.[60]

20. In *Niruddha Prakasha*, a tube with opening at both ends smeared with ghee is introduced into the urethra. Thicker tubes should be inserted after three days thereby widening the urethral orifice. Nowadays, dilators are used in the management of stricture urethra. Gradual dilatation, initially with thin dilators, later with thicker dilators of increasing size. Dilatation is done "once a week for one month, once a month for one year and later once a year (on his birthday)".[61]
21. Treatment described for *Niruddha Prakasha* is adopted in *Sannirudha Guda* after intimating its incurability.

Anorectal stricture management

1. The cause is treated.
2. Dilatation of the anal canal under general anaesthesia.
3. Resection in severe cases.[62]

22. In hydrocele bandaging is applied after fomentation and puncture through trocar in the lateral side of the raphe. After fluid removal *sthagika bandh* is applied. Infantile hydrocele usually yields to tapping with an aspirator needle or to acupuncture by a Clover's needle, but when these fail the sac may be excised or retroverted as in the treatment of ordinary hydrocele. For all ordinary cases the modern plan of retroversion of the sac by making an incision in the scrotum is the safest and most reliable procedure.[63]
23. In *Guda Bhransa*, the prolapsed part is anointed, given fomentation and pushed in slowly, and then a *gophanika* bandage is applied. Even in partial prolapse of rectum, this method is appreciated. Digital reposition of the partial prolapse may help a lot.[64]
24. In *Parivartika*, the penis is anointed and the skin (prepuce) is pulled forward slowly, the glans penis pushed in and warm poultice is applied. Similarly, in paraphimosis manual reduction of prepuceal skin is to be tried. If not possible, initial dorsal slit is made to relieve the oedema and compression.[65]
25. The entire *Uttara tantra* has been called *Aupadravika*, since many of the complications of surgical procedures like fever, dysentry, cough, hiccough, *krimi rog*, *Pandu*, K*amala* etc are described here.[66]

CONCLUSION

Surgery is indicated in those conditions in which medicines or other measures are not successful. Even in ancient era major abdominal surgeries like omentoplasy, intestinal obstruction, intestinal perforation, caesarean section, lateral perineal lithotomy, abdominal paracentesis etc were performed with limited measures i.e. for anaesthesia, *madhya* was used, instead of gloves trimmed, properly cleaned and lubricated hands were used, for wound sterilization various measures like *dhoopan prayod, shodhan dravyas* were used, rakhsa karma was done by *mantra-uccharana*, *shanti paath*, *vedabhyas*, reading mythological stories, worshiping god, for patient's safety he used to be placed in a separate auspicious room which was made according to the *vastu shastra;* residing in such an auspicious house, free from dirt, sunlight and heavy breeze, the person do not suffer from physical, mental and traumatic disorders.

Acharya Sushruta has described eight kind of surgical procedures which have withstood with the test of time. All the operative procedures are appreciated by the present day modern surgeons involve one or more of these techniques. The details of the steps of this operation, as recorded in the *Sushruta Samahita*, are amazingly similar to the steps that are followed in advanced surgery. The main difference is that all the abdominal surgical procedures, instruments, suturing materials, anaesthesia, peri-operative measures etc have been evolved in a refined, sophisticated and modernized form, otherwise the base is the same as *Acharya* has described around 600BC. It was certainly the most advanced school of surgery in the world. With his magnificent contributions to the surgical science: *Shalya Tantra*, he is regarded Father of Surgery.

REFERENCES

1. Dalhanachrya, Susruta samhita, Sutra sthana, *Agropahraniya Adhyaya* 5/6: p- 19, edited by Achrya Priyavat Sharma, Chaukhamba orientalia, Varanasi, 2009.
2. Susruta samhita, Sutra sthana, *Aam-pakweshaniya Adhyaya* 17/16-17: p-73, edited by Kawiraj Ambikadutta Shastri, Chaukhamba Sanskrit Sansthan, Varanasi, 2006.
3. Susruta samhita, Sutra sthana, *Agropahraniya Adhyaya*, 5/6: p-29, edited by Prof. K.R.Srikantha Murty, Chaukhamba orientalia, Varanasi, 2016.
4. Susruta samhita, Sutra sthana, *Agropahraniya Adhyaya*, 5/13-14; p-17. Edited by Kawiraj Ambikadutta Shastri, Chaukhamba Sanskrit Sansthan, Varanasi, 2006.
5. Susruta samhita, Sutra sthana, Part-1, *Agropahraniya Adhyaya* 5/9; p-39, edited by Dr. Anantram Sharma, Chaukhamba Surbharti Prakashan, Varanasi.
6. Dalhanachrya, Susruta samhita, Sutra sthana,

Astavidha-shastra karmiya Adhyaya, *2*5/21; p- 119, edited by Achrya Priyavat Sharma, Chaukhamba orientalia, Varanasi, 2009.
7. Haranchandra, Sushruta samhita, Sutra sthana, Part-1, *Astavidha-shastra karmiya Adhyaya* 25/11; p-297, edited by Srikant Bhattacharya, Chaukhamba Surbharti Prakashan, Varanasi, 2000.
8. Susruta samhita, Sutra sthana, Part-1, *Astavidha-shastra karmiya Adhyaya* 25/23-24; p- 213, edited by Dr. Anantram Sharma, Chaukhamba Surbharti Prakashan, Varanasi.
9. Susruta samhita, Sutra sthana, Shri Dalhanachrya virachit nibandhsangrha, *Yantra- vidhi- Adhyaya*, 7/29; p-436, edited by Achrya Priyavat Sharma, Chaukhamba orientalia, Varanasi, 2009.
10. Sushruta samhita, Chikitsa sthana, *Moodgarbha Chikitsa,*15/3; p-72, edited by Kawiraj Ambikadutta Shastri, Chaukhamba Sanskrit Sansthan, Varanasi, 2006.
11. Susruta samhita, Sutra sthana, *Agropahraniya Adhyaya* 5/7; p-30, edited by Prof. K.R.Srikantha Murthy, Chaukhamba orientalia, Varanasi, 2016.
12. Sushruta samhita, Chikitsa sthana, *Sadhyo-vrana chikitsa Adhyaya, 2*/45-49: p-17, edited by Kawiraj Ambikadutta Shastri, Chaukhamba Sanskrit Sansthan, Varanasi, 2006.
13. Haranchandra, Sushruta samhita, Chikitsa sthana, Part-2, *Sadhyo-vrana chikitsa Adhyaya* 2/35; p-41, edited by Srikant Bhattacharya, Chaukhamba Surbharti Prakashan, Varanasi, 2000.
14. Haranchandra, Sushruta samhita, Chikitsa sthana, Part-2, *Sadhyo-vrana chikitsa Adhyaya* 2/36; p- 41, edited by Srikant Bhattacharya, Chaukhamba Surbharti Prakashan, Varanasi, 2000.
15. Susruta samhita, Chikitsa sthana, *Sadhyo-vrana chikitsa Adhyaya, 2*/54; p- 37, edited by Prof. K.R. Srikantha Murty Chaukhamba orientalia, Varanasi, 2016.
16. Sushruta samhita, Chikitsa sthana, *Sadhyo-vrana chikitsa Adhyaya* 2/56-61; p- 18, edited by Kawiraj Ambikadutta Shastri, Chaukhamba Sanskrit Sansthan, Varanasi, 2006.
17. Susruta samhita, Chikitsa sthana, *Sadhyo-vrana chikitsa Adhyaya*, 2/56, p- 182, edited by Dr. Anantram Sharma, Chaukhamba Surbharti Prakashan, Varanasi.
18. Susruta samhita, Chikitsa sthana, Shri Dalhanachrya virachit nibandhsangrha, *Sadhyo-vrana chikitsa Adhyaya* 2/62-63; p-412, edited by Achrya Priyavat Sharma, Chaukhamba orientalia, Varanasi, 2009.
19. Susruta samhita, Chikitsa sthana, *Ashmari chikitsa Adhyaya*, 7/30-33, p-91, edited by Prof. K.R. Srikantha Murty, Chaukhamba orientalia, Varanasi, 2016.
20. Sushruta samhita, Chikitsa sthana, *Ashmari chikitsa Adhyaya*, 7/34-35, p- 71, edited by Kawiraj Ambikadutta Shastri, Chaukhamba Sanskrit Sansthan, Varanasi, 2006.
21. Susruta samhita, Chikitsa sthana, Shri Dalhanachrya virachit nibandhsangrha, *Udar chikitsa Adhyaya*, 14/17, p-460, edited by Achrya Priyavat Sharma, Chaukhamba orientalia, Varanasi, 2009.
22. Haranchandra, Sushruta samhita, Chikitsa sthana, Part-2, *Udar chikitsa Adhyaya* 14/21, p-175, edited by Srikant Bhattacharya, Chaukhamba Surbharti Prakashan, Varanasi, 2000.
23. Susruta samhita, Chikitsa sthana, *Udar chikitsa Adhyaya*, 14/18, p-148, edited by Prof. K.R. Srikantha Murthy, Chaukhamba orientalia, Varanasi, 2016.
24. Susruta samhita, Chikitsa sthana, Shri Dalhanachrya virachit nibandhsangrha, *Moodgarbha chikitsa Adhyaya*, 15/9-13, p-462, edited by Achrya Priyavat Sharma, Chaukhamba orientalia, Varanasi, 2009.
25. Haranchandra, Sushruta samhita, Chikitsa sthana, Part-2, *Vridhi chikitsa Adhyaya*, 19/8, p-219, edited by Srikant Bhattacharya, Chaukhamba Surbharti Prakashan, Varanasi, 2000.
26. Susruta samhita, Chikitsa sthana, Part-II, *Arsha chikitsa Adhyaya*, 6/3-7, p- 227, edited by Dr. Anantram Sharma, Chaukhamba Surbharti Prakashan, Varanasi.
27. Susruta samhita, Chikitsa sthana, *Bhadandar chikitsa Adhyaya*, 8/4-54, p-95- 102, edited by Prof. K.R. Srikantha Murty, Chaukhamba orientalia, Varanasi, 2016.
28. Sushruta samhita, Chikitsa sthana, *Sadhyo-vrana chikitsa Adhyaya* 2/66-67, p- 18 edited by Kawiraj Ambikadutta Shastri, Chaukhamba Sanskrit Sansthan, Varanasi, 2006.
29. Susruta samhita, Chikitsa sthana, *Kshudrarog Chikitsa Adhyaya*, 20/61-63; p- 200, edited by Prof. K.R. Srikantha Murthy, Chaukhamba orientalia, Varanasi, 2016.
30. Susruta samhita, Chikitsa sthana, Shri Dalhanachrya virachit nibandhsangrha,; *Kshudrarog Chikitsa Adhyaya*, 20/43-46, p-480, edited by Achrya Priyavat Sharma, Chaukhamba orientalia, Varanasi, 2009.
31. Susruta samhita, Chikitsa sthana, *Kshudrarog Chikitsa Adhyaya*, 20/46-47; p- 198 edited by Prof. K.R. Srikantha Murthy, Chaukhamba orientalia, Varanasi, 2016.
32. Haranchandra, Sushruta samhita, Chikitsa sthana, Part-2, *Kshudrarog Chikitsa Adhyaya*, 20/24, p-232, edited by Srikant Bhattacharya, Chaukhamba Surbharti Prakashan, Varanasi, 2000.
33. Susruta samhita, Chikitsa sthana, Part-2, *Vridhi-Upadamsha-Slipada Chikitsa Adhayaya*, 19/25-51; p- 323-326, edited by Dr. Anantram Sharma, Chaukhamba Surbharti Prakashan, Varanasi.
34. Susruta samhita, Chikitsa sthana, 2006, *Udar Chikitsa Adhayaya*, 14/ 13-16; p- 71, edited by Kawiraj Ambikadutta Shastri, Chaukhamba Sanskrit Sansthan, Varanasi.
35. Susruta samhita, Chikitsa sthana, *Udar Chikitsa Adhayaya*, 14/ 13-16; p-71, edited by Kawiraj Ambikadutta Shastri, Chaukhamba Sanskrit Sansthan, Varanasi, 2006.
36. Susruta samhita, chikitsa sthana, *Vridhi-*

Upadamsha-Slipada Chikitsa Adhayaya, 19/20-24-48; p- 185, edited by Prof. K.R. Srikantha Murty, Chaukhamba orientalia, Varanasi, 2016.
37. Susruta samhita, Sutra sthana, *Vranitopasaniya Adhyaya*, 19/3-37, p-137-143, edited by Prof. K.R. Srikantha Murthy, Chaukhamba orientalia, Varanasi, 2016.
38. Susruta samhita, Chikitsa sthana, *Dhoom-Nasya-Kawalgraha Chikitsa Ahayaya*, 40/19, p-395, edited by Prof. K.R. Srikantha Murthy, Chaukhamba orientalia, Varanasi, 2016.
39. Susruta samhita, Sharir sthana, *Sharir-Sankhya-Vyakaranam Adhyaya*, 5/47- 48; p- 100, edited by Prof. K.R. Srikantha Murty, Chaukhamba orientalia, Varanasi, 2016.
40. Susruta samhita, Sutra sthana, *Yogya-sutriya Adhyaya*, 9/4: p-57, edited by Prof. K.R. Srikantha Murty, Chaukhamba orientalia, Varanasi, 2016.
41. The roots of Ayurveda: selections from sankrit medical writing, London, 2003, p-72, Wujastyk, Dominik, Penguin classics.
42. Susruta samhita, Sutra sthana, *Agropahraniya Adhyaya*, 5/3: p-28, edited by Prof. K.R. Srikantha Murty, Chaukhamba orientalia, Varanasi, 2016.
43. Susruta samhita, Sutra sthana, *Agropahraniya Adhyaya*, 5/5: p-29, edited by Prof. K.R. Srikantha Murty, Chaukhamba orientalia, Varanasi, 2016.
44. Susruta samhita, Sutra sthana, *Agropahraniya Adhyaya*, 5/7; p-16, edited by Kawiraj Ambikadutta Shastri, Chaukhamba Sanskrit Sansthan, Varanasi, 2006.
45. Clinically Oriented Anatomy, Keith L. Moore, Arthur F. Dalley, Anne M. R. Agur, Wolters Kluwer (India) Pvt. Ltd., New Delhi, sixth edition, p-15.
46. Surgical Ethics, McCullough LB, jones JW, Brody BA, (eds): New York: Oxford University Press, 1998.
47. Haranchandra, Sushruta samhita, Chikitsa sthana, Part-2, *Sadhyo-vrana chikitsa Adhyaya* 2/35; p-41, edited by Srikant Bhattacharya, Chaukhamba Surbharti Prakashan, Varanasi, 2000.
48. Ward Procedures, Mansukh B. Patel, Yogesh P. Upadhyay, Fourth edition, Elsevier, chapter 12, p-159.
49. Haranchandra, Sushruta samhita, Chikitsa sthana, Part-2, *Sadhyo-vrana chikitsa Adhyaya* 2/36; p- 41, edited by Srikant Bhattacharya, Chaukhamba Surbharti Prakashan, Varanasi, 2000.
50. Taber's cyclopedic Medical Dictionary, 18th edition, p-643.
51. Susruta samhita, Chikitsa sthana, *Sadhyo-vrana chikitsa Adhyaya* 2/54, p-18, edited by Kawiraj Ambikadutta Shastri, Chaukhamba Sanskrit Sansthan, Varanasi, 2006.
52. Schwartz's Manual of Surgery, eighth edition, F. Charles Brunicardi, Part 1, third chapter: Hemostasis, Surgical bleeding, and Transfusion, p-52-53.
53. Rustagi, T; McCarty, TR; Aslanian, HR(2015) "Endoscopic Treatment of Gastrointestinal Perforations, Leaks and fistulae". Journal of Clinical Gastroenterology, 49(10): 804-9. PMID 266325190
54. www.encyclopedia.com
55. SRB's Manual of Surgery, Sriram Bhat M, Third edition, chapter-23, Intestinal Obstruction, 865-868.
56. Susruta samhita, Chikitsa sthana, Part-II, *Arsha Chikita Adhyaya*, 6/3-7, p- 227, edited by Dr. Anantram Sharma, Chaukhamba Surbharti Prakashan, Varanasi.
57. Bailey & Love's Short Practice of Surgery, 25th edition, 2008 Edward Arnold (Publishers) Ltd, chapter 69-The Anus and Anal Canal, p-1257.
58. Susruta samhita, Chikitsa sthana, *Bhagandar Chikitsa Adhyaya*, 8/4-54, p-95- 102, edited by Prof. K.R. Srikantha Murty, Chaukhamba orientalia, Varanasi, 2016.
59. Bailey & Love's Short Practice of Surgery, 25th edition, 2008 Edward Arnold (Publishers) Ltd, chapter 69-The Anus and Anal Canal, p-1264-1266.
60. Medscape, Testicular Trauma Treatment & Management, Updated: Jun 26, 2017, Author: Ryan P Terlecki, MD; Chief Editor: Bradley Fields Schwartz, DO, FACS.
61. SRB's Manual of Surgery, Sriram Bhat M, Third edition, chapter-26, Urology, p-998.
62. SRB's Manual of Surgery, Sriram Bhat M, Third edition, chapter-25, Rectum and anal canal, p-919.
63. Dictionary of Treatment" by William Whitla (1920) GluedIdeas.com
64. A Concise Textbook of Surgery, S. Das, ninth edition, chapter 45: The Rectum and Anal Canal, p-1066.
65. SRB's Manual of Surgery, Sriram Bhat M, Third edition, chapter-26, Urology, p-1006.
66. Sushruta Samhita, Nibandha Sagraha and Nyaya Chandrika commentary by Dalhan, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrit Sansthan.