

## SURGICAL PROCEDURES IN SUSHRUTA SAMHITA

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### ABSTRACT

The Sushruta Samhita is an Ayurvedic text, by the legendary Sushruta, foundational to Ayurvedic medicine (Indian traditional medicine), with innovative chapters mainly on surgery. There is a general impression that Sushruta Samhita is only an ancient Indian Ayurvedic text book of surgery. Sushruta Samhita contains 184 chapters and description of 1120 illnesses, 700 medicinal plants, a detailed study on anatomy, 64 preparations from mineral sources and 57 preparations based on animal sources. It still retains the landmark position in the field of surgical texts. In addition to his worldwide known work of historical significance on plastic surgery, he also made similar unique contributions on numerous aspects of medicine, such as fracture and dislocations, urinary stones, skin diseases including leprosy, Pancha Karma (Purification) procedures, toxicology, pediatrics, eye diseases, psychiatry, obstetrics and gynaecology, etc. A very limited conceptual work has been performed on the selected chapters of Sushruta Samhita. Therefore a review conceptual study has been carried out on the various surgical concepts of Sushruta Samhita. Outcome of this study shows, Sushruta Samhita is written in the aphorism form and the techniques described in it are eminently in line with technical abilities of the times. It is need of the hour to explore the hidden truth by decoding the versions of the texts.

**Key Words:** Sushruta Samhita, Shalya, Types of Surgical Procedures.

### INTRODUCTION

The ancient Indian medical science can be traced back from the Vedic period. The Vedas are considered to be the first record of the ancient knowledge and civilization in the world. Out of the four Vedas the maximum description of the medical science is included in the 'Atharvaveda', the penultimate source of Ayurveda<sup>1</sup>.

Ayurveda later developed as a separate system of medical knowledge and has given the status of Upaveda. The 'fifth Veda'<sup>2</sup> in the next stage of its growth, Ayurveda specialized into eight<sup>3</sup> branches such as Kaya Chikitsa, Shalya, Kaumar Bhritya etc. and separate treatise were written on the each branch by different authors who were further revised and edited by their disciples and followers. Among the available literatures three Samhitas are currently the chief source of knowledge on Ayurveda- Charaka, Sushruta and Astanga Hridaya.

The Sushruta Samhita was written in the holy city of Kashi (Varanasi)<sup>4</sup> some times around 1000 B.C. Sushruta was primarily a surgeon and recognized as the "The Father of Surgery" in the world.

### Aim & Objectives

1. To evaluate, elaborate, discuss and the various surgical concepts of Sushruta Samhita.
2. To decode the various hidden surgical procedures of the Sushruta Samhita and co-relate with modern technological steps of surgery.

### MATERIAL AND METHODS

All sorts of references has been collected and compiled from Ayurvedic classics and available commentaries like- Sushruta Samhita, Astanga Hridaya, Astanga Sangraha, Charaka Samhita, Harita Samhita, Bhava Prakasha, Chikitsa Sangraha Granth, Kashyapa Samhita, Bhela Samhita and Sharangadhara Samhita etc.

We have also referred the modern text books of surgery like Bailey and Love, K. Das, Farquharon's Text book of operative surgery, Primary Surgery vol-1 (Oxford medical publication) and similar other books and also searched various websites related to surgery.

### Observation

By the study it elucidates this fact that the Sushruta Samhita was a 'Text book of surgery' in those periods and were studied by the students of medicine for nearly two thousands years back, much like the medical students of today studied "Bailey and Love's Textbook of Surgery".

The Sushruta Samhita is in two parts, the Purva-Tantra in five<sup>5</sup> sections and the Uttara-Tantra. Apart from Shalya and Shalakyas, these two parts together encompass the other specialities like

medicine, pediatrics, geriatrics, toxicology, aphrodisiacs and psychiatry. Thus the whole Samhita, devoted as it is to the science of surgery, does not fail to include the salient portions of other disciplines too. In fact, Sushruta emphasizes in his text that unless one possesses enough knowledge of relevant sister branches of learning, one cannot attain proficiency in one's own subject of study. The Samhita is thus an encyclopedia of medical learning with special emphasis on Shalya and Shalakyas. The Sutra-Sthana, Nidana-Sthana, Sarira-Sthana, Kalpa-Sthana and Chikitsa-Sthana are the five sections of the Purvatanttra containing one hundred and twenty<sup>6</sup> chapters. Incidentally, the Agnivesa-Tantra known better as the Charaka Samhita and the Astanga Hridaya of Vagbhata also contain one hundred and twenty chapters in all. The Nidana-Sthana gives the knowledge of aetiology, signs and symptoms of important surgical diseases and those ailments, which have a bearing on surgery. The rudiments of embryology and the anatomy of the human body along with instructions for venesection (cutting of veins), the positioning of the patient for each vein, and protection of vital structures (Marmas) are dealt with in the Sharira-Sthana. This also includes the essentials of obstetrics. Principles of management of surgical conditions including obstetrical emergencies are contained in the Chikitsa-Sthana, which also includes a few chapters on geriatrics and aphrodisiacs. The Kalpa-Sthana is mainly Visa-Tantra, dealing with the nature of poisons and their management. The Uttara-Tantra contains the specialities, namely Shalakyas, Kaumarabhritya, Kayachikitsa and Bhutavidya. The entire Uttara-Tantra has been called Aupadravika<sup>7</sup> since many of the complications of surgical procedures as well as fever, dysentery, cough, hiccough, worm infestation, anaemia, jaundice, etc., are briefly described here. The Shalakyas-Tantra portion of the Uttara-Tantra contains various diseases of the eye, ear, nose and head. Thus the whole Samhita is a comprehensive treatise on the entire medical discipline.

On the whole, the entire Samhita is a complete work on medicine with special attention to Shalya and Shalakyas Tantras. As a text-book, it is unrivalled in respect of composite teaching of the subject of surgery with reference to all allied branches of medical learning required by a surgeon. It is a forerunner of Vagbhata's Astanga Sangraha.

He had performed many surgeries in those period covering all fields of surgical branches like general surgery, eye, E. N. T., Oro-Dental, pediatrics, obstetrics, Urology, Orthopedics etc. The contributions of

Sushruta are not only limited to surgical field but also extended up to the anatomy, embryology, gynaecology, obstetrics, paediatrics, toxicology, medicine. Some of the examples of surgical techniques performed by him and other contributions to the surgical fields are narrated in brief here:

#### **Nasa-Sandhana (Rhinoplasty)**

The Rhinoplasty and other reconstructive surgeries were first mentioned by the Sushruta in his text, and established as a remarkable mile stone in the field of plastic surgery. He had taken a green leaf of a tree and trimmed it as the shape and dimension of defect of nose. Then he used the cut leaf to raise the flap of same size and dimensions from the side of the cheek. The free end of the flap is turned toward the nose and apposed on the defect exactly after freshening the edges of the defect. The two tubes were inserted under the flap to keep the nostrils open. The powders of Pattanga or Rakta Chandana (*Pterocarpus santalinus*<sup>8</sup>), Yastimadhu (*Glycyrrhiza Glabra*<sup>9</sup>) and Rasanjana (*Barberis Aristata*<sup>10</sup>) was dusted over the wound and covered with the cotton pad. The Sesamum (*Sesamum Indicum*<sup>11</sup>) oil was used to soak the pad as it required<sup>12</sup>. When the healing was completed, the flap should be carefully checked. Any excess growth of tissues should be trimmed<sup>13</sup>.

#### **Karna-Sandhana (Lobuloplasty)**

The Sushruta had advised to perform the reconstructive surgeries of ear lobules in the various defects either caused by congenital reasons or traumatic reasons. 15 techniques of repair of torn ear lobules (lobuloplasty) had been given by the Sushruta even though in the absence of ear lobe by the flap of cheek<sup>14</sup>. The surgeon should tailor the reconstructive technique to suit the specific deformity. For example, when the ear lobe flaps are congenitally absent, a lobe can be created by incising above the level of tragus and turning down the incised flap<sup>15</sup>.

#### **Ostha Sandhana (Repair of Hare lip)**

The description of repair of deformed lip is given in the same chapter as such as given for the Nasa-Sandhana. A surgeon who is expert in the Nasa-Sandhana can perform the Ostha-Sandhana. The detailed procedure of repair is not clearly quoted or missing in the text<sup>16</sup>.

#### **Karna-Vedhana (Ear puncture)**

The Sushruta had described the piercing of the children's ear lobe with a needle or awl on the auspicious day and time with hymn is known as Karna-Vedhana Samskara (custom)<sup>17</sup>.

#### **Establishment of various Surgical Techniques**

He had given various suggestions to make the incision. As per him the incision line should be preferred in the line of hair which heals quickly. The incision should be made in a single stroke and with applying appropriate pressure on the knife to keep the edges sharp of incised tissue. The counter incision or multiple incisions are required where the pus is not properly drained in a single incision. Sushruta also discusses certain surgical conditions of ano-rectal region; he has given all the methods of management of both hemorrhoids and fistulae. Different types of incision to remove the fistulous tract as Langalaka (T-shaped), Ardhalangalaka (L-shaped), Savatobhadra (circular), Gothirhaka (half moon) and Kharjurapatraka<sup>18</sup> (serrated) are described for adoption according to the type of fistula.

Sushruta was well aware of the urinary stones, their varieties; the anatomy of urinary bladder along with its relations is well recorded in the chapter 'Ashmarichikitsitopakramah' (Chapter on urinary stones). Varieties of stones, their signs and symptoms, the method of extraction (by perineal lithotomy), and operative complication were given in detail. He elaborated the details of perineal lithotomy<sup>19</sup> and post operative wound management which may be the first reference of surgical management of calculus in the history of surgery.

Apart from the above, surgery (intestinal sutures) for Baddha-Gudodara<sup>20</sup> (intestinal obstruction), Chidrodara<sup>21</sup> (perforated

intestines), accidental injuries to Aasaya (abdomen) in which protrusion of omentum occurs are also described along with their management. The operations like couching for cataract, caesarian section to save a baby's life and if the mother dies in the labour and other surgical procedures are established by the Sushruta for the first time.

#### **Treatment by Agni (Thermal) & Kshara (Alkali), Jaluaka and Classification of Burns**

The Sushruta is the person to give the importance to Agni<sup>22</sup> & Kshara<sup>23</sup> for therapeutical purposes in the form of a separate modality. For various disorders of mainly involving musculoskeletal system, Sushruta advocated the utility of several forms of thermal cauterization by using Dahana Upakaranas<sup>24</sup> (tools for Agni Karma). He had also elaborated the depth and intensity of burn in his classifications of burn as Plusta Dagdha (singeing), Durdagdha (blister formation), Samyaka Dagdha (therapeutic) and Atidagdha<sup>25</sup> (severe or deep) and their management. For the first time the symptoms, sign & treatment of Dhoomopahata<sup>26</sup> (dyspnoea by smoke) is also described by the Sushruta. Kshara (Caustic Alkali) utility in therapeutics is a unique kind of its own. As Sushruta had discussed various usage<sup>27</sup> forms of Kshara in different ailments, like to stop the bleeding, for healing an ulcer, for necrose the haemorrhoids, for cutting the tract in fistula in ano without injuring the other structures etc. Likewise Kshara, the Agni<sup>28</sup> & Jauloka<sup>29</sup> (Leeches) are also used as para-surgical procedure in Ayurvedic surgical science for various ailments.

#### **Management of Sadyo-Vrana (traumatic wounds)**

On the subject of trauma, Sushruta speaks of six<sup>30</sup> varieties of accidental injuries naming (i) Chinna (excised), (ii) Bhinna (incised), (iii) Viddha (punctured), (iv) Ksata (lacerated), (v) Picchita (crushed) and (vi) Ghrista (abrasion) encompassing almost all parts of the body and their probable causative agent or weapons. As war was the major cause of injury in the past, the name Shalya-Tantra<sup>31</sup> for this branch of medical science is derived from the Shala<sup>32</sup> (arrow), which in fights is used to be lodged in the body of the enemy soldiers. He emphasizes that removal of foreign bodies is fraught with certain complications, if the seat of the Shala or Shalya be a Marma<sup>33</sup> (vital spots).

**Asthi-Sandhi Bhagna Chikitsa (Fracture and Displacement of Bone and its management)** Sushruta also gives classification of the bones and their reaction to injuries. Varieties of dislocation of joints (Sandhimukta<sup>34</sup>) and fractures of the shaft (Kandabhagna<sup>35</sup>) are given systematically. He classifies and gives the details of the six types of dislocations and twelve varieties of fractures. He gives the principles of fracture treatment, viz., traction, manipulation, appositions and stabilization<sup>36</sup> the same method is still practiced in the modern orthopedics.

#### **Anatomical Dissection**

The Sushruta was the first person who had establishes the preservation of deceased and cadaver dissection<sup>37</sup> in the scientific manner to learn the medical science. For the dissection of cadaver, the use of brushes made of bamboo is shows the highness of his knowledge in the anatomy.

#### **Practical Training**

Before proceeding to surgery on the human being the surgical demonstrations technique of making incisions, probing, extraction of foreign bodies, cauterization either by Kshara or Agni, tooth extraction, scarification, excisions, trocars for draining abscesses, saws for amputations on various natural fruits, dead woods and clay models had been established by the Sushruta. To obtain proficiency and acquiring skill and speed in these different types of surgical manipulations, Sushruta had devised various experimental modules for trying each procedure. For example, incision and excision are to be practiced on vegetables and leather bags filled with mud of different densities; scraping on hairy skin of animals; puncturing on

the vein of dead animals and lotus stalks; probing on moth-eaten wood or bamboo; scarification on wooden planks smeared with beeswax, etc.<sup>38</sup>.

#### Arrest of Bleeding

The bleeding occurs just after giving the incision or performing any surgical procedure by sharp instruments or by accidental injuries, either it may be minor or major. To stop or arrest the bleeding Sushruta has pointed out four methods to stop the bleeding naming as (i) Sandhana (ii) Skandana (iii) Dahana (iv) Pachana<sup>39</sup>. In the Sandhana steps he had advised to make the of apposition of the cut edges with stitches, in the Skandana to use cold things like snow or ice which causes thickening of blood by coagulation, in the Dahana by cauterisation of vessels with Kshara (chemicals) or Agni (heat), in Pachana, application of styptic decoctions to contract the vessels locally by application of styptic decoctions. In the loss of blood he had also advised to use the drugs or diet by which we can increase the blood. In the major loss of blood Charaka advises to give the blood of goat or buffalo or deer or cow through oral or rectal route<sup>40</sup>.

#### Concepts of Vrana (Ulcer)

The Vrana or injury, says Sushruta, involves breakdown of body-components and may have one or more of the following seats for occurrence, viz., skin, flesh, blood-vessels, sinews, bones and joints, internal organs of chest and abdomen and vital structures. Classically Vrana (wound) is the ultimate explosion of the underlying pathological structure. It is, in Sushruta's words, the sixth stage of a continuous process, which starts with Shotha (inflammation). Sushruta says that in the first stage, the ulcer is unclean and hence it is called as Dusta-Vrana<sup>41</sup> (un-healthy wound). By proper management it becomes a clean wound, a Shuddha-Vrana<sup>42</sup> (clean or healthy wound). Then there is an attempt at healing and is called Ruhyamana-Vrana<sup>43</sup> (healing wound) and when the ulcer is completely healed, it is a Rudha-Vrana<sup>44</sup> (healed wound).

#### Eight types of Basic Surgical Procedures

Sushruta describes eight types of surgical procedures: Excision (Chedana) is a procedure whereby a part or whole of the limb is cut off from the parent. Incision (Bhedana) is made to achieve effective drainage or exposure of underlying structures to let the content out. Scraping (Lekhana) or scooping is carried out to remove a growth or flesh of an ulcer. The extraction (Aharana) is carried out to remove the foreign body or tartar of teeth, etc. The veins, hydrocele and ascitic fluid in the abdomen are drained by Vyadhana (puncturing) with special instrument. The sinuses and cavities with foreign bodies are probed (Esana) for establishing their size, site, number, shape, position, situation, etc. Sravana (blood-letting) is to be carried out in skin diseases, Vidradhis (abscesses), localized swelling, etc. in case of accidental injuries and in intentional incisions, the lips of the wound are apposed and united by Sivana (stitching)<sup>45</sup>.

#### Suture Materials

The suture materials of absorbable/non-absorbable and synthetic/natural were described first time by the Sushruta. According to Sushruta the bark of Asmantaka<sup>46</sup> (*Bauhinia Racemosa*) trees, thread of Shana (*Corchorus capsularis*<sup>47</sup>), silk thread, tendon, hair or fibers of Murva (*Marsdenia tenacissima*<sup>48</sup>) and Guduchi (*Tinospora cardifolia*<sup>49</sup>) are the suture materials. The Sushruta had also used the black ants (*Lasius niger*<sup>50</sup>) during the suturing of intestinal anastomosis in the case of Chidrodara<sup>51</sup> (intestinal perforation) is probably the first reference of absorbable type of suture material in history of medicine.

#### Use of Suturing Needles

The Sushruta had used the suturing needles of different caliber for different purposes. These suturing needles were circular, two finger breadths wide and straight, and triangular bodied three-breadths wide. The circular needles which have round body are used at the places where the tissues are thin and in the joints. These needles can

be compared to atraumatic needles of contemporary science. Where the tissues are thicker, it should be straight, triangular bodied (cutting) and three finger breadths long. The semi-circular needles are used for the vital spots like testicles and abdominal viscera<sup>52</sup>.

#### Different types of Dressing<sup>53</sup> & Dressing Schedule

The Sushruta had described the various types of dressing and dressing materials for the first time to cover the wound at different sites of the body. The 14 types of bandages and their applications are the unique features of Samhita. They are named either on the basis of their shape or use. These are Kosha (sheath) applicable around thumb or fingers, Dama (sling), Swastika (spica), Anuvellita (spiral), Muttoli (winding), Mandala (circular), Sthagika (stump), Yamaka (twin bandage), Khatva (four tailed bandage), China (eye bandage), Vibandha (many tailed bandage), Vitana (cephalic bandage), Gophana (T bandage), Panchangi (five tailed bandage). During the bandaging the use of cotton to secure the wound from friction is the original theme of Sushruta and it is still in practice. The change of dressing at regular interval is the prime thought of Sushruta to protect the wound from infection. The period for change of dressing<sup>54</sup> in winter on every 3<sup>rd</sup> day and in summer season daily was the idea of Sushruta<sup>55</sup>.

#### Management of Pain

Patients were advised to take food before undergoing surgical procedure in order to withstand the pain during operation. In the old era there were no well established anaesthetic drugs to alleviate the pain during surgery. The Sushruta was the first person had used the alcohol<sup>56</sup> to alleviate the pain during surgery. He had also used the Bhang<sup>57</sup> (*Cannabis sativa*) during the surgery. Although the use of Henbane<sup>58</sup> (*Hyoscyamus niger*) and of Mohani Churna (powder)<sup>59</sup> are reported at a later period.

#### Surgical Instruments and their Fabrication with Maintenance of Edges

The Sushruta was the first person who had described the 101 types of blunt (Yantras)<sup>60</sup> and 20 types of sharp (Shastras<sup>61</sup>) instruments and their fabrication by different metallic element chiefly by iron and bronze. The unique classification of surgical instruments like the instruments used to facilitate the surgery known as Yantra and while the instruments used directly for the surgical procedures, known as Shastras. He had also considered the importance of hand as the most important (Pradhana<sup>62</sup>) Yantra, for without it no operation can be performed. He has not only described the types of Shastras but also had given the emphasis on the necessity to maintain the sharpness of edges. So he had advised to make the Dharasanthapana<sup>63</sup> (sharpening) and Payana<sup>64</sup> (tempering) at regular interval to perform the surgery hasselfree. Even though Sushruta was very aware regarding the storage and safety of Shastras and had develop the Shastrakosh<sup>65</sup> (instrument box or pocket), either of leather or bark.

#### Code of Ethics for Teachers and as well as for Students

The model code for the practice of surgery was established by Sushruta and he had advised to take the permission from the king<sup>66</sup> before initiating the medical practice which can be correlated to registration of medicos in today's era. For the first time the ethics for student and teacher were also described by the Sushruta in his text<sup>67</sup>.

#### Description of Marmas (Vital spots)

The Sushruta had described 101 numbers of Marmas<sup>68</sup> (Vital spots) in the body which causes fatal result on injury, either sudden death or subsequent deformity of organ or body. The anatomical landmark of each and every Marma had their degree of fatality is the unique feature of Sushruta of its own kind. In the surgical procedures, accidental injuries and in martial art, it plays major role.

#### DISCUSSION

The surgical procedures given in the Sushruta Samhita are in the basic form and still relevant to modern counter part. The Nasa Sandhana (rhinoplasty) was started from the time of Sushruta and later on it spread all over the world. The taking of green leaf to

measure the raw area of nose to take the exact size of pedicle graft from the adjacent cheek of both the side was the very accurate method to incise the surrounding tissue without wasting any live tissue. Sushruta knows the viability of pedicle graft. Above operative procedure is very easy, successful and still relevant in today's era. The methods of Karna-Sandhana described in Sushruta Samhita are very elaborative and cover all types of lobular defect either congenital or traumatic. The Sushruta had given the method to reconstruct the ear lobe in absence of ear lobe by the use of pedicle graft taken from cheek. This method of reconstruction is even popular in these days and the recent advancement in the methodology is based on the Sushruta's method.

The repair of Hare lip was started from the period of Sushruta. As he suggested that there is no need of any tubes as needed in the repair of Nasa Sandhana. The detail of repair of Hare lip was not described by the Sushruta but as he versed that who is expert in the Nasa and Karna Sandhana can perform this surgery. The verse suggests that the surgery for Osth-Sandhana was very popular but for some unknown reason some texts may be missing.

The Karna- Vedhana given by the Sushruta is still very popular amongst Hindus. The method to locate the site of ear puncturing is peculiar. As he suggest, to pierce the ear lobe through 'Daivakrita Chidra'<sup>69</sup> (a hole created by God) is very particular place for puncturing. At the puncturing of Daivakrita Chidra there will be no damage to blood vessels, nerves and muscles. To locate this hole, one can direct the ear lobule in front of sunlight and the maximum illumination of light is the confirmation. Instead of sun light, any light source can be used. This is very unique description of Sushruta and there are no such type of relevant description is found elsewhere.

Sushruta knows the every steps of any surgical technique and his visions regarding every aspect were very clear. As he suggests to make an incision in the single stroke<sup>70</sup> of knife which is still true and good in surgical practice. In the single stroke of knife the very sharp margins of wounds are made which causes perfect approximation of edges and heals quickly with least scar tissue. The Sushruta's view to make the incision in the line of hair<sup>71</sup> (Langer's line) is still true and proved, this fact that the incision made in the line of Langer's heals quickly. As Sushruta quotes the various types of incisions in the surgery of fistulous tract e. g. Sarvatobhadra (circular), Lagalaka, Ardhalangalaka and Chandrardha. Due to standardization and wide recognition of Kshara Sutra<sup>72</sup> therapy in the fistula in ano, the above incisions are less practiced, and the Kshara Sutra therapy dominates other modes of treatment. Less number of recurrence cases and early mobilization of patients in these cases make this therapy gaining popularity and uplifting the glory of Ayurvedic surgical science. The Ardha-Chanrardha<sup>73</sup> (semicircular) incision used in the abscess or growth situated below the areola<sup>74</sup> of the breast is similar to free hand incision of contemporary science. The abscess which opening lies against the gravity, in such cases Sushruta advocates the utility of second or multiple incisions which are in nowadays called as counter<sup>75</sup> incisions. The use of multiple incisions is still relevant in the abscess of parotid gland<sup>76</sup>.

The technique for the perineal lithotomy for the vesical calculus is no more relevant now but the new technique of lithotomy i.e. suprapubic lithotomy<sup>77</sup> is the advancement of perineal technique. The extraction of stone from the urinary bladder by pushing the stone upward through inserting the finger in rectum is still helpful in the operation of vesical calculus and suprapubic prostatectomy.

The operation of caesarian section<sup>78</sup> is the modified form of Moodhagarbha Chikitsa<sup>79</sup> in which the surgery was performed to save the mother, when the foetus becomes dead. But in the caesarian section both the mother and child can be saved.

The treatment by the Ksara, Agni and Jalauka are the para-surgical methods for a person who's afraid of surgery as alternative

modalities of treatment. The unique role of Ksara in the piles<sup>80</sup> and well known treatment by Ksara-sutra in fistula in ano are later accepted by the one and all. The use of Agni for the removal of extra growth of skin and other minor ailments<sup>81</sup> was established by Sushruta. The technique to use the Agni to stop the bleeding during surgery is the original concept of Sushruta which is later modified by the modern scientist to develop in the form of electric cautery.

The types of Sadyo-vrana (Traumatic Wound) are the six which are unchanged in the modern text book of surgery. The management of these wounds required immediate attention of surgeon as it is already shown by the Sushruta.

The Chikitsa of Asthi and Sandhi Bhagna was described by Sushruta under the heading of Bhagna. He had kept both the Sandhi Bhagna and the Asthi Bhagna (Kanda Bhagna) in a single heading. The symptoms, sign are still relevant while their basic principles of management are remained unchanged even these days like traction, manipulation, apposition and stabilization. The newer techniques have been added in the modern orthopedic surgery but without intervening the basic concepts of Sushruta's views. The concepts of physical rehabilitation after the full recovery from the fracture and dislocation are still followed by the modern orthopaedic surgeons. Now this rehabilitation treatment is now becomes a new branch of medical science known as physio-therapy department.

For a medico, anatomical knowledge is vital for which he has to depend on dead bodies for dissection. Sushruta had explained the method of preserving the deceased body and preparation of body before dissection. This ancient method of preservation and dissection depicts that ancient medical science of India is no where lesser to when compared to other systems of medicine.

The surgical procedures are to be practiced before going on the live body. This concept of Sushruta is still relevant is followed by the modern medical practitioner by performing the surgery on dog and on dummy and natural objects which are having the same features. Even though, before entering in the field of practice, the internship and house job are serving the same purpose.

The Sushruta's views on the arrest of bleeding are still remained unchanged. Apart from the use of cautery, he explains use of astringent herbs through local and oral administration which is similar to conventional styptic drugs of present era.

The concepts of Vrana (ulcer) are remained unchanged. As the Sushruta classified it into Dusta (unclean), Suddha (clean), Ruhamana (healing) and Ruhya (healed). These stages of Vrana are clinically proved, which falls in the path of wound healing. As Sushruta says that just after the making of wound either by trauma or by surgeon goes under Shopha (inflammation) which is required up to some extent for healing. This fact is also appreciated by modern scientists.

The 8 types of surgical procedures like Chedana, Bhedana, Lekhana, Aharana, Vyadhana, Sravana, Esana and Seevana are the basic of any surgical technique and it is remained unchanged till now. All surgical procedures are bound by these 8 varieties. There may be conflict on numbers of surgical procedures by some authors but the procedures are unchanged. These surgical procedures are still in use in these days.

The Sushruta was aware of different types of suturing materials and suturing needles. As he described the various varieties of suturing material like non-absorbable, absorbable, synthetic and natural. In the operation of Chidrodara, the anastomosis of intestine by clinching the head of the black ant is the basic idea of Sushruta is the best example of usage of biological substance as absorbable suture material. This is still useful in modified form like in the place of black ant we use the absorbable suture like catgut etc. This signifies the concept of absorbable suture material in gut repair was known to ancient Indian surgeons long back before the invention of catgut etc. The use of various forms of suturing needle in accordance with the

depth of the tissues is well known to Sushruta. These all facts help us to develop the new technique and devices for the suturing needle like atraumatic needle etc on which further research is expected.

The bandaging of wounds is still relevant to safeguard the wound from the infection, either from the trauma or friction or insects like flies<sup>82</sup>. The types of materials and dressing are the key part of the post operative care of any surgery or wound. The Sushruta had given the indication of type of bandage which is still relevant in modern era on the modern counterpart. The interval to change the dressing of the wound either in the winter or summer is still same as was mentioned in Sushruta. The concept of Sushruta not to do the bandaging in the wound of Agni Dagdha<sup>83</sup> is remained same in this modern era.

The knowledge of alleviating the pain during the surgery was started from *Sushruta* and later this knowledge flourishes by modern surgeons to establish it as a separate branch of medical science and known as Anesthesiology. The use of Pragbhukta<sup>84</sup> (full stomach) in the minor surgery & Abhuktavata<sup>85</sup> (empty stomach) in major surgery is remained same as earlier to alleviate the pain and to check the vomiting and other complications respectively.

The Yantras (blunt instrument) and Shastras (sharp instruments) are the main tools of surgeon and the Sushruta had the knowledge of 101 Yantras and 20 Shastras. Even though he was agree with the fact that if the more instruments are required then it can be developed as per need<sup>86</sup>. The shape of the Yantras and Shastras are further modernized to compete with the surgery in modern era but the basic theme and functions are remained same as before. The classification of instruments in to the Yantras (blunt instruments) and Shastras (sharp instruments) is the basic concepts of Sushruta. No any such type of classification of instrument is found in the modern surgical text books. As per Sushruta the hand is the main and important instrument amongst all which hold the key position till date. Without the hand any instrument can not be hold. The tempering and sharpening of edges of Shastras are also the view of Sushruta which remains unchanged till date. In present time to keep the sharp instruments free from micro-organism and rust, they are kept into the anti-septic solutions or specially designed instruments chambers is the forerunner idea of Sushruta. He had even given the specifications for the Shastra Kosha (instrument pocket or box) where instruments are to be kept.

In today's the model codes for practicing surgery or any other branch of medical science at the particular place registration done by the competent authority is essential from respective state government while in ancient times, the physician has to seek permission from the king. Without the registration no one can practice and if caught may face the legal prosecution.

The knowledge of Marmas is still relevant in present era as surgeons always have to take extra care to save these vital points while performing any surgical procedure else which it may end up in morbidity or mortality.

#### CONCLUSION

The techniques of Nasa Sandhana, Karna Sandhana, Otha Sandhana and other surgical procedures described in the Sushruta Samhita are eminently in line with the technical abilities of the times.

The para surgical procedures like Agnikarma, Raktamokshana and Kshara karma are gaining popularity nowadays, in the same way other main surgical techniques which are not been tested should be assessed taking due co operation from other system of surgical science.

The Ayurvedic literatures are preserved in the Sanskrit language, and originally in the form of manuscripts written on birch bark; palm leaves or paper. These literatures should be explored which may further nourished the field of surgery and other branches of medical sciences. The versions of Sushruta Samhita is itself indicates that

these descriptions are in form of surgical procedures and teaching methods of ancient era.

It's the need of the hour to establish various super specialties of Shalya Tantra in order to bring back the glory which has lost decades ago. The technical refinements of surgical skill are possible and it should be evolve.

Sushruta had given the base for the surgery and opened the door to develop the field, now its younger generation's duty to uplift this branch of medicine.

#### REFERENCES

- <sup>1</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-2.
- <sup>2</sup> Kashyapa Samhita commentary by Pandit Hemaraja Sharma, Vimana Sthana, Chaukhamba Sanskrita Sansthana, p-62.
- <sup>3</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-2.
- <sup>4</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-1.
- <sup>5</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-12.
- <sup>6</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-12.
- <sup>7</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-14.
- <sup>8</sup> Draya Guna Vigyan vol-2, by P.V.Sharma, Chaukhamba Bharati Akadami, Varanasi, Ed-2005, P-718.
- <sup>9</sup> Draya Guna Vigyan vol-2, by P.V.Sharma, Chaukhamba Bharati Akadami, Varanasi, Ed-2005, P-253.
- <sup>10</sup> Draya Guna Vigyan vol-2, by P.V.Sharma, Chaukhamba Bharati Akadami, Varanasi, Ed-2005, P-537.
- <sup>11</sup> Draya Guna Vigyan vol-2, by P.V.Sharma, Chaukhamba Bharati Akadami, Varanasi, Ed-2005, P-120.
- <sup>12</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-81.
- <sup>13</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-80.
- <sup>14</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-78.
- <sup>15</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-70.
- <sup>16</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-81.
- <sup>17</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-76.
- <sup>18</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-440.
- <sup>19</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-437.
- <sup>20</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-460.
- <sup>21</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-460.
- <sup>22</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-51.
- <sup>23</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-45.
- <sup>24</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-51.

- <sup>25</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-53.
- <sup>26</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-54.
- <sup>27</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-46.
- <sup>28</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-52.
- <sup>29</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-55.
- <sup>30</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-408.
- <sup>31</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-121.
- <sup>32</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-121.
- <sup>33</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-372.
- <sup>34</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-328.
- <sup>35</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-328.
- <sup>36</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-416.
- <sup>37</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-369.
- <sup>38</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-42.
- <sup>39</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-66.
- <sup>40</sup> Charaka Samhita, Ayurveda Dipika commentary by Chakrapani, Sharma R K, Bhagawan Das, English commentary, Sutrasthan, Chaukhamba Sanskrita Series office, Varanasi, Edition 2009, Siddhi Sthana, p-286.
- <sup>41</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Sutrasthan-p 108, Chikitsa, p-396 & 397.
- <sup>42</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Sutrasthan-p-113.
- <sup>43</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-113.
- <sup>44</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-113.
- <sup>45</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-118.
- <sup>46</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-119.
- <sup>47</sup> Draya Guna Vigyan vol-2, by P.V.Sharma, Chaukhamba Bharati Akadami, Varanasi, Ed-2005, P-614.
- <sup>48</sup> Draya Guna Vigyan vol-2, by P.V.Sharma, Chaukhamba Bharati Akadami, Varanasi, Ed-2005, P-699.
- <sup>49</sup> Draya Guna Vigyan vol-2, by P.V.Sharma, Chaukhamba Bharati Akadami, Varanasi, Ed-2005, P-761.
- <sup>50</sup> Wikipidia, The free encyclopedia
- <sup>51</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-460.
- <sup>52</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-119.
- <sup>53</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-86.
- <sup>54</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-88-89.
- <sup>55</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-88.
- <sup>56</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-83.
- <sup>57</sup> Dravyaguna Vigyana Vol.-2 by Prof. P. V. Sharma, Varanasi: Chaukhambha Bharati Academy, Edition-2005, P-25.
- <sup>58</sup> Dravyaguna Vigyana Vol.-2 by Prof. P. V. Sharma, Varanasi: Chaukhambha Bharati Academy, Edition-2005, P-51.
- <sup>59</sup> Ballal Pandit. Boja Prabandha, Luxmivenketeshwar Publication, Kalyan-Mumbai, Edition 184, p-194.
- <sup>60</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Sutrasthan, p-30.
- <sup>61</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-35.
- <sup>62</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-30.
- <sup>63</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-41.
- <sup>64</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-40.
- Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Sutrasthan, Varanasi: Chaukhamba Sanskrita Sansthana, p-40.
- <sup>65</sup> Astanga Hridaya vol-1 by Prof. K.R. Srikantha Murthy, Varanasi: Chaukhamba Krishnadas Academy: Sutrasthan, p-303.
- <sup>66</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Sutrasthan, p-15.
- <sup>67</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Sutrasthan, p-11.
- <sup>68</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Sharirasthan, p-369.
- <sup>69</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Sutrasthan, p-76.
- <sup>70</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Sutrasthan, p-20.
- <sup>71</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Sutrasthan, p-19.
- <sup>72</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Chikitsasthan, p-468.
- <sup>73</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Sutrasthan, p-20.
- <sup>74</sup> Primary Surgery vol-1, Non Trauma, Oxford medical publications, Oxford university press, Oxford, Delhi, Kualalumpur; edition 1990, p-344.
- <sup>75</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Sutrasthan, p-20.
- <sup>76</sup> Primary Surgery vol-1, Non Trauma, Oxford medical publications, Oxford university press, Oxford, Delhi, Kualalumpur; edition 1990, p-59.
- <sup>77</sup> Primary Surgery vol-1, Non Trauma, Oxford medical publications, Oxford university press, Oxford, Delhi, Kualalumpur; edition 1990, p-386.
- <sup>78</sup> Primary Surgery vol-1, Non Trauma, Oxford medical publications, Oxford university press, Oxford, Delhi, Kualalumpur; edition 1990, p-263.
- <sup>79</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Chikitsasthan, p-462.
- <sup>80</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Chikitsasthan, p-430.

- <sup>81</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Sutrasthan, p-83.
- <sup>82</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Sutrasthan, p-89.
- <sup>83</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Sutrasthan, p-89.
- <sup>84</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Sutrasthan, p-52.
- <sup>85</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Sutrasthan, p-21.
- <sup>86</sup> Sushruta Samhita, Nibandha Sangraha and Nyaya Chandrika commentary by Dalhana, Jadavji T, editor, Varanasi: Chaukhamba Sanskrita Sansthana: Sutrasthan, p-35.