

## An Innovative Surgical Model's in Hands on Training Programme-Yogyasutreeya

Hanumanth M. Bagi\*, Manohar S. Sarangi\*\*

### Abstract

*Shalyatantra* is one among the eight branches of *Ayurveda*. *Susrutaacharya*, the master of this branch, briefs every aspects relating to basic principles of surgery in his text – “*Susrutasamhita*”. Mere theoretical knowledge of the disease is not sufficient to treat the ill, especially for a surgeon and there lies the importance of *Sareerastana*. *Susrutasamhita* is considered as the prime text book on “*Sareerasthana*”, where anatomical descriptions are detailed. *Susrutasamhita* classified surgical procedures into eight – *Astavidha Sastra Karmas* – *Cchedya*, *Bhedya*, *Lekhya*, *Vedhya*, *Eshya*, *Aharya*, *Visravaya* and *Seevya*. *Acharya* had taken steps like “*Yogyasutreeya*” for training before being accepted as a “*Surgeon*”. Only after practical training, *Acharya* details the indications of these procedures. And an attempt is made to developa innovative surgical models in hands on training based on feasibility.

**Keywords:** *AcharyaSusruta; AstavidhaSastra Karma; Innovative Surgical Models.*

### Introduction

In surgery, practice without surgical skills on human beings is like searching in darkness and the theoretical knowledge remains incomplete. So the need to gain mastery over the surgery demands training. The training programmes are detailed even for the non-surgical procedures along with surgical procedures. Knowledge of anaesthesia wasn't developed during the period of *Susrutaacharya*, which made the surgeons to complete surgical procedures in minimum time with maximum accuracy. The medium where these surgical skills could be practiced and mastered should be similar to that of human body or a diseased part of the body, so as to employ in the human subjects. We can observe, that different types of practical experimentations are explained on animal structure and different plants. *Acharya Susruta*

has also dealt with the instruments, its qualities and methods to handle it according to its use and also about the materials which can be used in its absence. The sharpness of the instruments used for different procedures like *Cchedana*, *Bhedana* and *Lekhana* should have *Ardhakaishiki*, *Masuri* and *Ardhamasuri* respectively. For *Vyadhana Karma* and *Visravana Karma* the sharpness should be of *Kaishiki*<sup>1</sup>. Instruments used for *Cchedhana Karma*, *Bhedhana Karma* and *Lekhana Karma* are held by using thumb, index and middle fingers, between handle and the blade. For *Visravana Karma*, instrument is held towards the tip with index finger and the thumb. For *Aharana Karma*, the instrument should be held towards base [2].

### *Cchedhana Karma*

Different types of *Cchedana* should be practiced in fruits like *Kushmanda*, *Alabu*, *Kalinthaka*, *Trapusa*, *Ervaruka* and *Karkaruka*. *Uthkarthana* (cut in the upward direction) and *Apakarthana* (cut in the down ward direction) should be practiced on these [3]. This trains to what extent the *Cchedhana Karma* should be done. Different types of *Cchedana Karmas* as per the site and different disease conditions are dealt. It is generally done in non – supportive conditions which are hard. *Kushmandaka* is round in shape, its outer skin is thick and the fruit pulp is very soft. *Alabuis*

**Author Affiliation:** \*Assistant Professor, Dept. of Shalyatantra \*\*Assistant Professor, Dept. of Agadatantra, SDMT's Ayurvedic Medical College, Danigonda Post-Graduation Centre, Padmanagar, Terdal, Taluk Jamakhandi, Bagalkot, Karnataka 587315, India.

**Corresponding Author:** Hanumanth. M. Bagi, Assistant Professor, Dept. of Agadatantra, SDMT's Ayurvedic Medical College, Danigonda Post-Graduation Centre, Terdal, Taluk Jamakhandi, Bagalkot, Karnataka 587315, India.  
E-mail: [dr.hanumanth12@gmail.com](mailto:dr.hanumanth12@gmail.com)

Received on 27.10.2017, Accepted on 09.02.2018

also a similar fruit like *Kushmanda*, it is round in shape, the outer skin is thick and fruit pulp is little thick in consistency. *Kalinthaka* means watermelon, it's also round in shape, the outer skin is thick, but the fruit pulp is very soft and porous and filled with water. *Trapusa* is the cucumber, which is elongated, the outer skin is thin, the inner structure is thick in consistency and it's watery in nature. *Kushmanda* can be compared to *Arbudha*, *Alabuta* the *Mamsasanghata*, *Kalinthaka* to lipoma / *Medojaarbudha*, *Trapusa* to *Arshas*, *Galashundika*, because of its similarity in structure and shape, as the fruit pulp resembles like muscular structures, which is smooth, to practice *Cchedhana Karma Mandalagra*, *Karapatra*, *Vridhipatra*, *Nakhasastra*, *Mudrika*, *Utpalapatra* and *Ardhadhaara* were used for *Cchedhana Karma* [4]. Scissors, scalpel, bone saw etc. are used currently.

#### *Bhedana Karma*

*Bhedana Karma* is practiced over an area where there is some collection of fluids, may be pus, blood, serous fluid etc. The skin over such area will be stretched and tightened. The leather bag, urinary bladder, leather bottle etc. if filled with watery mud [3] will be similar to such a diseased condition. *Acharya* has mentioned that the incision should be long enough to clear out the contents in that particular area. Incision should be made by a sharp instrument so as to get a smooth and clear wound. The instruments to be used for incisions were *Vridhipatra*, *Nakhasastra*, *Mudrika*, *Utpalapatra* and *Ardhadhaara* [4].

#### *Lekhana Karma*

*Lekhana Karma* should be practiced on leather sheet with hairs [3]. The structure and layers of the skin in the animals are similar to that of human beings. *Lekhana Karma* is mentioned in *Dusta Vranas* and in *Karna* or *Nasasandhana* / *Bandhana*. So, by practicing on above, one gets the ideas to which extent the pressure is to be applied as per the site for *Lekhana Karma*. It is indicated to remove superficial layer of skin and in *Dusta Vranas* to remove dead skin or debris. In plastic surgery, *Lekhana Karma* is done superficially on skin to cause bleeding to carry out further procedure. *Mandalagra* and *Karapatra* were used for *Lekhana Karma* [4].

#### *Vyadhana Karma*

*Vyadhana Karma* should be practiced on blood vessels of dead animals and lotus stalk [3]. Blood vessels of animals are similar to that present in the human body. One should practice *Vyadhana Karma*

because while puncturing we require to apply a certain amount of pressure, one can know to which extent we are piercing the walls of the blood vessels, skin and different structures. Stalk of the lotus is a circular structure and resembles vein. Its outer wall is thick, it is also having *Snigdha Guna* or *Pichila* / slippery in nature like that of vein. Because of this property it is difficult to puncture the lotus stalk. Inside this stalk there will be separate column for transporting of water and food which is called xylem and phloem. We can practice *Vyadhana Karma* by applying different type of pressures. After puncturing, if we apply the negative pressure we can elicit the water content. The instruments like *Kutharika*, *Vrihimukha*, *Aara*, *Vetasapatra* and *Suchi* were used for *Vyadhana Karma* [5].

#### *Eshana Karma*

*Eshana Karma* should be practiced on *Gunopahatakashtha* that is the wood, eaten by worm or on *Venunala*, or on the mouth of a dry *Alabu* [3]. The moth eaten wood would be weak, soft, and porous in nature; this can be compared to infection occurring in the *Nadivrana* (sinus) or *Bhagandhara* (fistula). Due to the infection by bacteria and other micro organisms, the surrounding structures of the wound will be weak, there will be discharge, uneven border, foul smell and delicate. Tube of bamboo is compared to small tracts like nasal passage, urethra, etc. Dry *Alabu* is thin, very delicate structure, it will be hollow after drying, it can be compared to a hollow organ like stomach and in endoscope *Eshana Karma* can be practiced. *Eshani* is used in *Anuloma* direction for the purpose of *Eshana* [4].

#### *Aharana Karma*

*Aharana Karma* should be practiced on fruits like *Panasa*, *Bimbi*, *Bilwa* and also by extracting teeth of dead animals [3]. This helps the surgeon to train themselves about the amount of pressure to be applied while extraction. Jackfruit is surrounded by number of fibres, in the centre part of the fruit; there will be thick fibrous structure which has to be removed first. All the fibres surrounding the fruits should be removed. Then we will reach the fruit, which will be adhered to the root. So, one should train to remove fibres and extract the fruit. So, by practicing on this one can get the knowledge regarding extraction. *Bilwaphala* - it has outer hard kernel, inside there is thin and small seed embedded in the fruit pulp, which should be extracted slowly. Extraction of teeth of the dead animals is the classical example of *Aharana*. The structure of teeth, jaws, dentine

structure, the blood supply, nerve supply, adherence of the tooth to the gums is similar to that of human beings. A me procedure of tooth extraction is carried out both in animals and human beings. The instruments used for *Aharana* were *Badisha* and *Dantashanku* [4].

#### *Visravana Karma*

*Visravana Karma* should be practiced on *Shalmaliphalakas* meared with *Madhuchista* (bee wax) [3]. *Shalmaliphalaka* is the bark of the *Shalmalivruksa*, which is hard in consistency, if *Madhuchista* is applied over it, it becomes *Snigdha*, *Pichila* and also thick in consistency. This can be compared to an abscess, where there is collection of pus, just by doing *Visravana Karma* the pus can be drained out. Adequate drainage of pus is important so as to hinder the progress of the disease into conditions like *Nadivrana*. *Visravana Karma* is done using *Suchi*, *Kushapatra*, *Aadimukha*, *Sharareemukha*, *Antarmukha* and *Trikurchaka* [4].

#### *Seevana Karma*

*Seevana Karma* should be practiced on *Sookshma Vasthra*, *Gana Vasthra* or *Mridhucharma* [3]. *Suchishastra* is used to perform *Seevana Karma* [4]. The materials used for suturing and its types can be classified into absorbable and non-absorbable suturing materials used now a days. Descriptions about using the black ants for suturing are well appreciated. Cloth is made up of threads i.e., it is the collection of the threads, in the same way the tissues are made up of collagen fibres which are similar to threads of the cloth. Hence, one has to practice, the suturing on the cloth. As there are different types of suturing method, one has to practice on different textures of materials, here the thin cloth can be compared to different smooth structures like intestine, stomach, etc. So, by practicing suturing on different materials, one can get the good knowledge of *Seevana Karma*. The pressure varies according to the thickness of the tissue where the suture is to be applied. By training suturing in thin as well as in thick cloths, different pressure gradient to be applied during suturing can be well understood.

#### *Bandhana Karma*

Bandaging is to be practiced on different part of the human body or on a dummy model. The circumference of human body differs from one another. Bandage is applied depending upon the nature of wounds, the site, severity etc. Different types of bandages are explained in *Ayurveda*. *Bandha* s like *Kosa*, *Dama*, *Swasthika*, *Anuvellitha*, *Pratholi*, *Mandala*, *Sthagika*,

*Yamaka*, *Khatwa*, *Cheena*, *Vibandha*, *Vitana*, *Gophana* and *Panchangi* are done according to the site. *Acharya* had great consideration about the pressure to be applied while bandaging, accordingly classified in to three – *Gada*, *Sama* and *Shithila Bandha*. He has explained the after effects, if these rules are not followed. By applying bandages on different parts of the body, one can acquire the knowledge and experience in bandages.

#### *Kshara Karma and Agni Karma*

*Kshara Karma* and *Agni Karma* are also as important as *Sastra* and *Yantra Karma*. A very good skill is needed for a surgeon to practice these procedures. So the *Acharya* has mentioned its practical training on small soft pieces of muscles. Since there is similarity in structures, texture, consistency of muscles, here for practical experience animal muscles is used. They have mentioned only on muscles because usually the *Kshara Karma* and *Agni Karma* are done only on delicate structures. The *Lakshanas* of *Samyakdagdha*, *Dagdha*, *Durdagdha* and *A thidagdha* are appreciated along with the merits and demerits of these procedures.

#### *Karna Sandhana*

*Karna Sandhi Bandhana* is likely practiced on thin layer of skin and muscle or a lotus stalk. Ear is a very delicate structure, it is made up of cartilaginous bone. Ear pinna is a soft muscle. *Karna Sandhana* is superficially mentioned for ear pinna only. So for this reason, one should practice to do the *Karna Sandhana* in the soft skin and muscles of animals for training purpose. Soft skin and muscles are thin, delicate, very difficult to handle and requires fine skill. At the same time it is difficult to bind such two structures together. *Acharya Susruta* is the Father of Plastic Surgery and having cosmetic value, one should be perfect in doing *Sandhibandha*. He has detailed a chapter on this in *Susrutasamhita Sutrasthana*, named *Karnavyadha bandhavidhi*. So the trainee should first practice on the soft skin and muscle of animals and then on human subjects. Lotus stalk is circular in structure; outer structure is smooth and slippery in nature. It's very difficult to take out the superficial layer and also it's a difficult task to again bind the two structures. Its thin, delicate and requires fine manipulative skills. So, by practicing on these structures one can get knowledge regarding *Karna Sandhana*.

#### *Vasthi Karma*

In *Ayurveda*, *Vasthi Karma* is one among *Panchakarma* and considered *Ardhachikitsa* according to *Kayachikitsa*. Along with its importance, *Acharya*

*Charaka* has explained the complications that may occur if not done properly. Introduction of *Vasthinethra* is one of the important steps in the *Vasthi Karma*. If it is not introduced properly, it may give rise to *Vasthiviyapath* and this may injure the area too. An optimum pressure is to be applied for attaining the result and also to avoid complications. If proper pressure is not applied while squeezing the *Vasthiputa*, the *Vasthidravaya* may not enter the *Gudamarga* or it may spill out. So, one should practice this procedure first on the dummy model. *Vasthinethrapravesha*, *Vasthi Karma*, *Vranavasthikarma* is practiced on a mud pot filled with water and a hole on its side, *Alabu* etc. The introduction of *Vasthinethra* should be practiced very carefully as the pot filled with water is a very delicate, it is difficult to introduce *Vasthinethra*



Fig. 1: Incision taking and suturing model



Fig. 2: Knot practicing model



Fig. 3: Intracorporeal or Intra-abdominal knot practicing



Fig. 4: Incision taking and suturing model



Fig. 5: Anastomosis practice on animal intestine



Fig. 6: Agnikarma kit

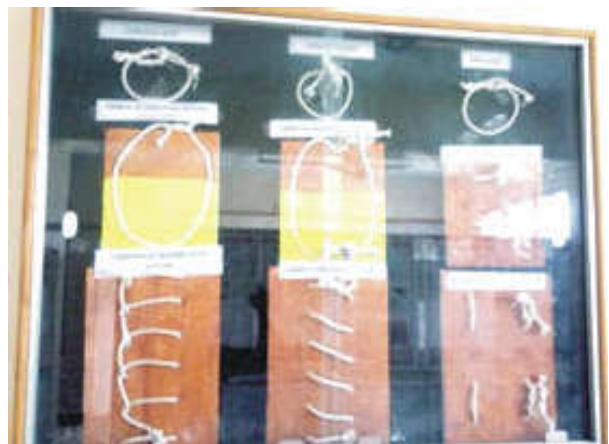


Fig. 7: Different types of suture models

without spilling water and one cannot apply much pressure because there is every chance of breaking of ear then pot. The stump of *Alabu* is removed and opened; in to this opening *Vasthinethra* is introduced to practice *Vasthi*. The inner structure is smooth, so if it is not introduced carefully, its opening may get enlarged.

### Innovative Surgical Models

Considering Acharya Sushruta view here some of the innovative surgical models are prepared for the hands on training of the students as follows-

1. Incision taking and suturing model
2. Incision taking on abdominal wall model
3. Knot practicing model
4. Intracorporeal Intra-abdominal knot practicing model
5. Intestinal anastomosis practice on animal intestine model
6. Different types of suture models
7. Agnikarma kit

### Discussion

All these can be taken as examples and newer methods and techniques may be introduced into these, to train better thus sharpening one's own Surgical skills. Both theoretical and practical experiences helps one to attain in the qualities of a surgeon as explained in *Susrutasamhita - Shauryam* (courage), *Aashukriya* (speed in doing the procedures), *Shastrathaikshyanam* (sharpness of instruments: well equipped), *Aswedavepathu* (no shivering or sweating), *Asammoha* (not having giddiness: at the site of

blood etc.) [5]. The prime aim of *Yogyasutreeya* is to furnish one as a surgeon.

### Conclusion

Training also helps us to avoid the complications, which a surgeon is vulnerable to. An intelligent physician, who has repeated practical experience along with theoretical knowledge, will never lose his presence of mind in the professional practice. The ideas or subject are understood by repeated study of treatise, boldness by self-confidence produce by comprehensive knowledge.

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