A REVIEW ON SUTURING TECHNIQUES IN ANCIENT AYURVEDA AND MODERN SCIENCE

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ABSTRACT

A Suture also known as “stitch” made to join together open parts of the wound which are caused after an injury or surgery. In Ancient India, Surgery is the branch of ayurvedic medicine famously known as Shalyatantra. Acharya Sushruta “father of surgery” and “father of plastic surgery” has described Ashtvidha Shastra Karma (8 surgical procedures) are means and methods to treat surgical diseases at that time. Among Ashtvidha Shastra Karma, Seevan Karma (Suturing) is primarily important in approximation of wound. Acharyas described Seevan Dravyas which are required for Seevan Karma i.e. Seevan Sutra and Seevan Suchi. Although suture material and aspects of the technique have changed, the primary goals remain the same as closing the dead space, supporting and strengthening wounds until healing increases tensile strength and minimizing the risks of bleeding and infection. For that purpose, one should practice proper suturing with ideal techniques. In Sushruta Samhita, basic techniques of suturing are described years back are still in use and also in various classical literature of Ayurveda, methods of suturing and its importance in practice was described well. In current surgical practices, modern science follows the same ancient principle without change.

KEYWORDS: Seevan Karma, Ashtvidh Shastra Karma, Suture, Suchi.

INTRODUCTION

The Indian civilizations are known to have been in regular communication with other civilizations at that time. Acharya Sushruta lists detailed accounts of how to perform repair of anal fistulae, tonsillectomy, caesarean section, amputation and rhinoplasty. Intestinal obstruction was relieved by surgical intervention. The intestines were opened and any
obstruction removed, they were then washed out with milk, lubricated with butter and sutured with ant heads. Nerves were not just repaired but divided to relieve pain. To perform these surgical feats, nearly 125 instruments were described in detail, including triangular, round-bodied, curved and straight needles. Sutures were made from flax, hemp, bark fiber or hair. Acharya Sushruta has advised how to rehearse Ashtvidh Shastra Karma (surgical skills) on various objects: gourds, melons and animal bladders were used to practice incisions, animal skin for suturing and lotus stems for ligating. Acharya Sushruta told about these techniques in surgical practice in chapter-9 of Sutra-sthan, Yogasutriya Adhya. It is obvious from these and the other texts available that Indian surgery was considerably ahead of any other early civilization and we must assume that much of Egyptian, Babylonian, Greek and Arabic surgery originated in India.\[1\] In various Samhitas, Acharyas mentioned Ashtvitha Shastra Karma (8 surgical procedures). They are as follows Chedana (Excision), Bhedna (Incision), Lekhana (Scraping), Vedhana (Puncturing), Eshana (Probing), Visravana (Evacuating), Aharaya (Extraction) and Seevana (Suturing). Shastra Karma is the procedure concerned with usage of sharp instruments. Seevan Karma (Suturing) is placed at 8\textsuperscript{th} place in Ashtvidha Shastra Karma.\[2\] This is placed last not because it is least important, but after finishing the first seven karmas it is employed. Seevan karma and its indication; contraindication and procedure are mentioned in different ayurvedic Samhitas which is relevant in modern era also. Seevan Karma (Suturing) is important for proper approximation and early wound healing. Acharya Sushruta has given detailed description about Seevan Karma (Suturing) and its indication, contra-indication, type, site of suturing, suturing material, and suchi etc. The primary aim of suturing is to keep the edges of wound connected and to heal that wound quickly.

**AIM AND OBJECTIVES**

1. To study and co-relate the various suturing techniques described in Sushruta Samhita and modern science.
2. To study the suturing materials described in Sushruta Samhita and modern science.

**MATERIAL AND METHODS**

All references are collected and complied from Ayurvedic textbook like-Sushruta Samhita, other Samhitas and modern textbook.

**Suture material**

Suture material is medical device used to keep wound together until they healed themselves.
by natural fiber (Collagen). Suture application generally involves using suture needle with an attached thread. A various shape and size of needles and different origin of thread were first time described by Acharya Sushruta.

**Seevan dravya**

*Seevan Karma* is performed with the help of *Seevan Suchi* (needle) and *Seevan Sutra* (thread), collectively known as *seevan dravya*;

1. **Seevan Suchi** - *Suchi* should be *Tikshna* (sharp) and body must be round like *Malati Pushp Vranta*. Sharp needle is easy to insert in the area and also causes less pain.[3]

**There are three types of suchi and its uses as follows**[4]

- **a)** *Vrutta* (cylindrical & round)- It is 4cm (2 angula) long; for places which have less of muscles & for joints.
- **b)** *Dhanurvakra* (curved)- for suturing on vital points like scrotum & abdomen.
- **c)** *Tryastra* (triangular)- It is 6cm (3 angula) long; for places which are broad.

2. **Seevan sutra**[4]

The thread used for *Seevan karma* (Suturing) with needle is called *seevan sutra*. According to Acharyas, a wide variety of *dravyas* (drugs) used as *seevan sutra* which includes *Ashmantak Twak*, *Shan*, *Kshom* (*Atsee*) (*Linum usitatissimum*), *Snayu*, *Baal*, *Murva* (*Marsdenia tenacissima*).

**Indications of seevan karma**[5]

*Seevan karma* or suturing is done in diseases due to excessive fat i.e *Medojanya Roga*, incised or cut wound i.e. *Bhinna Varna*, traumatic wound i.e. *Sadyovarna* and wound localized on movable joints etc. are also treated with suturing.

**Contraindications of seevan karma**[6]

Wounds caused by *Kshara* (alkali), *Agni*(cauterization), *Visha* (poison), *Antar-Lohit Shalya*,Gangrene, wound which contain *Panshu*, *Rom* (hair loop), *Nakh*(nails) are contraindications for *seevan karma*.

**Types of seevan karma (Suturing)**[7]

Four types of *seevan karma* mentioned in *sushrta samhita* as follows;

1. **Vellitaka**- It means continuous suture. This is done by stitching continuously along the length of the wound rapping the twisted edges inside it.
2. **Gophanika**- They are suturing with *gophanika* (blancket) kind of suturing.

3. **Tunnasevani**- It is fitting in *vrana* over the eyelids.

4. **Rujugranthi**- It is interrupted suturing. In this needle is embedded in *vrana* edges and sutured, keeping some distance between two join.

**Principal of seevan karma**\(^{[8]}\)

In *Seevan Karma* (Suturing) should not be too far or too close, performing too far reaching *Seevan* (Suturing) can cause pain in the margin of the wound and by doing more close suturing the margin of wound may get cut.

**External suturing**\(^{[4]}\)

The wound sutured either with thin thread of bark of *ashmantaka*, flax, jute, linen, ligament, horse hair, fiber of *murva* or of *guduchi*.

**Internal suturing**\(^{[9]}\)

The intestinal exudates cleaned, the cut ends of intestine are brought together and got bitten by black ants; after they have stuck up well, their body should be cut off and removed but not their heads. Big ant heads used for internal suturing as it is absorbable. This leads to closure of the perforation wound.

**Standard operating procedure of seevan karma**

*Seevan Karma* procedure is explained it by dividing it into *Poorva Karma*, *Pradhan Karma* and *Paschat Karma*.

1. **Poorva karma** (Pre operative procedure)

The surgeon desires performing any of *Ashtvidh Shastra Karma* should collect *yantra*, *shastra*, *kshara*, *agni*, *shalaka* etc. & in case of *seevan Karma*, *Suchi* and *sutra* is most important. If wound is contaminated with *Pamshu* (small stones), *Roma* (hairs), *Nakha* (nails) should be removed. After *Samyak Vishodana* (proper cleaning) of *Vrana*, wound edges are raised.\(^{[10]}\) *Poorva karma* is mainly cleaning of wound to prevent contamination and preparing it for *Pradhan karma*.

2. **Pradhan Karma** (operative procedure)\(^{[10]}\)

After *Samyak Shodhan* of wound the main procedure of *Seevan Karma* is done with *Suchi* and *Seevan Dravyas*. In this step the *vrana* is evenly stitched according to its need.
3. **Paschat Karma (Post operative procedure)**[11]

After suturing has been done properly, medicated *Khsom Pichu* applied over wound. Then sprinkling of fine powder of *Priyangu* (Calicarpa macrophylla Vahl), *Sauviranj*, *Yashtrimadhu* (Glycyrrhiza glabra Linn), *Rodhra* (Symlocos racemosa Roxb.), *Shallaki Phal* (Boswellia serrata) and ash of linen cloth on the wound, then bandaging of the wound done appropriately. The patient advised the regimen of food and activities to be adhered

**Dietic regimen**

Along with other measures *pathyapathya* i.e. dietic regimen is one of the important therapies’ according to *ayurveda*.

Patient should not consume *nava dhanya ,mastu, sarshapa, kalaaya, kulattha* and *nishpava*. he also avoids food materials prepared out of *haritaka shaka ,amla, lavana, katu* substances , dry meat, *dahi* etc.

Patient of wound should eat diet consisting of old rice and boiled *shali* rice,not extremely liquified and *snigdha* and taken with cooked meat of animals of *jangla* species soon get rid of disease. A diet consisting of *tanduleeyaka, jeevanti, vatsaka, moolaka, patola, karavella*, fried with *saindhava* and mixed with juice of *daalima* and *amlaka*. *Mudga* soup treated as above is also prescribed. Barley powder *vilepi, kulmaasha* and boiled water should also be given to the patient for food and drink

**Modern view of suturing (Seevan karma)**

In nature, damaged or destroyed tissue layers must be covered over quickly to preserve the integrity and functions of the organism. We humans have copied this response from nature. It is the aim of modern wound care, first and foremost, to preserve intact tissues and support the damaged parts. Suture materials, based on biocompatible raw materials, make possible the targeted application of every kind of wound care, and guarantees the best possible tissue acceptability. Surgical suture is a typical medical device for tissue repair. Most wound closures are still done with sutures. The mechanical properties of the inserted material are of the greatest importance in temporarily replacing the lost strength.

**Classification of suture materials**

There are three type of suture material
a) according to source or raw material
- **Natural suture materials:**
  Silk, linen (twine), animal gut (catgut)
- **Synthetic suture materials:**
  Polyglycolic acid, polylactide, polyamide, polyester, polypropylene

b) according to absorption characteristics
- **Absorbable sutures**
  Approximate the tissues during the healing process. During this time the suture’s tensile strength gradually diminish. Absorbable suture material is metabolized by endogenous proteolytic enzymes or by hydrolysis.
  e.g. chromic catgut, vicryl, PGA.
- **Non-absorbable suture**
  Remains almost unchanged when placed within body tissues, and is encapsulated within the wound scar by the organism. The sutures used for skin closure are removed once the scar tissue has become sufficiently firm to hold the wound edges together.
  e.g. nylon, silk, cotton, prolene.

c) According to the structure
1. Multifilament e.g. prolene, catgut
2. Monofilament e.g. mersilk, vicryl

**Quality of Suture**

a) It should have uniform diameter.
b) It should provide knots which hold security without slip or cutting/ Good tensile strength.
c) Easy to handle
d) Tissue biocompatibility/minimum tissue reaction
e) Easy to sterile
f) Low capillarity
g) Non-allergic, non-electrolytic, noncarcinogenic
h) Cost effective i) It should be readily visualized, should not shrink & should not be extruded from the wound.
i) On break down, it should not release toxic agents.
j) It should disappear without excessive reaction once its task is completed.
k) Selection of suture material
l) Healing characteristics of the tissues which are to be approximated. The physical and biological properties of the suture materials

m) The condition of the wound to be closed

n) The probable post-operative course of the patient

**Suture needle**

The characteristics of a needle (diameter, point, length of needle curvature) should always be optimally suited to the particular indication, surgical technique and tissue conditions. The parameters to be considered are:

- Response to penetration (on insertion and pulling through of the needle)
- Resistance to bending
- Resistance to breaking
- Secure seating in needle-holder

For suturing and suture encircling of wounds, atraumatic (eyeless) needles are usually used as needle-thread combinations. Needle-thread combination means, the thread is inserted and firmly anchored inside a drilled shaft at the end of the needle. This provides an essentially step free transition from thread to needle. Thus, any further trauma to tissue is avoided, as could occur if the thread is doubled up after passing it through the eye of a needle.

**Classification of surgical needles**

1. **According to eye**
   a) Eye less needles
   b) Needles with eye

2. **According to shape**
   a) Straight needles
   b) Curved needles

3. **According to cutting edge**
   a) Round body
   b) Cutting
   c) Conventional
   d) Reverse cutting
4. **According to its tip**
   a) Triangular tip
   b) Round tip
   c) Blunt tip

5. **Others**
   a) Spatula needles
   b) Micro point needles
   c) Cuticular needles
   d) Plastic needles

**DISCUSSION**

Acharya Sushruta had described the various suturing materials like hairs, cotton, guduchi, Murva, and linen thread and various suturing techniques in details. These suturing materials are natural in origin and hence may create less tissue reaction which promote early wound healing. Among major eight procedures of wound healing, seevan karma (Suturing) is primarily important. Detailed description of seevan karma in poorva, pradhan and paschat karma indicates the knowledge of acharyas at that time. Knowledge of different type of seevan sutra and different size and shape of needle is also important to do proper seevan karma which acharyas provided us sufficiently. The described suture materials and techniques in our texts can be utilized, if it will be combined with modern scientific interventions as an integrated approach.

**CONCLUSION**

We can conclude that Acharya sushruta and others were very well aware about management and care of wounds for its proper healing. For this purpose, Acharya Sushruta had given a complete idea of suturing procedure, needle and suturing material. *Seevan karma* and its indication; contraindication and procedure are mentioned in different *ayurvedic Samhitas* which is relevant in modern era also but modern advancements are also important to achieve the goal.

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