

Comparative Study of Concepts of Plastic Surgery in Ayurveda and Modern Sciences - A Review

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ABSTRACT

Plastic surgery is one of the prime important super specialty branches in the field of Surgery. Many of the procedures being followed by modern sciences are well established, still addition of more accuracy is continuous process in order to achieve perfection. When we go through these procedures and compare them with the procedures described by Sushruta we can come to know that many of these procedure are followed same as described by Sushruta. Modern literature of Plastic surgery also gives credit to Sushruta for many of surgeries and accepts Sushruta as pioneer of Plastic Surgery. From basic principles of Plastic surgery to some complicated surgeries like Rhinoplasty, Auroplasty, surgeries of Cleft Lip, practiced today have direct origin from *Sushruta Samhita*. This article highlights comparison of some of basic principles and some of procedures of Plastic surgeries in Sushruta Samhita and Modern Sciences.

Key words: Plastic Surgery, Sushruta's concepts of Plastic Surgery, Reconstruction Surgery, Rhinoplasty in Ayurveda, Auroplasty in Ayurveda.

INTRODUCTION

Plastic Surgery takes its name from Greek term "Plastikos" which means to mold and reshape. [1] Reconstructive plastic surgery involves using various techniques to restore form and function to the body when tissues have been damaged by injury, cancer or congenital loss. Its Origin can be traced back to ancient Egypt, to India in sixth century B.C. Where sushruta described using a forehead flap to reconstruction a nose and to Al-Zahrawi the tenth century Islamic surgical scholar. [2] Old Indian *Mahakavyas* like *Ramayan* and *Mahabharat*, we can understand that plastic surgery was well known in that era also. From some of

examples like reconstruction of nose of *Shurpanakha*, Rawan's Sister, implantation of head of horse to man. These are some examples which explains us extent of knowledge of plastic surgery from very long period back.

Sushruta *samhita* is also written in the era when wars are commonly happened. So Sushruta being '*Shalya Pradhan*' i.e. Surgery oriented, described some of surgeries which resemble plastic surgery being done in present days. Sushruta have mentioned plastic surgery in view of '*Sandhan Karma*' like *Nasa Sandhan* (Nasal Reconstruction), *Karma Sandhan* (Ear Reconstruction), *Ostha Sandhan* (Lip construction).

Modern techniques were developed after the First World War, especially with Sir "Harold Gillie's work on reconstructing facial injuries which was enabled by new safe anesthetic incubation. Later in twentieth century, renewed understanding of details soft tissue anatomy led to an explosion of new flaps, which with micro surgical methods, craniofacial surgery and tissue expansion resulted in an entirely new set of techniques, become available for reconstructing parts. [2] The first text book to include comprehensive account of plastic and reconstructive surgical operations was written by French surgery Velpeau in 1839. The fore fathers of modern day plastic surgery emerged out of First World War most famously the New Zealander Grillies. [3]

General Principles of plastic surgery -

Considering general principles of plastic surgery one should consider following points:

- a) Skin Incision and Excision
- b) Role of detrimment and Irrigation
- c) Role of suturing techniques
- d) Management of large wounds

a) Skin Incision and Excision:

Sushruta's View: Sushruta has clearly mentioned different types of incision to be taken on different parts of body under the heading 'Chedan Karma' (Incision). Sushruta has mentioned mainly three types of incision according to different sites. On head, eyelid, cheek, frontal region, lips, gums, axilla, hip joint Sushruta has advised to take 'Triyaka cheda' means oblique incision. Over extremities i.e. Upper and Lower limb one should take 'Chandramandal' incision (Circular) and over anal region and penis incision should be 'Ardhchandrakruti' (Semicircular).

Sushruta has clearly mentioned that if these rules of incision are not followed there are chances of intersecting vital structures and also wound healing may delay (Chirad Vranasanroho) and formation of keloid (Mamsakandi) may

occur. [4] Also while describing incision on breast abscess (StanaVidrathi) Sushruta has mentioned that incision should be taken such that it should avoid Papillary duct and areola otherwise there are chances of formation of Sirius (Nandivrama). [5]

Modern View: Modern science also gives prime importance to incision. Skin incision are carefully planned so as to avoid an obvious scar. Skin Creases and hair being area are useful place to camouflage incisions for example, facial incisions can be hidden in pretragal crease, subciliary crease or nasolabial fold, breast incision can be hidden in the periareolar skin, the infra Mary crease or axilla. Tension should be avoided across skin incisions, because it will result in wide and unsightly distributed in skin and human skin is less distensible in the direction of tension lines than across them. These 'Larger's lines' can be used to designed skin incision and diminish tension across the incision. When possible incision should be placed perpendicular to the long axis of underlying muscle. Relaxed skin tensionslines (RSTLS) are lines of minimal tension which often appear as wrinkle lines or natural skin lines. An example of this principle is transverse wrinkling of forehead, which is perpendicular to underlying vertically oriented frontal is muscle. [6]

b) Role of Debridement and Irrigation:

Sushruta's view: While describing wound management (vranachikitsa) Sushruta has described sixty types of treatment (Shashthiupokrama). In this topic Sushruta has described Scrapping (lekha) as sixteenth upakrama. Hard, large and round margined wounds which are gapping recurrently, wounds with hard fatty mass should be scrapped. Scrapping should be such that edges of wound should be at equal level. (Vartmanamtupramanenasamam). [7]

Also Sushruta has mentioned that before suturing wound should be

thoroughly cleaned otherwise there are chances of pus formation in wound. [8]

Modern view: While technically easy, proper wound debridement requires clear surgical judgment and careful inspection. Debridement implies the removal of devitalized and contaminated tissue while preserving critical structures such as nerves, blood vessels, tendons and bones. After debridement wound should be kept moist by normal saline or sterile water. [9] Chronic wounds in which granulation tissues has been allowed to develop and to persist for a prolonged time are often difficult to treat. Pathophysiologically one should indicate that granulation tissue is combination of capillaries, fibroblasts and bacteria of these three elements only one is helpful to the surgeon, the capillaries. Consequently if wound is filled with granulation tissue, it is essential that one resect surgically in tangential way until all granulation tissue is removed and one gets down to clean facial level. Following such tangential resection surgeon can apply grafts. [10]

C) Role of suturing techniques:

Sushruta's view:

Regarding suturing Sushruta has given detailed description of various techniques. Sushruta has described four types of suturing like. *Vellitaka*, *Gofanika*, *Tunnasevani*, *Rujugranthi* which should be used for different parts of body. [11] Also Sushruta has told precaution to be taken while suturing, as sutures should not be placed too close or far away from each other, If Sutures are placed too close there are chances of wound edges to break through and if they are placed far away sever pain may occur. [12] Sushruta has explained different types of needles according to different areas. For wound closure over the area which is less fatty in nature and over joints, round body two finger long needle (*Vrultanguladwgyam*) should be used while in areas with more fatty cutting body, three finger long (*Ayatatryangulatrastra*) needle should be

used And in arrears where vital organs are nearby curved (*Dhanurvakra*) needle should be used. [13]

Modern view: Regardless of suture material used the notion of minimizing tension is critical to maintaining wound closure and preventing excessive scar formation. Sutures are placed through epidermis and into the deep dermis approximately 2mm from skin edge and 7to10mm apart depending on need. Slight eversion of skin edges facilitates accurate closure without contracting depression of scar. Vertical mattress sutures are also used for eversion but will grasp and bring together the skin at separate points along the skin margin; there is greater theoretical concern with ischemic inhibition of tissue healing. Simple or mattress sutures usually constructed with non-absorbable material and should be removed as expeditiously as possible to prevent scarring. Buried dermal or facial suture should provide the significant proportion of strength of suture wound.

Subcuticular sutures are running superficial dermal sutures that avoid the external scar of interrupted sutures. They should not be relied upon, as the strength component of closure. Continuous over and over suture allow for rapid closure of tissue with some element of hemostasis that can be achieved. Staples also have been used for closure of the superficial component of skin and soft tissue. They may need to be combined with deeper sutures to augment the strength of the closure and ideally would not be left in longer than one week to avoid unsightly scar. Tissue adhesive substances especially cyanoacrylate based ones are advantageous if properly used and in a setting where relatively tensionless closure has already been accomplished with deeper sutures. Steri-strips or other tapes can similarly used when simple apposition of superficial skin is needed and tension on suture is absent by virtue of anatomy or pre-existing deeper structure. [14]

d) Management of large wounds:

Sushruta's view: Sushruta while describing treatment of *vrana* (wound) he described *Shashitiuparamas* (Sixty methods), in which he described sixty types of treatments for different types of wounds. In these treatments he described *Nirvapan*, *Vtkarika*, *Utsadan* and *Avasadan* as treatments for large wound. [15]

Modern view: In the management of large wounds when wound cannot be closed primarily or in a case where skin graft will not suffice the use of flap is most appropriate option. Difficult wounds generally fall into three categories:

1. Superficially infected wounds
2. Wounds over bone devoid of periosteum.
3. Post radiation wounds

1) Superficially infected wounds: After removing all granulation tissue and achieving clean fascial level a simple meshed split thickness skin graft may suffice, but in cases in which the wound cannot be cleaned completely due to essential structures underlying wounds, those wounds demand coverage with adjacent muscles. Muscles has an antibacterial effect on coverage of infected wounds, most likely because additional blood supply, which helps in the amelioration of infection. The use of an adjacent fasciocutaneous flap is a second choice although this is not as effective as muscle.

2) Wounds with exposed bone Devoid of periosteum: In these type of wounds it is essential that one try to maintain the exposed bone most with frequent dressing changes or a slow saline drip in case of osteomyelitis it is essential that one cover that defect immediately with an adjacent muscle to fill in cavity and to cover the exposed bone.

3) Post radiation wounds: Following wide excision of entire field that has been irradiated one, musculocutaneous flap and if that is not available with omentum, the wound should be closed. A skin graft for

post radiation wounds is not effective and is likely to fail. Adjacent skin flaps, similarly may not adhere to the underlying post radiation bed or to the skin edges, muscle or they bring to the wound. Over the muscle or omentum one can immediately place a meshed split thickness skin graft. [16]

e) Management of some specific defects:

a) Defects of nose:

Sushruta's view -Sushruta has described reconstruction of nose defects in detail in sixteenth chapter of *Sutrasthana*. Sushruta says one should take a leaf of the exact size of defect and after that same size piece of skin along with sub cutaneous fat from forehead should be sutured over defect properly. After placing this graft to keep air way (nostrils) patent one should place *Erandnala* (stick of *Ricinus Communis*- Castor). Pedicle of this graft should be attached to its original place and when the wound is healed completely the pedicle should be cut. [17]

Modern view- Basal cell carcinoma that occurs along the dorsum or the tip of nose often requires flap coverage for satisfactory results. The flap coverage should be from the adjacent nasal skin because it provides same color and texture as well as thickness and in elderly patients the scar is almost imperceptible. On the other hand skin graft may leave visible concavity and apatch appearance because of surrounding skin. Different color of flaps for nasal reconstruction is:

1. Nasolabial flap
2. VY advancement flap
3. Banner Flap
4. Total reconstruction of nose with Midline forehead flap. [18] Nasolabial flap based on the facial artery can resurface the nasal ala. The paramedian forehead flap, based on supratrochlear - supraorbital vessels, provides like tissue such as color texture for larger deficits of tip the dorsum, total nasal units and areas of missing cartilage. Forehead flap reconstruction requires two stages. To

delay the flap and patch the defect and to divide the pedicle and inset the flap. [19] (Figure-1)

b) Defects of Ear:

Sushruta's View- Sushruta has mentioned one separate chapter on defects of Ears and there management as *Karnabahavidhi Adhyaya* in *Sustrasthan* while piercing the ear Sushruta has advised to avoid three vessels to be prevented in order to avoid complications. Sushruta has mentioned fifteen types of ear defects and their management in this chapter. In case of patients having thick, broad ear lobule one should cut it and attach it upward. In absence of lobule Sushruta had advised to reconstruct lobule with tissue from forehead with intact blood supply (*Sanubandhenajivita*) [20]

Modern View –Removal of large basal or squamous cell carcinoma of ear requires immediate reconstruction if wedge resection is so large that it may result in deformity of ear. A local technique described by Anita is the more desirable method of reconstruction following the excision of large defect along the helix of ear, the lower portion of ear is incised along helix through the skin and underlying cartilage to the earlobe. If necessary the upper portion similarly below the helix is also incised through the skin and the cartilage. This leaves the two ends of helix able to move towards each other and to be approximated restoring the normal helical contour of ear. The inferior cartilage and overlying skin are also approximated. [21]

c) Defects of Lips:

Sushruta's view- Sushruta has advised reconstruction of Lips same as Nasal reconstruction without using *Erandanala*. [22]

Modern View- There are numerous techniques by which cleft lip can be closed. By plastic surgery. The operation, advocated by Mirault, which was modified by Blair is wildly practiced for unilateral cleft. This procedure is

performed in three stages. First stage- Adequate mobilization of lip lateral to cleft, Second stage- margins are made raw by cutting the whole thickness of lip and in Third stage skin flaps are sutured in such a manner that continuity red margin of lip is properly maintained. A rubber tube of proper size is introduced through nostril first and then repair is started. [23] (Figure- 2)

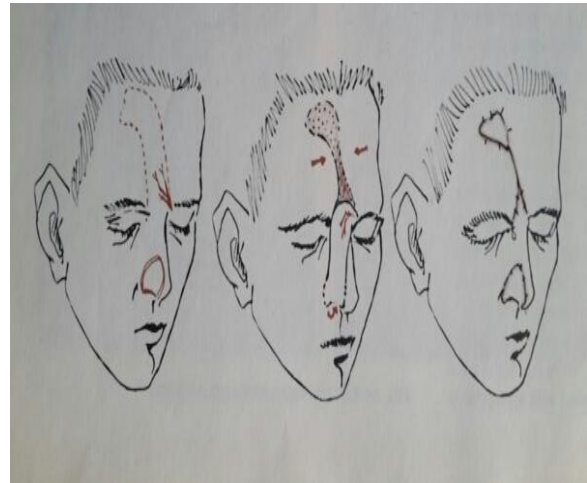


Figure- 1: Reconstruction of Nose by flap from forehead

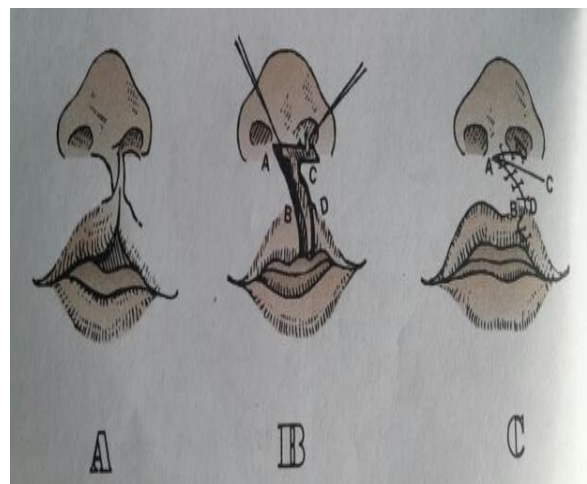


Figure- 2: Reconstruction Surgery for Cleft Lip.

DISCUSSION

Plastic surgery is one of the prime important branches in the field of Surgery. It is considered to be super specialty branch in Surgery now days. Though it is well established branch in Modern Sciences, continuous evolution and adding newer techniques is the continuous process for this field, in order to achieve more precision and perfection in this branch.

When we go through books available on Plastic Surgery we find that Modern Sciences has also mentioned that the oldest references for Plastic Surgery are found in Sushruta *Samhita*. And if we see the procedures in Plastic Surgery we can come to know that many of these procedures are followed just like procedures described in Sushruta *Samhitas*. The review study explains that some of basic principles described in Sushruta *Samhita* are also described in Modern sciences as basic principle for Plastic Principles. In Plastic Surgery some of basic principles to be followed for Skin Incisions, Excision, Debridement, Suturing Techniques, closure of large wounds with Grafts. Considering Skin incision and Excision, Sushruta has clearly mentioned different types of incisions to be taken on various body parts. And if these rules are not followed there are chances of either none healing of wound or formation of hard tissue- (*Mamsakandi*) which can be correlated with Keloid. Whereas Modern sciences has also described incision should be taken considering direction skin creases and avoiding tension on incision line in order to avoid wide and unsightly scar. For these purpose Carl Langer has described various lines on body called 'Langer's Line' which are to be used to design skin incisions. When we compare these lines with Sushruta's description of various incisions on various parts of body, we can come to know that these incisions also follow the exact principle of Modern Sciences.

Now considering role of Debridement and Irrigation Sushruta has mentioned importance of wound cleaning and removal of hard margins and scrapping of wound while describing *Ashtavidha Shastrakarma* and Sixty methods of treatment of wound. Modern Sciences has also described importance of Debridement and Irrigation in order to achieve good capillary bed for acceptance

of graft, otherwise there are chances of rejection of grafts.

When we see suturing techniques described by Sushruta, we find detailed description of types of Suturing, body parts where specific type is to be used different types of Suture materials. Also technique of suturing is also described in Sushruta just like the Modern sciences practicing now days, like proper approximation of margins, proper strength to knotting, period of removal of sutures on different parts of body. Only the difference we can see that Sushruta has described different suture material which are either of plant origin or of animal origins, whereas Modern sciences use mainly artificially prepared Suture materials. But it can be said that Suture materials described by Sushruta may possess some medicinal properties which may help in wound healing also, like *Guduchi (Tinospora Cordifolia)* which is having anti-inflammatory and antibiotic property. ^[24]

Considering some of references for management of large wounds like Reconstruction of Nose, Reconstruction of Ear, Reconstruction of Lips we can observe that the methods described in Sushruta is the pioneer in Modern Sciences also as these procedure are followed just like described by Sushruta. Like for reconstruction of nose Sushruta has advised to take graft from frontal area, keeping its blood supply patent. This procedure is followed as it is now days. Sushruta has also described fourteen methods for reconstruction of Ear out of which only few are followed by Modern Sciences.

CONCLUSION

The above review study reveals that knowledge of Plastic Surgery is very well established in Sushruta's era and many of procedures, Modern Sciences performing now a days are follower of Sushruta. There is very much scope for

more exploration of Suhruta's techniques and if used with development modern sciences there is much to add in the field of Plastic Surgery.

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