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A review on plastic & reconstructive surgery marvels of *Sushruta*

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Abstract

Sushruta Samhita is regarded as one of the finest books in the history of ancient surgery, where we found description of all kinds of surgical procedures in a very organized way. *Sushruta* a revered surgeon of his time not only described in detail about different kinds of wounds and wound healing methods but also was a master in surgical art craft. Plastic surgery is mentioned in the different chapters in *Sushruta Samhita*, especially in the wound healing and lobuloplasty chapters.

Today plastic surgery is developed as a super specialization branch in western surgery, but somehow we forget to give due credit to the concepts and works done by *Sushruta* some 3000 years ago. Present study was undertaken to review the works of *Sushruta* specific to plastic surgery. It was found that *Sushruta* had complete knowledge of different kinds of skin graft and pedicle graft and had the technique of reattachment of freshly cut off body parts, which is still a matter of astonishment for the scientists.

Keywords: *Sushruta Samhita*, Lobuloplasty, Plastic Surgery

1. Introduction

1.1. What is plastic surgery?

Plastic and reconstructive surgery is a speciality of general surgery which is concern with the treatment of prenatal and acquired deformities of the skin and subcutaneous tissue in the various parts of the body in order to improve both function and appearance. The surface deformities may be a result of loss of covering following burns, avulsions, various ulcerations, or surgical excision for treatment of birth marks, radiation damage or cutaneous malignancy. In addition plastic surgery deals with the reconstruction of all kinds of facial deformities.

1.2. Principles of plastic surgery

Based on the site and extent of diseased person appropriate methods are adopted based on the following principles.

- A. Correction of deficiencies by transferring new tissue obtained either from the immediate surrounding area or some other parts of the body; burns, avulsions, scar etc.
- B. Removal of excess or relaxed tissue; keloids, hypertrophy of breasts, supernumerary tissue, tumors etc.
- C. Repositioning of tissue which may be adequate in amount but not in position; fractures, protruding ears, etc.

The main aim of plastic surgery is to restore the function of tissues and skin to as close to normal as possible and improving the appearance of body parts.

1.3. Material and methods of plastic surgery

Plastic and reconstructive surgery is concerned essentially with the shifting of tissues, either local or distant. Different techniques have been used for that purpose which can be broadly classified as follow:

1. Free Transplants

A free transplant is obtained and fixed in one surgical procedure. Based on source site it can be again classified as-

- Autogenous (same person)
- Homogenous (another person)
- Alloplastic or heterotransplants (non- human or another species)

2. Pedicle flap

Where a piece of tissue from one part of the body is transferred to another, along with the blood vessels that keep it alive; it's called flap surgery because the healthy tissue usually remains partially attached to the body while it is repositioned [1].

1.4. Plastic & Reconstructive Surgery in Vedic era

Plastic and reconstructive surgery was in a highly developed state during *Vedic* era with lots of examples and stories are mentioned regarding this, some of them are as follows: [2]

- God *Shiva* cut the head of *Daksha Prajapati* which was later reconstructed by *Ashwinikumars* with the head of a Goat, it was first instance of heterotransplants.
- *Bispala*, wife of king *Khel*, lost her leg during the war. *Ashwinikumars* transplanted an artificial leg made of iron, this may be first instance of a metallic transplant.
- *Ashwinikumars* also performed another heterotransplant by attaching the head of a horse to *Rishi Dadhichi*.
- *Ashwinikumars* also transplanted the testis of Sheep to king *Indra*, when he lost them by a curse.
- *Shiva* also performed heterotransplant by attaching the head of an Elephant to that of *Ganesha*.

1.5. Plastic & Reconstructive Surgery as mentioned in *Sushruta Samhita*

Sushruta known as father of plastic surgery [3] has described about plastic and reconstructive surgical procedures in *Sushruta Samhita*, which can be summaries in three different categories

1. Reconstruction- Lobuloplasty, Rhinoplasty, Cleft lip.
2. Reattachments of body parts; neck, limbs etc.
3. Cosmetic- *Krishnikarma* (blackening), *Pandukarma* (whitening), *Romsanjanana* (re-growth of hairs), *Lomapaharanan* (depilation).

Lobuloplasty

The human ear can be bifurcated during the procedure of dilatation or due to trauma according to *Sushruta*. There are fifteen kinds of patterns of repair of the ear based on the condition of traumatized ear. *Nemisandhanaka*, *Utpalabhedyaka*, *Valluraka*, *Asanima*, *Gandakarna*, *Aharya*, *Nirvedhim*, *Vyayojima*, *Kapatasantdhika*, *Ardhakapatasantdhika*, *Samksipta*, *Hinakarna*, *Vallikarna*, *Yastikarna*, and *Kakausthaka*.

Operative technique: After deciding the proper repairing method preoperative arrangements should be done and patient is held in operative position with reliable assistants. Appropriate technique is adopted and blood coming out of the ear should be examined and washed with lukewarm water or cold water or alcohol, based on the *Dosha* involvement. Further the area should be made raw and approximation done, so that the ear is neither elevated nor devoid of a portion or irregular. After adequate haemostasis, suturing should be done. Then honey and *Ghruta* is applied and ear should be covered with either cotton or gauze and tied with a

thread neither too tightly nor too loosely. As a post-operative care ear lobule should be soaked with fresh sesame oil for three days and dressing should be changed after every three days. When the ear lobule healed completely, then it should be elongated gradually. *Sushruta* also mentioned that when ear lobule is totally destroyed or absent in that case a pedicle flap should be taken from neck or cheek [4].

Rhinoplasty

When the nose is cut off due to trauma, in that case Rhinoplasty should be performed. A tree leaf of the size of the nose should be taken and it should be placed on the cheeks and after measuring the size, a flap should be taken from cheek with one end continuing it. Afterward it should be sutured by placing two hollow tubes inside and approximation done from each side. It should be sprinkled with red Sandalwood powder, *Yashtimadhu* (licorice) and *Rasanjana* (preparation from Berberis) and covered with cotton. This should be soaked regularly with sesame oil [5].

Cleft-Lip Repair

Cleft-lip should be repaired same way as that of Rhinoplasty without the use of tubes.

Reattachments of body parts; neck, limbs etc

When the neck is cut off from *Krikatika* (atlanto-occipital joint) and air is leaking through it, in that case it should be put back properly and suturing should be done all around with bandaging. *Ghruta* made with Goat's milk should be sprinkled locally. Food should be taken by the patient in supine position.

When the limbs are cut off widely from an oblique blow, it should be sutured properly after quickly putting the bones, joints in their normal position. Spiral bandage should be applied rapidly and it should be soaked with oil. Afterwards sling bandage should be applied [6].

Cosmetic: *Krishnikarma* (blackening), *Pandukarma* (whitening), *Romsanjanana* (re-growth of hairs), *Lomapaharanan* (depilation).

Pigmentation therapy like blackening and whitening should be adopted in cases where after healing the wound, scar is either too white or too black respectively. Different herbal preparations are mentioned for that proposes in *Sushruta*. Furthermore there are procedures mentioned for re- growth of hairs and also for removing excess hairs [7].

2. Conclusion

From above description it is clear that plastic and reconstructive surgery is a very old science, which was in a highly developed state during *Vedic* era. It is, however, difficult to say when the first plastic and reconstructive surgery was performed. The necessity arose when human lost body parts such as nose, ear, fingers, etc during war or by some form of punishment. What is most surprising is *Sushruta's* mastery in dealing with these kinds of defects. The concept of Lobuloplasty, Rhinoplasty, Cleft- Lip Repair, reattachment of bodily parts was unparalleled at that time and the concept of cheek pedicle flap and free flap method is also his unique contribution to modern surgery. Pigmentation therapy and hair growing formula are still a matter of research for scientist, which *Sushruta* successfully described 4000 years ago. The art of plastic and reconstructive surgery later spread to Middle East, Persia and from there it spread to

other European countries, where it further developed as a specialized branch of surgery. But in true sense *Sushruta* is the father of plastic and reconstructive surgery.

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