

## ROLE OF LEECH(JALAUKA) IN PLASTIC AND RECONSTRUCTIVE SURGERY

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### ABSTRACT

The term plastic derived from the Greek word Plastikos means to mould or shape. Plastic surgery is a specialized branch of surgery involving the restoration, reconstruction or alteration of the human body. In Ayurveda the plastic operation of otoplasty and rhinoplasty are described in the 16<sup>th</sup> chapter of first book (Sutrasthan) of compendium. Now a days the microsurgery, has been improved by the use of leech. Leeches are used to enhance circulation of blood in the injured area after replantation surgery.

**KEYWORDS:** Plastic surgery, Sushruta, Leech, Microsurgery.

### INTRODUCTION

Plastic surgery is a specialized branch of surgery devoted to the treatment of deformities of the face and other parts of the body. The term plastic surgery was employed in the title of Zeis's book, hand buch der plastischen chirurgie, in 1838. Von Graefe was the first to employ the term plastic in his monograph entitle Rhinoplastic published in berlin 1818. The term cosmetic and aesthetic have also been employed for corrective plastic surgery.

The term plastic derived from the greek word plastikos, means to mould or shape. The importance of plastic surgery is to restore the appearance and function of parts of the body destroyed or, damaged by disease or injury.

The charaka samhita and sushruta samhita are among the oldest known treatise on Ayurveda. The plastic operations of otoplasty(plastic surgery of ear) and rhinoplasty (plastic surgery of nose) are described in the 16<sup>th</sup> chapter of first book (sutrasthan) of compendium.

In 1993 the 1<sup>st</sup> international congress of plastic surgery was held in paris. Basically the task of plastic surgery is to restore the parts of the body destroyed or damaged by disease and injury. But in recent year cosmetic surgery as beauty treatment has become very fashionable.

Leech(jalauka) known as blood sucker. Blood sucking leech produces a liquid containing a chemical substance called Hirudin. Hirudin prevents the blood from the thickening and makes it easier to suck the blood.

### **Descriptions of jalauka in Ayurveda**

Jalauka (jala + ayuka) means one who can survive only in water.

**Types of leech (jalauka)** – There are 12 types of leeches. Six are poisonous and six are non-poisonous leech.

#### **1. POISONOUS LEECHES**

- Krishna
- Karbura
- Alagarda
- Indrayudha
- Samudrika
- Gochandana

#### **2. NONPOISONOUS LEECHES**

- Kapila
- Pingala
- Sankumukhi
- Mushika
- Pundrikmukhi
- Savarika

**ETYMOLOGY-** The word leech came into use early in the history of the English language and for most of its history has had to distinct meaning: the blood sucking worm often use for medical purposes, physician. The close association of leech and the physician was there fore early established and latest well in to 18<sup>th</sup> century. Its seems natural that the leech became synonym for doctor early in the history of the world.

### ZOOLOGICAL INTRODUCTION

Genus –hirudinaria

Phylum –annelida

Family – granulose

Class – hirudina

Sanskrit – raktapa, jalaula, jalsarpina

Hindi – Jalu, jobk

Bangali – jonk

Gujrati – jala

Telgu – jalgalu, attalu, jerika

Tamil – attar

Malyalum – alta

**HABITAT** – The leech is amphibious, needing both land and water, and resides exclusively in fresh water. A typical habitat for medicinal leech would be a small pond with a muddy bottom edged with reeds and in which frogs are at least seasonally abundant. Medicinal leech is primarily aquatic, swimming with a graceful undulation, but it lays its cocoon of eggs on land at the waters edge.

**SALIVARY SECRETION OF LEECH** – Salivary secretion of leech is found to be very useful. It contains medicinally useful substances. Some of these are following:

1. **Hirudin:** It is a proteolytic inhibitor. It is thrombin specific inhibitor. It retards the coagulation of blood. Mature *Hirudo medicinalis* contains 285 ATU of hirudin, varying with feeding state.
2. **Bdelin** – It is also a proteolytic inhibitor. Bdelin which molecular weight is about 5000 is the smallest known naturally occurring inhibitor of trypsin, plasmin and acrosin and may be useful in medical science where plasmin inhibition is indicated.
3. **Eglin** – The low molecular weight, eglin is a potent inhibitor of elates, cathepsin G, chymotrypsin and subtilisin. The polypeptide is of medical interest for several reasons.

Eglins effectively block the inflammatory response induced after localized trauma or surgery and Eglins are effective against some kinds of collagenolytic, ulcerous conditions of the gut endothelium, in addition, against non specific proteolysis of clotting factors associated with septicemia.

4. **Hementin** – It is another anticoagulant. Hementin, in salivary gland of *Haementeria ghilianii* is different from hirudin in action mechanism. Hementin, which is a fibrinogenolytic enzyme, degrades fibrinogen and fibrin in plasma. This enzyme is useful in medical therapeutics because of insensitivity to natural proteolytic inhibitor present in human plasma. Plasmin activat or which exists in posterior salivary gland of haementeria.
5. **Collagense**- An inhibitor of platlet aggregation.
6. **Apyrase** – A platelet anti-aggregant.
7. **Decrosin** – A potent glycoprotein antagonist and inhibitor of platelet aggregation.
8. **Hyaluronidase** – The hyaluronidase located in the salivary cells of *H. medicinalis* plays more important role in the efficacy of leeching than even the anticoagulants.
9. **Anaesthetic** – The bite of all bloodsucking leeches is painless. It is supposed that this is due to an anaesthetic secreted by the leech. This substance is not identified yet, but it is known that this is different from hirudin.
10. **Vasodilator:-** Except for well-known anticoagulants, there are substances to prolong bleeding. This vasodilator is histamine like substance. In *hirudo medicinalis*, this substance was shown to be in salivary cells.
11. Antibiotic properties of leech has been studied. For example anthrax, relapsing fever, tetanus, meningitis, streptococcal infections have been studied. The antibiotic in *Hirudo medicinalis* is produced by *Aeromonas hydrophila* which lives endosymbiotically in its gut. This bacterium cultured in vitro kills tuberculosis, dysentery, staphylococcus aureus and other diseases.

**Role of leech (jalauka) in plastic surgery-** Leech known as blood sucker. Blood sucking leech produces a liquid containing chemical substance called hirudin. Hirudin prevents the blood from thickening and makes it easier to suck the blood.

Now a days the microsurgery, has been improved by the use of leech. Leeches are used to enhance circulation of blood in the injured area after replantation surgery. Blood will flow in through the arteries, but it will not flow out through the veins, resulting in abuild up pressure. The reason for this could be that there are not enough veins, or because the veins are not

functioning well enough. In this case the leech is used to suck up the extra blood, causing a reduction in pressure, leading to a better circulation.

Over past several years, countless patients have benefited from the use of leeches in Microsurgery. Leeches are used to overcome the problem of venous congestion by creating prolonged localized bleeding. The artificial circulation gives the graft time to re-establish its own circulation normally 3 to 5 days. Today medicinal leeches are used as tools in tissue grafts and reattachment surgery. Not only they secrete anticoagulants to prevent blood clots and relieve pressure due to pooling blood. Leech saliva helps to reestablish blood flow to reattached body parts by means of a vasodilator, provides a numbing anesthetic and lessens the risk of infection due to an antibiotic.

**Mode of action** – The leeches main therapeutic benefits are not derived from the average 5 mls. Of blood removed during biting, but from the fact that each bite wound continues to ooze up to 150 mls. of blood for 10 or more hours. The goal then is to produce a minimally adequate venous outflow from the tissue by adjusting the number of bite wounds to suit the clinical situation.

Research indicates that after about 3 to 5 days, new vessel in growth around flap margins develops sufficiently to restore effective venous drainage. Therefore, it is important that treatment is not terminated too soon, but rather, continued over a period of time to avoid failure.

## **Role of leech in medical therapeutics**

### **1. Plastic and reconstructive surgery**

Presently, medicine, specially the area of microsurgery, has been favoured and improved by the use of the leech. Wherever amputated parts are sown back, or replantation surgeries are performed, leeches are used to enhance circulation of blood in the injured area. Blood, will flow in through the arteries, but it will not flow out through the veins, resulting in a build up of pressure. The reason for this could be that there are not enough veins, or because the veins are not functioning well enough. In this case, the leech is used to suck up the extra blood, causing a reduction in pressure, leading to a better circulation. The leech secretes a chemical that opens the veins, helping blood circulation.

The following criteria may help in diagnosing a true venous problem in a flap:

- Skin colours dusky or bluish.
- Capillary return Bruskiier than normal (note that areas of fixed colouration are beyond salvage).
- Pinprick response bleeding should be rapid and dark.
- History known problems with veins at operation, either in the pedicle or at the site of a microvascular anastomosis.

## 2. Prevention of Necrosis

It has been proved that after transplanting or reattaching human limbs or the tissue the blood supply at the site of the operation often fails to return through the veins to the heart, but blocks up and reduces the supply of fresh blood through the arteries. This results in the death and decay of the tissues. Attempt by doctors using mechanical and chemical means to prevent tissue death once venous problems have risen, so far have failed.

Some surgeons involved in the transplant, reattachment, removing cancerous tissue or cosmetic surgery have turned leech to remove blood from the site of the operation and keep blood flow regular. The leeches suck-up blood and there by prevent necrosis. They also provide enough time for capillaries to grow across the suture and allow normal blood flow to be resumed.

## 3. Oedema

Increasingly leeches are being used to treat severely edematous patients. The leech itself provides immediate reduction of swelling by removing 15 to 30 ml of blood. Its most important contribution is the injection of hirudin that keeps the wound seeping for another 10 hours on average.

4. It is used in the management of periorbital haematoma in the accident.
5. It was recently used in the Russia in treating acute external otitis, adhesive otitis and malignant tumors.
6. Research on leech saliva is being done, involving possible anti tumor effects of leech saliva, as well as other properties that could help in heart related diseases.
7. Use of leech in buergers diseases.

**CONCLUSION**

Leeches have become popular for preserving soft tissue and promoting healing after facial reconstructive surgery. Leech therapy's effects on blood clotting during and after cosmetic surgeries helps the body to heal more naturally and completely. Leech therapy's benefits for blood circulation has also led some people use leech therapy to treat baldness and hair loss on scalp. In summary, hirudotherapy is a safe, easy to use, beneficial and cost effective treatment modality to save reattached body parts and flaps in reconstructive plastic surgery.

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