



## ANCIENT CONCEPT IN THE MANAGEMENT OF HYPERTROPHIC SCAR AND KELOID

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### ABSTRACT

The Keloid and Hypertrophic scar are wound healing disorders. These disorders occur during phase of proliferation and remodelling in wound healing. In Hypertrophic scar, there is excess scar but it will not extend beyond the margins of the scar of original wound where as in Keloid persistent excessive growth of scar beyond its margins into the adjacent skin. Although various attempts has been made to understand the exact patho –physiology, molecular abnormalities and treatment of Hypertrophic scar and Keloid but it is yet to be determined clearly. So, it is high time for us to explore and validate the ancient concept of the texts. Even though there are many treatment modalities for Hypertrophic scar and Keloid but the recurrence rate is very high despite of the present ways of treatment. In Ayurvedic text, *Acharya Sushruta* mentioned many procedures for the treatment of *Vrana vastu* (can be correlated to Hypertrophic scar and Keloid) which are known as *Vaikratapaham*/ warding off the abnormalities. Term '*Vaikratapaham*' is formed by two words '*Vikrati*' and '*Apaham*' means to remove the deformity formed after wound healing. At present we believe that the following combination of therapeutic procedures in a definite sequence will most reliably achieve a complete cure i.e. prophylactic as well as curative treatment for Hypertrophic scar and Keloid. These therapeutic procedures are *Snehana*/oleation, *Swedana*/fomentation, *Vranabasti*/oil pooling on scar, *Pratisarana*/ rubbing, *Patradan*/covering with leaf, *Avasadana*/ removal of granulation tissues, *Kshar karma*/ caustic application and *Pandu karma*/ bring to normal skin colour etc. The prophylactic treatment includes *Shamana* therapy while in curative treatment we can choose *Shodhana* therapy as well as *Shamana* therapy.

**KEYWORDS:** Keloid, Hypertrophic scar, *Vrana vastu*, *Shamana*, *Shodhana*, *Dosha*.

### INTRODUCTION

The Keloid and Hypertrophic scar are fibro proliferative disorder of skin caused by abnormal healing of injured or irritated skin. Hypertrophic scar has similar appearance as Keloid but is usually linear, both lesions are commonly pruritic but Keloid may even be the source of significant pain and hyperaesthesia. Keloid tend to reoccur following excision, where as new Hypertrophic scar formation is rare after excision of the original Hypertrophic scar. In present era these are big concern for patient and surgeons for cosmetic and therapeutic purpose. Out of many drugs and procedures described in classics, we try to discuss about few drugs which can be used for the management of *vrana*(scar) and are relevant in present time too.

### Epidemiology

Occurrence of Keloid and Hypertrophic scar has equal sex distribution and highest incidence in second to third decade of life. Incidence rate of Hypertrophic scar varying from 40% to 70% following surgery to 91 % following burn injury depending on depth of wound. Keloid formation is seen in all races except albinos but

dark skin individuals are more susceptible to Keloid formation with incidence of 6% to 16% in African population. Several single nucleotide polymorphisms associated with Keloid formation were identified in "Chinese Han Population".

### Pathogenesis

Keloid and Hypertrophic scar have some tumour like properties; they are actually inflammatory condition. Keloid extend beyond the borders of original wound and invading around normal skin, usually expressed as firm nodule often pruritus and painful and generally don't regress itself or spontaneously. Keloid may develop up to several years after minor injuries and may even form spontaneously on the mid chest in absence of any injury. Hypertrophic scars usually occurs within four to eight weeks following wound infection, wound closure with excess tension or other traumatic skin injury, has a rapid growth phase for up to six month and then gradually regress over a period of a few year leading to flat scar with no further symptom.

The pathophysiology of Keloid and Hypertrophic scar is not completely known. Keloid represent aberration in fundamental process of wound healing. In which imbalance between anabolic and catabolic phases, lead to increase fibroblastic activity and sustained extracellular matrix deposition. Aberrant expression of various growth factors and their receptor has been described for Keloid derived fibroblast e.g. Keloidal fibroblast have been shown to over express the Growth factor. TGF-  $\beta$  1 is a well studied player in pathogenesis of abnormal scarring and much research is focus on this pathway. According to recent study reported that over expression of TGF-  $\beta$  1 is an important component in the formation of Keloid. TGF- $\beta$  1 is thought to be pro fibrotic where as TGF-  $\beta$  3 have anti fibrotic function.

TGF-  $\beta$  modulates the expression of Matrix Metallo Proteinase (MMPs) which is capable of cleaving all the component of extracellular matrix and basement membrane. Expression of these MMPs in healthy tissue is low but a special characteristics of Keloid invasiveness is increased migratory activity with higher MMP1 (interstitial collagenase) and MMP 2 (Gelatinase-A) production. Insulin like growth factor (IGF-1) also known to regulate cell proliferation, differentiation and growth. TGF- $\beta$  (Transforming Growth Factor- $\beta$ ) seem to turn on IGF receptors usually high number in Keloidal fibroblast. The genetic causes of pathological scar development includes single nucleotide polymorphisms which is associated significantly with clinically severe Keloid. Adolescent and pregnancy appear to be associated with high risk of developing pathological scar. Latest study reveals hypertension is associated with severe Keloid development.

#### **Histological difference between Hypertrophic scar and Keloid**

In Hypertrophic scar- Collagen bundle (wavy type 3), primarily fine, well organised, oriented parallel to epidermis surface with abundant nodule containing myofibroblast and plentiful acidic mucopolysaccharides. Low expression of Proliferative cell nuclear antigen (PCNA).

In Keloid – Hypocellular collagen bundles (Type 1 &3), large thick, disorganised with excess myofibroblast, poor vascularisation with widely scattered dilated blood vessels and having high expression of Proliferative cell nuclear antigen (PCNA).

#### **Current treatment procedure in modern medical science**

**Pressure Therapy-** Continuous pressure (15-40 mm of Hg) at least 23 hr/day for more than 6 month, but patient have frequent discomfort.

**Silicon Gel Sheeting-** Used for more than 12 hr/day for >2 month, start after 2 week of wound healing but no effect on mature Keloid and Hypertrophic scar.

**Flavonoids-** It decreases extent of inflammation but used in prophylaxis.

**Corticosteroid-** Intralesional Triamcinolone acetone (10-40 mg/ml) twice a month. First line therapy for Keloid and Second line therapy for Hypertrophic scar. Their adverse effects are skin and subcutaneous fat atrophy, teleangectasia.

**Cryotherapy-** Using Liquid Nitrogen for 10-20 seconds contact/ spray freezing. The adverse effects are blistering and pain.

**Scar Revision-** It includes Z plasty, W plasty, Skin grafting. It is efficacious for Hypertrophic scar but not for Keloid. The re-occurrence rate is 45% to 100%.

**Radiotherapy-** The X-ray dosage 15-20 Gy in 5-6 sessions in early post operative period. The adverse effect is potential risk of malignant changes.

**Laser Therapy-** The short pulsed dye Laser (585nmPDL) with dosage ranging from 6.0 to 7.5J/cm<sup>2</sup> in two to six episode of treatment for every 2 to 6 weeks. The adverse effect is re-occurrence rate.

**Interferon** – The Intralesion injection of INF alpha 2b twice daily over 4 days. The adverse effects are flu like symptom.

**5 FU(Floro Uracil)** - The Intralesion injection of 5FU (50 mg/ml). The adverse effect are anemia, thrombocytopenia, bone marrow suppression.

#### **Concept of Acharya Sushruta for removing wound scar-**

Ayurved is an ancient medical therapy in which *Sushruta samhita* described elaborately about the concept of *Vrana/wound*. In *Sushruta samhita*, *Acharya Sushruta* (Founder of surgery) described in detail about wound, wound healing, their features, scar formation and its treatment. In *Sushruta samhita* eight seat of *Vrana* i.e. *Tvaka*(skin), *Mamsa*(muscle), *Sira*(blood vessel), *Snayu*(tendon and ligament), *Asthi*(bone), *Sandhi*(joint), *Kostha*(viscera) and *Marmas*(vital points) are described. In which wound and wound scars are present, but here we are discussing only about *Tvaka* or skin related wound scar.

*Acharya Sushruta* explained *Shashti upkrama* (sixty treatment procedures) for *vrana shophal*/ swelling and *vrana* whereas *Acharya Charak* described only 36 *upakrama* for the treatment of *vrana*. *Acharya Sushruta* mentioned that some procedures are for treating scar formation after wound closure and they are termed as *Vaikratapaham upkrama* which includes- *Avasadana*/ removing of granulation tissues formation, *Mridu karma*/ softening procedure, *Kshar karma*/ application of caustics, *Pandukarma*/ bring to normal skin colour,

*Pratisarana/* rubbing, *Patradana/* application of leaves, *Madhu sarpi/* honey and clarified butter etc.

### Strategy for treatment of Keloid and Hypertrophic scar on the basis of concept of *Acharya Sushruta*

Hypertrophic scar and Keloid are burning issue in dermatological disorders of modern medical science, even though modern system is having multiple modalities of treatment but none of these treatment modalities are complete as far as proper complete cure is concerned. At present time there is need for more detail study and new treatment plans for the management of Keloid and Hypertrophic scar.

Therefore, presently we believe that the following combination of therapeutic procedures in a definite sequence is likely to cure Keloid and Hypertrophic scar. In this plan of study both aspect of treatment i.e. *Sanshamana* and *Sanshodhana* therapy should be considered in individuals having Keloid and Hypertrophic scar. First we should try to prevent formation of Hypertrophic scar and Keloid occurring after surgery and then secondly those who are clinically diagnosed cases should be considered for curative treatment strategy.

1. The *Sanshamana chikitsa* is to be used in post operative patients to prevent formation of Hypertrophic scar and Keloid. As per Ayurvedic text, the vitiation of *doshas* is balanced by applying *Sanshamana chikitsa*, under which we can use mixture of four specific drugs for local application on Keloid and Hypertrophic scar. The drugs are namely *Madhu*, *Guggulu*, *Mulethi*, *Apamarga kshar* (*madhyam/* medium) and *Eranda* as they have specific chemical constituents which acts on scar tissue and can give tremendous results, the action and properties of which are discussed below.

**a. Madhu/ Honey-** Madhu having scrapping property as well as promote healing of wound. Chemically they contain Invertase, Catalase, Acid phosphorylase enzymes, 18 free amino acids, trace amounts of minerals like Ca, Fe, Zn, K, Mg, Mn, Cr, Se and trace amount of vitamin B complex and vitamin C. It contains flavanoid of which Pinocembrin is unique. It has anti- microbial, anti- septic, anti- inflammatory, antioxidising property, stimulate immunity, and also has healing and cleansing action. It is beneficial in skin diseases. As per classics it is,

*Madhu śītam laghu svādu rūkṣam grāhī vilēkhanama |*  
*Cakṣuṣya dīpanamsvaryama vranāśōdhanarōpanam ||*  
*(Bhāvaprakāśa)*

**b. Guggulu** (*Commiphora mukul*) - Chemically it contain Quercitine, Z-guggulosterone, Beta sitosterol, Ellagic acid, Ferulic acid, Three C-27 Guggulosteron 1,2,3. It also contains amino acids. It acts on atherosclerosis, has anti – coagulant, anti- inflammatory and hypolipidemic action as well as fibrinolytic activity.

It has property to reach micro circulation. As described in text,

*Guggulurviśadastiktō vīryōṣṇa pittalāh sarh |*  
*Kaṣāyah kaṭukah pākē kaṭu rūkṣō laghuh parah ||*

.....  
*peedikaagranthishophaarshogandamaalaakrimeejayet ||*  
*(Bhāvaprakāśa)*

**c. Mulethi** (*Glycyrrhiza glabra*) - Chemically it contains glycyrrhizin, isoflavones, quercitine, astragaline, triterpenoid, asparagine, glycerine. It has anti-atherosclerotic, anti-exudative, anti ulcer, antinociceptive, anti inflammatory and anti mutagenic property. It reduces itching. As mentioned in classics,  
*Yashthi himaagurooh svaadvee chakshushya balavarnakrt |*  
*Susnigadha shukralakeshya svarya pittanilastrajit ||*  
*(Bhāvaprakāśa)*

**d. Apamarga** (*Achyranthes aspera*) **Kshar** - It contains chemically Ecdysone, Ecdysterone, Inokosterone, Saponin A&B, Achyranthene, Betaine. It is anti implantation, vasodilator and anti pruritic action. As per *Acharya* it is as follows,  
*Apaamaargastu sarasteekshno deepanastiktakah katuh |*  
*Paachano rochanashchhardikaphamedonilaapahah ||*  
*(Bhāvaprakāśa)*

**e. Eranda** (*Ricinus communis*) - Chemically it has Ricinin, Albumin, Gallic acid, Rutin, 3 Glycoside Quercitine, Flavanoids. It has anti- inflammatory, immunizing and spasmolytic action. In text it is mentioned as,  
*Ēraṇḍapatra vātaghnam kaphakrimīvināśanama |*  
*Mūtrakṛcchaharam cāpi pittarakṭaparakōpanama ||*  
*(Bhāvaprakāśa)*

### METHOD OF APPLICATION OF PROPOSED DRUGS

The paste made up of mixture of *Madhu*, *Guggulu*, *Mulethi* root powder and dry powder of *Apamarga kshar* can be applied on scar tissue and it should be covered by *Eranda* leaves or other leaf depending upon the *dosha* predominance as mentioned in the text, where it is termed as *Patra dana*.

Then, as per *Sushrut samhita*, *sutrasthana* chapter 37/31-32 we can use mixture of *Saindhav* (salt), *Kukkutanda kapal* (egg shell), *Shirish* (*Albezia lebbek*) powder, *Karanja* powder (*Pongamia pinnata*) and *Kasisa churna* ( $\text{FeSO}_4$  powder) on scar tissue and it is suppose to regress the size of scar, which is termed *Avasadana karma* in text.

After these procedures according to *Sushruta samhita Chikitsasthan* 1/ 96, for discolouration of scar tissue and to regain its normal colouration, we can use mixture of some drugs like *Nav kapalika churna* (powder of new earthen pot), *Vaidul* (root of bamboo), *Sarja* (gum of *Vateria indica*), *Kasisa* ( $\text{FeSO}_4$  powder) and *Mulethi*

powder mixed with *Madhu* and can be applied over scar, which in text is termed as *Pandukarma*.

2. In the clinically diagnosed patients of Keloid or Hypertrophic scar should be taken and *Shodhana* and *Shamana* both *chikitsa*/ treatment is to be planned. In *Shodhana Chikitsa*, use of *Snehana*, *Swedana* and *Vrana basti karma* and *Shamana Chikitsa* as mentioned above is to be considered.

Initially we can start with *Snehana* therapy on Keloid tissue by using *Kshar taila*(oil). *Kshar* having *teenkshna guna*/ sharp quality, *chedan*/excision, *bhedan*/ incision, *lekhan*/ scrapping and *vata kapha nashak* property and as per Ayurved, Keloid or Hypertrophic scar are firm, nodular and shiny swelling hence they can be considered under *Vatakaphaj shotha*/ swelling.

Therefore, after *Snehana* (oleation) we can start *Swedana* (fomentation) by hot water or hot saline water due to which softening of swelling occur, to some extent after that we can start *Vranabasti* in which we make boundary around the Keloid tissue by using *pishthi*/dough of *Masha*/black gram pulse and pour luke warm *Eranda* tail/oil in it. At this stage *Shodhana* therapy is complete and then *Shamana* therapy should be started by *Pratisarana*, using paste of *Madhu*, *Mulethi*, *Guggulu* and *Apamarga kshar* followed by *Eranda* patra covering. After that we should apply mixture of *Saindhav*, *Kukkutandakapal* powder, *Shirish* powder, *Karanja* powder and *Kasisa churna*.

Then for skin colouration we can use *Kapalik churna*, *Kasisa* powder, *Vetas*(bamboo) root powder and *Mulethi* powder along with *Madhu* as a paste on Keloid and Hypertrophic scar. These combination of therapies used externally is believe to be complete cure of pathological scar i.e. Keloid and Hypertrophic scar.

**Prevention-** The most important factor in Hypertrophic scar or Keloid formation is prevention. The clinician should be aware of risk associated with these scar's development; which include previous history, family history, tension at site of trauma, dark skin and other associated conditions and also prevention from unnecessary tattooing and piercing.

## CONCLUSION

The scar following surgery or trauma is difficult to predict. Both physician and their patients are highly concerned for minimising scar appearance and even small improvement in scarring is clinically meaningful. Even though several modalities of treatment are available for managing Keloid and Hypertrophic scar but none of the treatment is effective in all patients. Moreover there are no clear guideline available regarding this disease and lot of researches are going on. So, proposed external prophylactic and therapeutic strategy includes *Snehana*, *Swedana*, *Patradan*/ covering by leaf, *Pratisarana*/ rubbing, *Avsadhana*/removal of granulation tissues and

*Pandukarma*/ bring to normal skin colour etc. Many of them have been proven through use, but few have been supported by well designed prospective studies and need to be explored further.

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