



REVIEW ARTICLE

UNDERSTANDING SAVRANA SUKLA IN THE LIGHT OF CORNEAL ULCER – A CRITICAL REVIEW

ARATHI S NAIR¹ SREEKUMAR KARUNAKARAN²

ABSTRACT

Susruta Samhitha is one of the prominent classics dealing with *Ayurvedic* ophthalmology. The disease *Savranasukla* is described among *Krishnamandala Roga* (diseases affecting black circle of eye) and predominantly involves *Rakta Dushti* (vitiation of blood). It resembles corneal ulcer of modern ophthalmology. The chief commentator of *Susruta Samhitha*, *Acharya Dalhana*, has considered *Savranasukla* as *Asadhya* (incurable) in *Nibandasangraha* commentary. Even though it is incurable by prognosis, *AcharyaSusruta* has very well detailed its management. The factors like chronicity, site of manifestation in cornea, number of ulcers formed will influence the prognosis. Even though *Krishnamandala* (cornea) is an avascular organ, the diseases manifesting in it is mainly *Rakthaja* origin. This is because of its embryological evolution from the *Raktha Dhatu*. The main stream management of the *Savranasukla* is also *Rakthamokshana* and *Virechana* which can be adopted for the management of mild corneal abrasion as well as the well-developed corneal ulcer. In this review the concept of *Savranasukla* is critically analyzed in the light of corneal ulcer.

Key words: *Savranasukla*, *Krishnamandala*, corneal ulcer, *Rakthamokshana*, *Virechana*

¹ FINAL YEAR PG SCHOLAR, ²ASST. PROFESSOR, AYURVEDA MEDICAL EDUCATION DEPARTMENT, DEPARTMENT OF SHALAKYATANTRA, GOVT. AYURVEDA COLLEGE, TRIPUNITHURA, ERNAKULAM, KERALA- 682301, INDIA

Corresponding Email id: arathi1986@gmail.com Access this article online: www.jahm.in

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INTRODUCTION

Ayurveda, the most ancient still the most accurate science offers answers to even unresolved questions of modern science. *Susruta Samhitha* can be considered as the first authentic reference with regards to *Ayurvedic* ophthalmology. It gives a detailed and unique description starting with anatomy of eye, ocular diseases and their management, emergency eye care in ocular trauma, preventive ophthalmology etc. *Savranasukla* (corneal ulcer) is described as a disease affecting *Krishna mandala* (black part) of eye whose clinical features match corneal ulcer. The management of *Savranasukla* is elaborated with clear consideration to its prognosis by *Acharya Susruta* in *Utharatantra*. In this article, an attempt is made to assess *Savranasukla* and its *Ayurvedic* management as compared to corneal ulcer.

AIMS AND OBJECTIVES

- To explore the pathogenesis and prognosis of *Savranasukla* (corneal ulcer)
- To understand *Savranasukla* in the light of corneal ulcer
- To discuss the relevance of *Savranasukla Chikitsa* in the management of corneal ulcer.

MATERIALS AND METHODS

Susruta Samhitha Utharatantra was screened meticulously to understand the

clinical features of *Savranasukla*. Its management is enumerated in *Raktaabhishyantha pratisedha Adhyaya* of *Utharatantra*. As there is a “*Vranaavastha*” (ulcer), principles of management of *Vrana* (ulcer) delineated in *Vranapratisedha Adhyaya* of *Chikitsasthana* is also incorporated to redefine a clear line of management of *Savranasukla*. Modern ophthalmology texts were referred thoroughly to understand corneal ulcer in detail and to interpret the line of management followed by them.

DISCUSSION

Concept of *Krishna mandala* – A discussion

Discussion on anatomy of *Krishna mandala*

The term *Krishna mandala* indicates the black circular portion of eye as per *Ayurveda*. It is the fourth concentric ring among six *Mandalas* (concentric circular layers). Its size is one third of *Netraayama* (horizontal diameter of eye) as per *Acharya Susruta* ⁽¹⁾. *Acharya Dalhana* specifies this measurement to be twice the size of *Yava* (barley) ⁽²⁾. *Acharya Vagbhada* has identified three layers in *Krishna mandala* while explaining the clinical features of *Kshatasukla* (corneal ulcer) ⁽³⁾. By dissecting the concept of *Krishna mandala*, it can be ascertained that *Acharya* has included cornea in it. *Krishna* means black color and *Mandala* means a circular area. As cornea is transparent, it looks black in color due to the underlying iris and it

is circular in shape. Modern anatomy describes cornea as a five layered transparent, avascular structure which forms anterior one - sixth of the outer fibrous coat of the eyeball ⁽⁴⁾.

Discussion on embryology

Krishna mandala is considered as a “*Matrujabhava*” (the part derived from maternal side) in *Garbha* (embryo) by *Acharya Vridha Vagbhada* ⁽⁵⁾. *Acharya Susruta* observes it to be *Vayubhutapradhana* ⁽⁶⁾. This can be attributed to the high corneal sensitivity and transparency. *Acharya Susruta* also includes *Tejas* and *Jala Mahabhutas* which constitutes the *Bahyapadala* (outer layer) of *Netra* along with *Vayubhuta*. This is clear from the description of *Drishti* in *Drishtirogavijnaneeyam Adhyaya*. Here *Drishti* is said to be covered by *Bahyapadala* and *Acharya Dalhana* makes it clear that this layer is *Athyanthaacha* (transparent) and hence will not hinder vision ⁽⁷⁾. This transparent layer can be nothing other than cornea. As per modern embryology, corneal epithelium is formed from surface ectoderm; endothelium and descemet’s membrane from mesenchymal cells derived from neural crest which are situated at the margins of the rim of the optic cup; stroma and bowman’s layers are derived from the mesenchymal cells that insinuate between the surface ectoderm and the developing lens ⁽⁸⁾.

Discussion on *Krishna mandala Rogas*

Even though *Krishna mandala* is predominant in *Vayubhuta*, most of its pathologies involve *Rakthadushti* (derangement of blood). By deeply analyzing the *Krishna mandala rogas*, most of them are different stages of corneal ulcer or its complications. *Rakthadushti* is indispensable in *Vrana avastha* (stage of ulcer) and *Rakthamoksha* (bloodletting) is the primary treatment modality suggested here which is mainly indicated for *Rakthasodhana* (purification of blood).

Discussion on *Savranasukla*

The term *Savranasukla* means a “*Vrana*”(ulcer) which is “*Sukla*”(white) in color or which will leave behind a white scar on the affected site i.e., *Krishna mandala*. Ulcerative keratitis or corneal ulcer is a break in epithelium with underlying stromal necrosis ⁽⁹⁾. The **general clinical features** of *Savranasukla* as per *AcharyaSusruta* :

- “***Nimagnarupam hi bhavettukrishnae***” which implies that there will be a depression on the surface of *Krishna mandala* which leaves it uneven ⁽¹⁰⁾. *Acharya Dalhana* comments on “*Nimagnarupa*” as “*Anthapravishtarupam*” which means the same as stated above. *Acharya Dalhana* also gives another meaning to this as “*Ishatdrishyarupam*” which signifies blurring of vision. Corneal ulcer is usually presented as a saucer

shaped depression on the corneal surface. There will be associated blurring of vision due to corneal haze⁽¹¹⁾.

- The next clinical feature is **“Suchyevavidham”** which is defined as **“Varthulatwam”** by *Acharya Dalhana*⁽¹²⁾. This may indicate the circular shape of ulcer or the ‘pin prick’ like pain associated with it. *Acharya* also adds **“Athevaruk”** or intense pain as one symptom⁽¹³⁾. In general, corneal ulcers are characterized by oval or irregular shape. Pain and foreign body sensation occurs due to mechanical effects of lids and chemical effects of toxins on the exposed nerve endings of cornea⁽¹⁴⁾.
- **“Sravamsravetushnam”** which implies warm discharge from eyes⁽¹⁵⁾. Watering of eyes in a corneal ulcer occurs due to reflex hyper lacrimation⁽¹⁶⁾. *AcharyaVideha* has also included a similar feature **“Ushnarusravi”**⁽¹⁷⁾.
- **“Raktarajeenibhamkrishnaavidrumabham”**⁽¹⁸⁾ is another clinical feature mentioned in addition by *AcharyaVideha*. In this context, *Raktarajee* means blood red colored network which may be correlated to the circumcorneal congestion of vessels. *Vidrumabham* either indicate the shape and structure of a coral reef similar to neovascularization of cornea or the color

of coral reef to indicate the color of the wound.

Acharya Dalhana states the *Doshic* predominance of *Savranasukla* as *Raktha* and prognoses it to be *Asadhya* (incurable)⁽¹⁹⁾.

Discussion on prognosis of *Savranasukla*

Even though *Asadhya*, *Acharya Susruta* enumerates some **“Kadachitsadyalaksana”** or clinical features seen in *Sadhya* (curable) *Savranasukla*:

- **“Drishtaesameepaenabhavet”** means an ulcer not near *drishti* (pupillary area)⁽²⁰⁾. An opacity formed in the pupillary area will be fatal as it will badly hamper visual prognosis even if it is a superficial one.
- **“Na cha avagadam”**⁽²¹⁾ may indicate an ulcer not involving deeper corneal layers which rules out chances of corneal perforation. Further, in the stage of cicatrization, the degree of scarring from healing varies. If the ulcer is very superficial and involves the epithelium only, it heals without leaving any opacity⁽²²⁾.
- **“Na cha samsravet hi”** indicates absence of *sravas* (secretions)⁽²³⁾ again ruling out the chances of aqueous leakage due to corneal perforation.
- **“Avedanavan”** is commented by *Acharya Dalhana* as *Mandavedanavan* (mild or occasional pain)⁽²⁴⁾.

- **“Na yugmasuklam”** ⁽²⁵⁾ which give a clue to the absence of multiple corneal ulcers.

Apart from these *Acharya Susruta* details **Asadhylaksanas** which are more or less complications of corneal ulcer.

- The first one is **“Vichinnamadyampisitavrudhamva”** ⁽²⁶⁾. *Acharya Dalhana* comments on it as **“Videernamamsatwadmadhyesachidrameva”** ⁽²⁷⁾. In *Savranasukla, Krishna mandala* looks as if split in the middle due to the *Videerana* of *Mamsa* (sloughing of corneal layers). Stage of active ulceration is characterized by necrosis and sloughing of the corneal epithelium, bowman’s membrane and the involved stroma and may progress by deeper penetration of infection leading to descemetocele formation and possible corneal perforation ⁽²⁸⁾. Another opinion is **“Achinnamadyamevonnathamamsena veshtitham va”** ⁽²⁹⁾ which means that there may be no split in the middle but the ulcer is surrounded by higher level tissue. This may indicate a prolapsed iris forming anterior staphyloma which is a common complication of a corneal ulcer ⁽³⁰⁾.
- **“Chalam”** is the next term ⁽³¹⁾. *Acharya Dalhana* gives two opinions on this – **“Sira hi swabhavathaevachalaha, tadhasritasuklamabichalameva”**. *Siras* (blood vessels) are pulsating by nature and

the *Sukla* may also feel pulsating as the *Siras* are located on *Sukla*. As another opinion states that **“Chaladivanatusakshadchalameva”** i.e., feels as if pulsating but not actually happening ⁽³²⁾. This may indicate the corneal neovascularization developed on the opacity. The word **“Chalam”** means movement. In case of hypopyon corneal ulcer or *ulcus serpens*, the ulcer has a tendency to creep over the cornea in a serpiginous fashion and has a great tendency for early perforation ⁽³³⁾. This migration of corneal ulcer may be indicated by the term *Chalam*.

- **“Adrishtikrit”** is commented by *Acharya Dalhana* as **“Darshanarodhakrit”** ⁽³⁴⁾ or that which hinders vision. Corneal scarring is the end result of healed corneal ulcer which leads to permanent visual impairment ranging from slight blurring to total blindness ⁽³⁵⁾.
- **“Dwitwakgatam”** is commented by *Acharya Dalhana* as *Dwi* or *Tripadasritam* ⁽³⁶⁾ which indicates the deeper penetration of ulcer with worst visual prognosis.
- **“Lohitamanthatah”** is commented by *Acharya Dalhana* as **“Pranthesulohita”** ⁽³⁷⁾ i.e., redness or congestion around the outer border of *Krishna mandala* which clearly indicates severe circumcorneal

congestion which is an indicator of spread of infection to inner layers of eye. Purulent uveitis, endophthalmitis or even panophthalmitis may develop due to spread of intraocular infection⁽³⁸⁾.

- **“Chirothitam”** indicates the duration of disease⁽³⁹⁾, longer the duration less the chances of visual recovery.

Acharya further details the clinical feature of **Dwi or Tripadalasrita Savranasukla:**

- **“Ushnasrupata”** indicates warm discharge⁽⁴⁰⁾ which may be due to aqueous leakage.
- The next one is the **“Pidaka”** (cyst like) formation on *Krishna mandala*. This *Pidaka* is described to be **“Mudganibham”** which means that its size and shape will be similar to *Mudga* or green gram⁽⁴¹⁾. In

Nibandhasangraha Vyakhyana it is described as *Peetapidaka* (yellow cyst) as opinion of *Videha*. This may be the descemetocele formation which looks like a transparent vesicle due to herniation of descemet’s membrane. This is a sign of impending perforation⁽⁴²⁾ and is usually associated with severe pain.

- **“Thithiripakshatulyam”**⁽⁴³⁾ which means a *Sukla* (opacity) like the wing of a red wattled lapwing bird. Its feather has a deep brown color towards the pointed end and white color from middle towards the inner tip (quill or calamus). This may be used to denote a corneal opacity formed in the center of cornea.

Table 1: Comparative table of general clinical features

SL No	<i>Samanyalakshana of Savranasukla</i>	General clinical features of corneal ulcer
1	<i>Nimagnarupam hi bhavettukrishnae</i>	Saucer shaped depression on corneal surface
2	<i>Ishatdrushyarupam</i>	Blurring of vision due to corneal haze
3	<i>Suchyevavidham</i>	Circular shape of ulcer / associated ‘pin prick’ like pain
4	<i>Ushnamsravamsravet</i>	Warm discharge from eyes due to reflex hyperlacrimation
5	<i>Ativaruk</i>	Intense pain
6	<i>Raktharajeenibham</i>	Circum corneal congestion of vessels
7	<i>Krishnaavidrumabham</i>	Corneal neovascularization / color of ulcer

Table 2: Comparative table of clinical features indicative of good visual prognosis

SL No	<i>Kadachit sadhyalakshana of Savranasukla</i>	Clinical features indicative of good visual prognosis in a corneal ulcer
1	<i>Drishtaesameepaenabhavet</i>	Position of ulcer – sparing pupil (away from center of cornea)
2	<i>Na cha avagadam</i>	Superficial corneal ulcer
3	<i>Na cha samsravet</i>	Absence of aqueous leakage (no corneal perforation)
4	<i>Avedanavan</i>	Absence of pain / mild pain
5	<i>Na cha yugmasuklam</i>	Absence of multiple corneal ulcers

Table 3: Comparative table of clinical features in complicated stage of corneal ulcer

SL No	<i>Asadhyalakshana of Savranasukla</i>	Complications of corneal ulcer
1	<i>Vichinnamadyampishitavrutamva</i>	Stage of active ulceration
2	<i>Chalam</i>	Ulcuserpens
3	<i>Adrishtikrit</i>	Corneal scarring involving pupillary area leading to blurring / loss of vision
4	<i>Dwitwagatam</i>	Deeper penetration of corneal ulcer
5	<i>Lohitamantata</i>	Circumcorneal congestion
6	<i>Chirothitam</i>	Longer duration of disease
7	<i>Ushnasrupata</i>	Aqueous leakage due to corneal perforation
8	<i>Mudganibhapidaka</i>	Descemetoccele formation
9	<i>Tithiripakshatulam</i>	Scarring leading to central corneal opacity

Treatment

The management of *Savranasukla* is detailed by *Acharya Susruta* in *RakthaabishyanthaPradishedhaAdhyaya* of *Utharatantra*. When we go through the

treatment protocol, it is clear that it mainly aims at management of a chronic stage of *Savranasukla*. *Samanyachikitsa* (general treatment) is same as given for *Rakthaabishyantha*. *Viseshachikitsa* (specific

treatment) is also detailed. Since the disease involves a *Vranaavastha* (stage of ulcer), principles of *Vranachikitsa* (treatment of ulcer) enumerated in *Susruta Samhitha Chikitsasthana* should also be considered here. In an acute *Savrana sukla* (corneal ulcer), *Sadyovrana chikitsa* should be adopted as stated in *Nayanabhighata pratishedha* chapter of *Susruta Samhita Utharatantra*.

Samanya Chikitsa of a chronic Savranasukla:

- **Anthasudhi**
- **Bahirsudhi**

The first line of treatment is *Anthasudhi* (internal cleansing) which involves both *Dosha* and *Dushya Sodhana* (removal of *Dosha* and *Dushya*)⁽⁴⁴⁾.

- **Dosha sodhana –**
- ✓ **Snehapana** (intake of ghee) with *Kumbhasarpis* (100 years old ghee) or *Snigdhamamsa rasa* (meat soup)
- ✓ **Virechana** (purgation)

Above two procedures are for attaining *Koshtasudhi*.

- ✓ **Nasya –** for *Urdhwasrotosudhi*
- **Dushya sodhana (Rakta sodhana)-**
- ✓ **Siramoksha** (Vene-puncture)

As per *Susruta Samhita Chikitsasthana*,

- ✓ **Vicharana snehapana** (intake of ghee in small dose) is indicated in a patient with *Vranitopadrava* (complications in patients afflicted with ulcer) and who is *Ksheena* (weak)⁽⁴⁵⁾.

- ✓ **Rakthavisravana** (bloodletting), especially in an *Achirotpanna* (fresh) *Vrana* is indicated for *Vedanopasamana* (decreasing pain) and *Pakasamana* (reducing suppuration). There are two suggested methods – *Jalaukavacarana* (leeching) and *Prachanna* (scarification)⁽⁴⁶⁾ of which *Jalaukavacarana* will be apt method for bloodletting.

After attaining *KoshtaSudhi* (clean digestive tract), *Urdhwasrotosudhi* (cleansing of channels above the nape of neck) can be attained by *Sirovirechana* or *Nasya* (instillation of medicine in nose). Among the *Chatursneha* (4 types of unctuous substances), *Taila* (oil) is contraindicated for *Nasya* while any one among the other three cooked with *Sirovirechana* drugs (medicines used for purification of head) are ideal options⁽⁴⁷⁾

Bahirsudhikara (external cleansing) measures like

- *Pradeha* (application of paste of medicines),
- *Pariseka* (pouring liquid medicines in a thin stream over eyelids),
- *Aschyotana* (instillation of eye drops),
- *Anjana* (collyrium),
- *Tarpana, Putapaka* etc.⁽⁴⁸⁾

Different formulations suggested in *Pittaabhishyanthapradisedha Adhyaya* can be adopted here also. All these treatment

modalities will promote wound healing and surely prevent spread of infections.

Acharya Susruta has detailed the management of different degrees of pain in this disease⁽⁴⁹⁾:

- *Atibrisharuja* (excessive pain) due to *Anubandha VataKopa – Mridusweda* (mild hot fomentation)
- Excessive involvement of *RakthaDathu – Jalaukavacarana*
- Excessive *VataKopa – AchaSnehapana*
- Mild involvement of *Raktha– Pitta AbhishyanthasamanaChikitsa*

Visesha Chikitsa:

By thoroughly analyzing the *Visesha Chikitsa*, it can be understood that these are mainly *Anjanayogas* which are either *Lekhana* (scarifying) or *Suklavaivarnyanasana* (causing blackening of white opacity) in property. From these we can infer that the *Vrana* has completely healed by *Samanya Chikitsa* and has left a white scar on the *Krishnamandala*. The first line of *Visesha Chikitsa* is *Kharshana* or *Lekhana* of *Sukla* (opacity)⁽⁵⁰⁾. In *Chikitsasthana*, *Kharshana* is indicated for a healed ulcer with hard, big and broad margin and which shows tendency to ulcerate again⁽⁵¹⁾. In *Uthana* (superficial) or *EkapadalasritaVrana* (ulcer involving only outer corneal layer) and *Avagada* (deep) or *Dwiteeya* and *TriteeyapadalasritaVrana* (ulcer involving two or three corneal layers), *Acharya* advises to do *Rakthaabhishyantha Chikitsa*

followed by *Suklakharshana* and end it by *SantharpanaChikitsa*⁽⁵²⁾. In *Avagada* with pain, *Vatahara* (pacifying *Vata*) *Tarpana* is indicated⁽⁵³⁾. For cosmetic reasons special *Suklavaivarnyanasana Anjanas* are mentioned. *Acharya Dalhana* makes this clear by stating that “*Natustumethenasuklasyakrishnatwamutpadayatheethyartha*” which means that this will not cure *Sukla* but will only cause blackening of white scar formed on cornea⁽⁵⁴⁾.

Internal medications of choice can be ghee preparations like *Tikthaka Ghruta*⁽⁵⁵⁾, *Padoladi Ghruta*⁽⁵⁶⁾ etc, *Kaisoraguggulu Gudika*⁽⁵⁷⁾ which have anti-inflammatory action and promotes wound healing.

Management of corneal ulcer

The line of management followed in a corneal ulcer is almost similar to *Ayurvedic* principle. An uncomplicated corneal ulcer is primarily managed with topical broad spectrum antibiotics at hourly intervals for 24-48 hours, and then tapered according to clinical progress⁽⁵⁸⁾. Hot fomentation is an important physical measure which gives comfort, reduces pain and causes vasodilatation⁽⁵⁹⁾. In a non-healing one, mechanical debridement of ulcer by scrapping its floor is done to hasten its healing⁽⁵⁹⁾ which is similar to *Lekhana* or *Kharshana* described above. Peritomy i.e., severing of perilimbalconjunctival vessels which is done

when excessive corneal vascularization is hindering healing is another treatment option⁽⁵⁹⁾. *Raktamoksha* also have similar benefits. In a perforated corneal ulcer, urgent therapeutic keratoplasty is considered as the best option⁽⁵⁹⁾. This clearly indicates that without keratoplasty, it has a worst visual prognosis.

CONCLUSION

Susruta Samhita gives a detailed and complete description of *Savranasukla* in all its dimensions. The clinical features are detailed on the following levels – *Samanyalaksana*, *Kadachitsadhyalaksana* and *Asadyalaksana*. *Samanyalaksanas* unveil the general signs and symptoms of a corneal ulcer; *Kadachitsadhyalaksanas* shows clinical features of a corneal ulcer which is manageable and *Asadyalaksanas* which are mainly complications of corneal ulcer. By assessing all these features a physician can very accurately prognose the condition and infer the effect of treatment. This shows the brilliance of *Acharya Susruta*. In an era with very less sophisticated techniques *Acharya* has thoroughly understood the disease and wisely described its management which is relevant even in the present scenario.

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None

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There are no conflicts of interest

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