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# ROLE OF ANJANA IN THE MANAGEMENT OF *ARMA* (PTERYGIUM): A REVIEW

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## ABSTRACT

*Arma is* listed among the *Shuklagata Netra Roga* in the classical *Ayurvedic* texts. It presents as a slowly progressive, fleshy, wing-shaped overgrowth that begins at the *Kaninika Sandhi* (inner canthus), the *Apanga Sandhi* (outer canthus) or both, and creeps towards the *Drishtimandala*. The condition corresponds to pterygium, a fibrovascular proliferation of conjunctival tissue that encroaches on the cornea. Pterygium is common in tropical and subtropical regions, India included, and is linked with ultraviolet (UV) exposure, dust, wind, a dry climate and long hours spent outdoors. A progressing lesion can induce astigmatism, impair vision and eventually call for surgery. In present-day ophthalmology, early disease is handled conservatively with artificial tears, topical corticosteroids and UV protection, while excision is kept for advancing lesions or those that threaten vision. In *Ayurveda*, *Anjana* is a *Kriyakalpa* measure in which a medicated collyrium is put into the eye. By action it is classified as *Lekhana*, *Ropana* and *Prasadana*, and by dosage form as *Gutika/Pinda*, *Rasakriya* and *Churna*. *Lekhana Anjana* is the variety indicated in *Arma*, since it is expected to scrape away vitiated *Kapha* and excess *Mamsa Dhatu*. The drugs used are *Tikshna*, *Ushna* and *Ruksha* in quality and *Kaphahara* in effect. They are thought to act through *Lekhana* (reduction of the abnormal fleshy tissue), *Srotoshodhana* (cleansing of

channels, with tears carrying away morbid matter) and *Kapha-Rakta Shamana* (settling of inflammation and vascularity). When placed in the lower fornix, the medicine stays in the conjunctival sac and is taken up through the conjunctiva and cornea, which allows a local effect that may include anti-inflammatory, astringent, antimicrobial and anti-angiogenic actions on the lesion.

**KEYWORDS:** Arma, Pterygium, Anjana, Lekhana Anjana, Shalakya Tantra, Kriyakalpa.

## INTRODUCTION

*Ayurveda* is traditionally organised into eight clinical branches (*Ashtanga Ayurveda*), of which *Shalakya Tantra* deals with disorders above the clavicle (*Urdhvajatru*), namely those of the eye, ear, nose, throat and head.[1] In the *Uttaratantra*, *Acharya Sushruta* enumerates 76 *Netra Rogas* and groups them by the part of the eye affected: *Vartmagata*, *Sandhigata*, *Shuklagata*, *Krishnagata*, *Sarvagata* and *Drishtigata*.[2] *Arma* belongs to the *Shuklagata* group and is discussed in the *Sushruta Samhita*, *Ashtanga Hridaya*, *Ashtanga Sangraha* and *Madhava Nidana*. It is marked by a slowly extending overgrowth of flesh (*Mamsa Vriddhi*) in the *Shukla Mandala* that can advance on to the *Krishna Mandala*.[3,4] *Sushruta* recognised five varieties, namely *Prastari*, *Shukla*, *Kshataja* (*Lohita*), *Adhimamsa* and *Snayu Arma*,[3] whereas *Vagbhata* also lists five, with *Shonita Arma* as one of them.[4]

*Arma* is equated with pterygium, a wing-like fibrovascular overgrowth of the conjunctiva.[5] Established associations include UV radiation, dust, wind and a dry environment,[5-7] and the global pooled prevalence has been estimated at about 10-12%, being higher at lower latitudes.[6,7] As it advances, the lesion can produce irritation, astigmatism and obstruction of the visual axis.[7,8] Classically, *Lekhana Sadhya Arma* is treated with *Lekhana Anjana*, while *Chedya Arma* is treated by excision (*Chedana*).[9] Today surgical excision is the standard treatment, yet recurrence remains a drawback,[8,10] which makes a non-surgical option for early disease worth exploring.

## METHODS

This is a narrative review planned to identify, select, abstract and synthesise the available literature on the part played by *Anjana* in *Arma*. Hand-searches were made of the *Laghutrayi* (*Madhava Nidana*, *Sharangadhara Samhita*, *Bhavaprakasha*) together with the *Brihatrayi* (*Ashtanga Hridaya*, *Sushruta Samhita*, *Charaka Samhita*), looking for passages that deal with

the causes, clinical picture and treatment of *Arma*, as well as the definition, varieties, indications and action of *Anjana*.

## RESULTS AND DISCUSSION

### Pathogenesis of *Arma* and pterygium as the target of therapy

According to *Ayurveda*, *Arma* results when *Kapha* and *Rakta*, with some involvement of *Pitta* and *Vata*, vitiate the *Mamsa* (fleshy tissue) of the *Shukla Mandala*, producing an abnormal overgrowth of flesh.[3] The classical varieties are separated on the basis of the tissue affected, and the line of treatment varies with the thickness, vascularity and duration of the lesion.[9]

Contemporary knowledge of pterygium is broadly in line with this description. Ultraviolet damage to the limbus is believed to set off a chain of events involving inflammatory cytokines, growth factors, matrix metalloproteinases, fibroblast proliferation and neovascularisation, so that the conjunctival tissue turns thick, vascular and invasive.[5] Proliferation, new vessel formation and inflammation are thus the principal processes that a non-surgical treatment has to target. The *Ayurvedic* ideas of *Kapha-Rakta* vitiation and of *Lekhana* therapy can be mapped on to these processes, which provides the basis for the mechanisms considered later.

The features that the classics use to describe *Arma* (colour, thickness, vascularity and extent) are the same ones ophthalmologists use to judge whether a pterygium is active and whether surgery is required. A thin, red, advancing lesion points to active inflammation and angiogenesis, while a thick, pale, static lesion signals fibrous maturity. This agreement matters because it implies that the stage at which *Anjana* is advised in the classics is also the stage at which a medical treatment aimed at inflammation and vascularity is most likely to help.

### *Anjana Karma*: procedure, types and indication in *Arma*

*Anjana Karma* means placing a medicated preparation on the inner surface of the lower eyelid, generally drawing it from the inner towards the outer canthus with a rod (*Anjana Shalaka*). The classics recognise three dosage forms, namely *Gutika* (also called *Varti*), a pill or stick; *Rasakriya*, an extract; and *Churna*, a fine powder. They also recognise three functional categories: *Lekhana* (scraping), *Ropana* (healing) and *Drishtiprasadana* (improving vision).[11,12] *Lekhana Anjana* is meant for conditions with excessive, hardened or

overgrown morbid tissue such as *Arma*, and is thus the variety of concern here. As *Lekhana Anjana* is by nature scraping, drying and penetrating, its use is restricted to early, thin and progressing disease; where the lesion is thick and fibrous, the classics favour surgical removal.[9]

Detailed instructions are also given for the preparation and the procedure. Powders are to be passed through a cloth sieve, the rod may be of metal or another material depending on the kind of *Anjana*, and the amount (*Matra*) depends on the dosage form.[11,12] These instructions are more than ritual: they govern particle size, how much drug stays in the conjunctival sac and how long it remains in contact with the ocular surface, and so they influence the mode of action described below. A pre-procedure examination to rule out acute infection or marked inflammation is another important safeguard.

**Probable mode of action of *Anjana***

No direct experimental study has established how *Anjana* acts in *Arma*. The mechanisms discussed below are therefore drawn from classical *Ayurvedic* principles and from accepted concepts of ocular pharmacology, and should be taken as probable rather than proven. They are listed under separate headings for ease of reading, though in practice they probably act together.

**Action at the level of *Dosha* and *Dushya***

In classical understanding, *Lekhana* is the quality by which a drug scrapes out *Dosha* and *Dhatu* that have accumulated in excess. Drugs credited with this property typically combine a pungent (*Katu*), bitter (*Tikta*) or astringent (*Kashaya*) *Rasa* with hot (*Ushna*), sharp (*Teekshna*) and dry (*Ruksha*) *Guna*. These substances pacify *Kapha* and *Rakta* and also encourage *Srotoshodhana* (cleansing of channels). When put into the eye, they are believed to dislodge and clear the *Kapha* and *Rakta* that have collected in the *Shukla Mandala*, thereby lessening the bulk and congestion of the growth. The classics also recommend *Anjana* in the daily regimen for clearing *Kapha* and *Rakta* from the eyes.[12,13] This is the main explanation given by the classical texts, and the mechanisms that follow can be seen as its biomedical equivalents.

In terms of the *Chikitsa Sutra*, *Arma* needs a treatment that lowers *Kapha* and *Rakta* and eliminates the surplus tissue they have produced; *Lekhana Anjana* is the local application of this principle. As the drug is placed right at the site of disease, it can achieve *Samprapti*

*Vighatana* (breaking of the pathogenic chain) locally, with no need for absorption and distribution through the *Srotas* of the body. This accounts for the classical preference for local measures in eye disease and for the quick effect expected from them. The influence on the *Dosha* is considered to be mainly one of local cleansing (*Shodhana*), while *Pitta*- and *Rakta*-pacifying ingredients in the same formulation are thought to restrain the accompanying inflammation.

**Local ocular drug delivery through the conjunctival sac**

From the pharmacological standpoint, *Anjana* can be regarded as a topical ophthalmic formulation that is left in the conjunctival cul-de-sac. Once applied, it blends with the tear film and spreads over the bulbar and palpebral conjunctiva and the limbus, the site where *Arma* originates. Topical administration gives a high local concentration with minimal systemic exposure, a well-recognised benefit of the ocular route.[14] Many molecules cross the conjunctiva and sclera more readily than the cornea, so this non-corneal pathway is an important way in which drugs applied to the ocular surface are absorbed. Because the lesion in *Arma* sits on the conjunctival and limbal surface, this route brings the active constituents close to the target. Usually only a few per cent of an instilled dose reaches the intraocular tissues, owing to blinking, tear turnover and nasolacrimal drainage. In a disease confined to the ocular surface this is not a drawback, since the tissue to be treated is the one in contact with the preparation. What matters more is how long, and at what concentration, the active constituents remain in contact with the lesion.

The physical form of *Anjana* may also affect its action. Eye drops are cleared quickly by tear turnover and drainage, so little time is left for absorption.[15] *Churna* and *Gutika* contain fine particles that may be retained in the conjunctival sac for longer and give up the drug gradually, comparable to ophthalmic suspensions, whereas *Rasakriya* is closer to a solution. Read in this light, the classical qualities *Sukshma* (minute) and *Teekshna* (penetrating) may refer to a small particle size and ready tissue penetration. Residence time, comfort and absorption are known to depend on the pH, osmolarity, particle size and viscosity of a preparation,[14,15] and these properties, which vary with the method of preparation, have not been standardised for most *Anjana* formulations.

**Reflex lacrimation and mechanical clearance**

Many *Lekhana Anjana* cause a mild, short-lived stinging sensation along with reflex tearing and some conjunctival hyperaemia. In classical terms, the tears are the channel through which

the vitiated *Dosha* leave the eye (*Netra Srava*). In modern terms, the extra tear flow may help to rinse inflammatory mediators, cell debris and environmental irritants off the ocular surface, and the brief hyperaemia may raise local blood flow and aid the removal of metabolic waste. Sweeping the rod over the conjunctiva may also contribute a slight mechanical action at the lesion surface, although its depth is probably minimal and it is no match for removal of tissue by surgery. Any benefit is thus likely to be confined chiefly to early, superficial lesions. Over-stimulation is best avoided, because repeated injury to the surface could in itself trigger inflammation.

**Osmotic and astringent effects on the tissue**

Several *Anjana* formulations include salts, alkaline marine substances or astringent plant material. Hypertonic ingredients may draw fluid by osmosis out of swollen subconjunctival tissue, while astringent (*Kashaya*) constituents may, through a tannin-like effect, mildly tighten superficial tissue and reduce exudation. Together these effects could explain the reduction in swelling, congestion and watering usually credited to *Lekhana Anjana*. Such explanations are reasonable on basic physicochemical grounds, but they have not been shown in pterygium tissue, and excessive tonicity or alkalinity can damage the ocular surface.[14,15]

**Possible anti-inflammatory, antioxidant and anti-angiogenic actions of constituents**

Apart from these physical effects, the herbal and mineral ingredients of *Anjana* may have pharmacological actions of their own. The pathology of pterygium involves cytokine-mediated inflammation, oxidative damage, raised matrix metalloproteinase activity and pro-angiogenic signals.[5] Botanical compounds that suppress inflammation, counter oxidative damage or inhibit vessel formation could, at least in theory, interfere with these events once they reach the ocular surface, and this would offer a molecular parallel to the *Rakta*- and *Pitta*-pacifying action described in the classics. It needs to be emphasised that this is only a hypothesis. Most of what is known about individual constituents comes from other experimental models, the amount that actually reaches the tissue after one application of *Anjana* is unknown, and no study so far has shown a change in these pathways in pterygium following *Anjana Karma*.

**Clinical considerations, limitations and future directions**

Taken together, these mechanisms indicate that *Anjana Karma* is best viewed as a local therapy with several components: the *Lekhana* property of the drug, the way the dosage form delivers it and the reflex reaction of the eye's surface all act jointly on a lesion that is thin,

vascular and still advancing. This is consistent with the classical choice of *Anjana* for early *Arma* and of surgery for advanced *Arma*.[9,11] It further implies that the outcome is likely to be governed by disease stage, by how well the preparation is made and standardised, by how it is applied, and by the *Pathya* the patient observes.

Two further points merit comment. First, recurrence is the chief problem after pterygium surgery,[8,10] and it has been proposed that *Anjana* could serve as a supportive measure after excision by keeping inflammation and new vessel growth at the surgical site in check. This is a reasonable hypothesis, but there is currently no direct evidence for it, and it should be tested in controlled studies before being adopted in practice. Second, *Anjana* must not be treated as a replacement for surgery when the growth is thick, is advancing over the visual axis or is accompanied by loss of vision; in such patients delayed referral can cause avoidable harm.

Safety also deserves attention. Ophthalmic preparations are expected to be sterile, of appropriate pH and tonicity, and free from coarse particles and toxic metals. *Anjana* made by traditional methods may fail to meet these requirements unless the process is closely controlled, and contamination, chemical injury and allergic reactions are possible. Attention to such matters carries as much weight as the selection of the drug itself.

Certain limitations need to be stated. This is a narrative review, and the sources were not formally appraised for quality. Most of the proposed mechanisms are extrapolated from classical principles and general ocular pharmacology rather than from studies of *Anjana* in pterygium. Formulations vary widely in what they contain and in their particle size, pH, tonicity and sterility; some include minerals or metals, which makes safety and standardisation a real concern where the ocular surface is involved. Future work should therefore focus on quality control and standardisation of *Anjana* formulations, covering aspects such as sterility, particle size, pH and osmolarity; on how long the preparations stay on the ocular surface and how well they are tolerated; on laboratory studies of inflammatory, angiogenic and matrix-related markers using pterygium models; and on randomised controlled trials with objective endpoints (size of the lesion, its vascularity and the recurrence rate) and sufficiently long follow-up.

## CONCLUSION

*Anjana Karma* is a local ocular procedure whose effect in *Arma* probably arises from several mechanisms acting together: scraping (*Lekhana*) and channel-cleansing (*Srotoshodhana*)

action against *Kapha-Rakta* pathology; delivery of the medicine to the conjunctival and limbal zone from the conjunctival sac; reflex tearing that clears the surface of the eye; osmotic and astringent effects on tissue; and the possible anti-inflammatory, antioxidant and anti-angiogenic activity of its ingredients. These mechanisms lend support to the classical use of *Lekhana Anjana* in early and progressing *Arma*, but they are still largely inferential. Before *Anjana Karma* can be recommended as an evidence-based adjunct in pterygium care, controlled laboratory and clinical studies with standardised preparations are needed.

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