

## A Survey of the Ideas of Some Great Iranian Sages on the Diagnosis and Treatment of Pterygium

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### Abstract

**Background:** Pterygium is one of the eye diseases that have been a subject of interest since ancient times. The aim of this study was to trace back the methods of diagnosis and treatment of pterygium throughout the history of Islamic civilization and to learn about the drugs and the related surgical instruments used to treat it.

**Methods:** We searched all available reliable electronic and published sources for the views of ancient Iranian physicians including Avicenna, Rhazes, Jurjani, and compared them with what has been mentioned about this disease in recent medical literature.

**Results:** As Islamic countries were among the regions with pterygium outbreak, it received much attention by Islamic scholars and many discoveries and innovations were made by Iranian-Islamic sages. Especially in the treatment of the disease, they outdid their Greek counterparts. Among these scholars, Rhazes in *Al-Hawi*, Haly Abbas in *Kamel al Sanaye*, Avicenna in *Al-Qanun fi Tibb*, Jurjani in *Kharazmshahi Treasure* and Jesu Haly in *Tazkarat al Kahhalin* have suggested highly detailed and practical prescriptions for the disease showing their ingenuity and their careful clinical examination many of which are still valid in modern medicine for the treatment of the disease.

**Conclusion:** Unlike today's treatment of a disease which is based on a single protocol, in Islamic - Iranian traditional medicine a disease might be treated differently according to the temperament and characteristics of each individual patient. In addition, the doctors would not isolate the affected part from other parts of the body or mind and they always would first thoroughly cleanse the body and then they would start the treatment.

developed in the left eye. Two patients had no family history suspicious for keratoconus.

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## Introduction

The so-called pterygium, is taken from an ancient Greek word πτερυξ (pter'-oox) that means wing. Pterygium most often refers to a benign growth of the conjunctiva, that is a triangular fleshy bump which grows from bulbar conjunctiva of the eye to the cornea, usually without affecting the eyelid and often expands from the nasal (inner) corner of the eye to slightly below the horizon (1).

There are many theories on the etiology of pterygium. During the past centuries, pterygium has been known as a regional disease mostly prevalent in the equator. The difference in prevalence may be related to differences in lifestyles (2).

The factors which cause primary pterygium may cause it to recur after the treatment. It slowly expands from the eye corner to the cornea. The classification of the disease is based on size, percentage of adhesion, and the degree of visual impairment. In pterygium, both eyes are affected but the damage appears in one eye faster. In terms of anatomy, pterygium is divided into two parts: head and torso. The symptoms of the disease appear as the disease worsens which include chronic inflammation of the optic disc, tearing, and eventually irregular astigmatism and blurred vision expressed by the involvement of the visual axis. The feeling of having a foreign body in the eye is also another symptom (2, 3).

Pterygium is a vascularized tissue growth created from the conjunctival surface and the proliferation of the vascular granulation tissue which extends to the cornea. It destroys the surface layer of Bowman's membrane, stroma and is covered by conjunctival epithelium. Also, it is characterized by a disordered excess of fiber (4).

Specialists believe that it is better not to meddle in as long as pterygium causes no particular problem, unless it expands toward the pupil, causing astigmatism and limitation of movement or affecting the beauty of the face (5). For a long time, man has tried to fight against pterygium, but the challenge is still there. Some methods that have been experienced include cutting, removing, ripping, replacing, burning, plating, warming, rotating, freezing, radiation or laser therapy, chopping and implanting (6).

Today, common treatments include drug therapy and surgery. Based on the symptoms eye lubricants are prescribed at early stages of the disease while surgical treatment of pterygium is carried out when it is large or it affects the visual axis or causes astigmatism, irritation, redness, tearing or pain. Its impact on beauty is also another reason for removing it. Today, the conventional surgeries include a wide range of simple bare sclera surgery to complex surgeries such as lamellar keratoplasty and amniotic membrane patch graft. Relapses after surgery have been reported in 0- 89% of the cases (4).

Pterygium surgery was first reported by Susruta from India about a thousand years ago. Pterygium had attracted the attention of Hippocrates (400 BC), too. He used to treat it with eye drops made of lead, zinc, copper, iron, bile extract, urine and mineral syrup. Celsus (50 AD) and Galenus (129 AD) also explained the disease (2).

Susruta had fairly enumerated the pterygium stages. One of the medical treatments he used was the topical eye drops and ointments which would make scratches. Surgery of the inflamed pterygium had also been carried out. Although in modern times the

preoperative medication and the tools used in surgery have undergone significant improvements, they are basically the same as the ancient ones (7).

In order to prepare the patient for the surgery the eye would be excited by finely powdered salt as well as warm water compresses. The patient would sit in front of the surgeon and he would be asked to look down at the lower corner of the affected eye. The eyelids would be kept wide open and with a threaded needle the pterygium would be lifted and scratched with a sharp round tool and would be cut from the root. The root of the pterygium should be separately pressed and removed from the cornea. Post - operation care included rubbing with a mixture made of different salts, stimulation and bandage for three days, and if it was not totally removed, the relapse was possible (6, 7).

Some eye diseases such as cataract, conjunctivitis and trachoma were common in ancient Egypt. To reduce the effects of sunlight on the eyes, they would paint round the eyes with green marble or green copper, which were extracted from Sinai or mines in the eastern deserts. They also used a dark gray ore of lead (*mesdemet*), which was derived from either stibnite (antimony sulphide) or, more typically, galena (lead sulphide), as well as a powder made of stone, wood and insects (8). An eye disease in Ebers papyrus has been described in such words that Professor Waugh has proposed it to be an explanation of pterygium (9).

Iranian medicine has been influenced by several medical schools from Mesopotamia, Egypt, India, China and especially Greece. However, Iranian Muslim physicians did not simply imitate them. They also added a lot to

what they had borrowed from them in such a way that Islamic medicine became a new distinct practice (10, 11).

The aim of this study was to trace back the diagnosis and treatment methodology of pterygium throughout the history of Islamic civilization and to learn about the drugs and the related surgical instruments used to treat this disease as well as to overview the ideas and methods of treatment which have been prescribed by famous Iranian scientists and scholars in their books. It will be worthwhile to look at the traditional drugs hoping to find a medical and less risky treatment of the disease.

#### Methods

This was a library research in which classical texts as well as all reputable websites, especially databases such as, PubMed, Medline, Science Direct, Scopus, Ovid, Up-To -Date, magiran, SID, and google scholar were used. First, the articles and reference books of modern medicine about new therapies were searched by using keywords like new, medicine, surgery, pterygium, treatment, ancient, ophthalmology, eye disease, Rhazes, Avicenna, Haly Abbas, Jesu Haly and Jurjani, medical treatment and history. Those resulted articles which were related to the history of eye diseases and particularly to pterygium were selected, read and other non-related articles were excluded. Also, six classical books in medicine, that is *Al-Hawi*, *Teb al Mansouri*, *Kamel al Sanaye (Teb al Maliki)*, *Al-Qanun fi Tibb*, *Zakhire Kharazmshahi* and *Tazkarat al Kohalin* were selected to be scrutinized and studied as their originalities were proven to the authors and are frequently referred to in medical studies.

## Results

In this section, the description, diagnosis and treatment of the disease will be discussed according to the prominent scholars of Iranian-Islamic medicine:

### The description and diagnosis of Pterygium

Abu Bakr Muhammad ibn Zakariya Razi known as Rhazes (860-932 AD) is one of the biggest and most influential Iranian doctors and has written a great medical encyclopedia titled *Al-Hawi*. He explained pterygium as a cover which starts from the nasal corner of the eye and expands over the white part of the eye up to its black spot (4, 12).

Rhazes in *Al-Hawi* has categorized pterygium as small and soft or big and rigid. Elsewhere he has referred to the color of pterygium, he has described it in yellow or red (14). In *Al-Mansouri fi Al-Tebbhe* has also mentioned newly emerging, white and thin, weak and rigid and red, thick, and persistent pterygium (13). Today, pterygium is classified as fibrosis (yellow and rigid) and vascular (red and soft) which is very similar to the classification made by Rhazes: "The inflamed pterygium is white or yellow and the pre-inflamed one is red and is called pterygitis". According to Rhazes, the causing factors of conjunctiva diseases (the pterygium as one of them) were exposure to sunlight, heat, dust and oil (15).

Abul Hasan Ali ibn Abbas Ahwazi (died 982–994) who is known in the West as Haly Abbasin his book *Almaleki* or *kamell al-Sinaa fi Tibb* (16), has defined the disease much similar to other scientists: "It is a growth starting from the nasal part of the eye which may cover the black part of the eye". In the chapter devoted to eye health maintenance he has said: "The eye is a

sensitive organ for which no strong drug should be used and we should never pour too much drug into it. If the cause is sunlight, dust or smoke, the disease will be eliminated when the causes are removed" (17, 18).

Ali Hussein bin Abdullah bin Hassan bin Ali Ibn Sina (1037 -980 AD), who is known as Avicenna, in *Al-Qanun Fi Al-Tibb* has written: "pterygium is a growth and appendage from the flesh or cover of the eye which mostly extends from the tear corner of the eye and covers the fleshy part and sometimes covers the cornea and even covers the pupil". He explicitly classified pterygium as rigid and soft, yellow, red, and bad color (turbid). In an implicit classification, he spoke of a type which sticks to the fleshy part and the type which merges into the flesh and becomes one with it.

Avicenna on sanitation of the eyes has referred to what we today know as the risk factors for pterygium: "Someone who wants eye health must avoid dust, smoke, heat, dusty wind and whatever brings about dryness like radiation and too much bathing" (19).

Ali ibn Isa al-Kahhal who is known as Jesu Occulist or Jesu Haly (940 -1010AD) was the most famous clinical ophthalmologist of his time. In his book *Tazkarat al Kahhalin* (advice for ophthalmologists) which was the best reference for the doctors in the medieval, has stated: "Pterygium is a neural growth in the conjunctiva expanding from nasal corner of the eye to cornea. It may extend from the outer corner of the eye or even both corners. It is harmful to the eyes and stops their movement and when it covers the conjunctiva and the cornea it stops seeing". He has called the white, thin pterygium as easy pterygium and the red and rigid one as hard pterygium (20).

Sayed Ismail Jurjani (1041-1136 AD) was one of the most outstanding physicians of his time and the founder of the Persian medical school (21). He wrote a book in Persian called *Zakhire Kharazmshahi* (Kharazmshah's Treasure) in which he suggested a complete definition of the disease: "Zafreh which is the Arabic word for fingernail is a growth in the membrane which is thick and with an invasive nature. As it is in the eye and is always wet, it is softer than nail. It grows from the corners of the eye, mostly from the nasal corner and extends to the conjunctiva, sometimes it reaches the pupil and stops there, and sometimes it covers the pupil and blinds the eye. It is possible for it to grow from both corners of the eye, and its least harm is that it stops the movement of the eye" (22).

#### The treatment of Pterygium

An interesting aspect of Iranian- Islamic tradition in the treatment of any affected part of body, including the eyes, is that the physicians would first pay attention to cleansing the whole body. That is, they would consider both the general and the specific aspects of the disease. Ibn Abi Usaibia, a Syrian Arab physician of the 13<sup>th</sup> century (1203-1270 AD), has stated that the ophthalmologists especially the precursors used to treat eye diseases with phlebotomy and cleansing of the body from waste and by creating a balance between their temperaments and by prescribing different drugs. In fact, traditional medicine tended to treat the disease with food and a variety of singular and compound drugs rather than by surgical intervention (23).

Also, treatment varied from person to person and depended on one's nine temperaments and it was not the same for all. Jesu Haly, in *Tazkarat al kahalyin* has said: "To keep eyes healthy, one should also

look at other parts of the body and the brain as they are interrelated. The most important measure is to observe one's temperament; one's is warm and one's is cold and one's is wet or dry and people should be treated accordingly" (20). Drug treatment was effective for the first (soft) type of the disease in which dissolving drugs were used like burnt copperas, ammonium chloride, steoptria-alon-aloman-alen, *sorme roshanie* (A kind of Kohl used to treat poor vision and night blindness and sturdiness of eyelids and mangle) and *akhzar* suppository (A mixture of copper oxide, Dorema ammoniacum and Arabic gum boiled in wine) while a surgical treatment was used for the second type. In surgery, using one or some *Sinnnarahs* (a hook-shaped surgical instrument used for averting the eyelids or for holding a vessel), the pterygium would be first fixed, then a needle and thread would be inserted under it to raise it from its place. If it was not stuck to the layer beneath, it would be plucked out by using a mihatt (couching needle, a needle used in cataract surgery). If not, first it would be cut from one side and then the mihatt would be used to pluck it out. This would be repeated until the whole pterygium was cut off from the eye. It was important to remove the whole pterygium as the risk of recurrence was high. After surgery, the eye would be washed by water and salt and cumin and a poultice of egg yolk and flower extract would be applied on it (24).

In another method, some surgeons would raise the pterygium by one or more hooks and then they would cut it by a scalpel and scissors. If the surgeon could not raise it with a hook, he

would try to insert a curved needle with a tread made of cow hair or horse hair beneath the pterygium, then he would tie the thread and pick it up. Then he would cut the pterygium entirely with scissors or a scalpel in such a way that no damage would happen to the eye or eyelids. If it was not possible to raise it even with the thread, he would penetrate a very thin scalpel into the pterygium in such a way that it would enter from one side and come out from the other side. Then he would hold both ends of the scalpel and would lift it (19, 20).

Rhazes used drugs for the treatment of pterygium in which pungent extracts were used, and these drugs had polishing and brightening properties, too. These compounds were merely cleaners (25). He also mentioned disinfectant drugs like orpiment and steoptria-alon-aloman for the treatment of this disease. In his book, Rhazes mentioned both the treatments that others had suggested and what he had achieved in his own experience. Here are some of his comments and remarks on the treatment of this disease:

"Take a mixture of blue alum and ammonium chloride as a suppository and apply it to the eye to benefit from its amazing effect".

He also reported the prescription of an anonymous person: "Pour hot water on ground *Boswellia thurifera* and after one hour apply it to the eye with some water, it has surprising effect".

"Make a mixture of *Qalymya* (the remainder of burnt gold and silver in the container after smelting) and *Sebastes minia* and red realgar and crystalline sugar - one deram of each (2.97-3.5 gr) and *commiphora molmol*, *cucuma domestica* and saffron (*crocus sativus*), of each one unit, and *dorema ammoniacum*, half deram,

and *boswellia thurifera*, one deram. Then apply all as suppository".

He also mentioned his own experience: "to make a suppository to relieve the pain of pterygium, mix a unit of orpiment and half a unit of leguminoseae/ *Astraggallus sarcocoll* and half a unit of *hajar al felfel* (According to Ibn Telmiz it is a pebble which gets the quality of dried pepper when mixed with it) and drop it to the eye with the extract of *coriandrum sativum*"(14).

In another place he has said: "If you use this drug for the treatment of pterygium, you will need no surgery: take the seeds of cotton (*Gossypium*) and extract its oil, then take a few clean small pottery pieces and grind them into a fine powder and then mix it with that Cottonseed oil and apply it to small sticks and penetrate and scrape the pterygium with them several times a day hopefully the pterygium will become thinner" (14).

To reduce the complications of the prescribed pungent drugs he has suggested: "If you want to use drugs for the treatment and removal of pterygium and to reduce the side effects of the resulting wounds you should apply them to the eye like Kohl and mascara then you should wait for an hour to let the drug be absorbed by the eye's tissues to obtain a better impact". Elsewhere, he has said: "apply the medication by a Kohl stick and rub it to the affected part of the eye or hold the eyelid with your hand, then let it fall as it is not necessary for the drug to reach all parts of the eye".

For the treatment of hard pterygium, Rhazes has suggested surgical operation: "In order to remove pterygium, I believe, it is good to raise it by a hook and then cut one side of it with small and thin scissors in such a way that the head of a scalpel can penetrate into it. The scalp

should have a blunt and flat head like a spoon. Then penetrate it into the eye and remove the pterygium. If it is not possible to remove the pterygium in this way, just push the hook into the pterygium and use a strong thread instead, god willing it will be effective" (14).

After the surgery, he recommended: "open eyes repeatedly and turn the eyelids frequently in order to prevent the eyelids sticking together. Then apply Basilicon Ointment, light suppository (A mixture of different eye medications mostly made of remainder of tin and lead after they are burned into ash) and green suppository (A mixture of copper oxide, Dorema ammoniacum and Arabic gum boiled in wine) and the like after three days in order to dry its roots up and to eradicate it forever"(14).

Among the complications due to incorrect surgical operations he mentioned the adhesion of eyelids whether they stick to the black part of the eye or to each other. Another postoperative complication is the excessive tear secretion as the fleshy part of the eye decreases.

Another postoperative complication is the scratched cornea as the result of using sharp instruments.

On patient's position at the time of surgery he has said: "When removing pterygium or cataracts it is needed for the patient to be seated against the light stops careful examination of the eye. (14).

Haly Abbas, who first named the disease as pterygium, has recommended cleansing and bloodletting and different diets and Kohl applications to cure the disease prior to any other practice (25).

Then, he reported the surgical procedures in details: "The patient lies on his back with his eyes wide open. We rub a clean and soft feather on the pterygium up to the black part of the eye.

We pass a mane hair through a needle eye or any other sharp instrument. Then slowly and carefully we pass the needle under the pterygium. Next, we put aside the needle and pass the hair under the pterygium up to the verge of eye socket. When the pterygium is lifted from its place, we gradually cut it with scissors. This should be done in such a subtle way that no injury happens to the eye. Then we wash the place of pterygium with salt water and the extract of cyminum. Then we apply egg yolks and oil and bandage it until the next day. Next day, we examine the eye and if it is red we treat it like ophthalmia"(19).

Avicenna in *Al-Qanun fi Tibb* has referred to the several ways which Rhazes had used, but with some minor differences. For example, in his treatment he has also talked about amber (19). It seems that using magnetic ore in the treatment of pterygium was first mentioned in the writings of Aetius and Gallons and Serapion (2<sup>nd</sup> century AD) (25).

On removing pterygium he has said: "If it resists and cannot be pulled out, insert a hair or silk beneath it by a needle or a thin feather. If it is not effective, use a small and blunt scalpel to remove it" (19).

In preparation for applying the pungent drugs he has said: "the patient should put his head over steam till his eyes are warm and his face is red; or he should go to the bath. I think he should draw his head over the vapour rising from the wine which is boiling. Or he should drink a little wine mixed with water and then he is ready for the operation".

He reported one of his treatments for the disease which was very similar to Rhazes' method (19).

Jesu Haly dealt with the disease in much the same way and proposed pungent and drying

medicine for the treatment of pterygium before surgery (25). In addition to burnt copper, he used starch, gall of swine and billy goat and *Durrani* (extremely white salt). He also quoted Galen who used the extract of glycyrrhiza glabra to treat the disease. He also mentioned an important point to be observed in surgical treatment of the disease: "The important thing is that the fluid around the pterygium should be dried and taken out and washed by detergents to achieve a good result" (20).

Jurjani has mentioned the suppositories used for the treatment of pterygium as follows: *Roshanaie* (White), *Akhzar* (green), *Dynargun Kaiser* and *Baslyqun* (basilicon). His method for the treatment is the same as those used by Avicenna and Rhazes. He has said: "A pterygium which is thick and rigid and too old needs to be surgically operated. The patient should be made to vomit in order to cleanse his body and mind before they start the operation. First the pterygium should be isolated from the conjunctiva. In Arabic this separation is called *kashth* (meaning removing the cover of something) and *salkh* (peeling off, skinning) which needs to be done with utmost care as it may scratch the conjunctiva" (22).

Haly Abbas and Avicenna proposed scissors for surgical operation while Rhazes and Jesu Haly suggested nipper (scalpel) or scissors to comply with Aulus Cornelius Celsus (25 BC- 50 AD) (26).

## Discussion

A review of traditional medicine reference books indicates that Iranian scholars knew pterygium very well and had studied the books of their predecessors and had practiced their prescriptions and added their own experience to them. Unlike today that the treatment of a

disease is done based on a single protocol, in Islamic - Iranian traditional medicine, treatment would vary according to the temperament and characteristics of each individual patient. Also, they wouldn't isolate the affected part from other parts of the body or mind and they would first thoroughly clean the body and then they would start the treatment.

The research and prescriptions proposed by these scientists were much more complete than those done by Greek physicians. The western references could never ignore the effectiveness of the treatments proposed by physicians like Rhazes, Avicenna, Haly Abbas and Jesu Haly.

In defining the disease and its risk factors, today's civilization is indebted to scholars of Islamic civilization who according to Hirschberg, pioneered the medical community in Europe and the world for 800 years. The roots of modern improved surgical instruments can also be traced back to the simple ones which were practiced in Iranian sages; even though, in the first glance, it is not noticeable.

In addition to their significant progress in elucidating the structure of the eye and the way it works, Iranian physicians were able to define and categorize its diseases and have suggested several varied treatments and surgical methods. Also, they have shown wonderfully high expertise in innovation of the required surgical equipment (15). Their abundant written recommendations for preserving eye health (*hefz al sehha*) and preventing eye diseases are also so remarkable (19).

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