



Dental and oral diseases in Medieval Persia, lessons from Hedayat Akhawayni

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Abstract

Persian physicians had a great role in assimilation and expansion of medical sciences during the medieval period and Islamic golden age. In fact the dominant medical figures of that period were of Persian origin such as Avicenna and Razes, but their works have been written in Arabic that was the lingua franca of the period. Undoubtedly the most substantial medical book of that period that has been written in Persian belongs to *Abubakr Rabi ibn Ahmad al-Akhawayni al-Bokhari* and his book, *Hidayat al-Mutallimin fi-al-Tibb (Learner's Guide to Medicine)*. There are two chapters related to oral and dental diseases in the *Hidayat*, a chapter on dental pain and a chapter on buccal pain. Akhawayni's views on dental diseases and treatments are mainly based on anatomical principles and less influenced by humeral theory and no mention about the charms, magic and amulets. False idea of dental worm cannot be seen among his writings. Cutting of the dental nerve for relieving the pain, using the anesthetizing fume, using the natural antiseptic and keeping the tooth extraction as the last recourse deserves high praise.

Keywords: dental diseases, Akhawayni, history of medicine, medieval period, Persian

Introduction

During the Islamic scientific Golden Age that started in the 9th century, Islamic medicine greatly influenced European science, an effect that continued until the Renaissance. Islamic scientists not only accumulated the existing information, but added to this knowledge through their own observations, trials and skills (1-3). Persian physicians had a great role in this period of innovation, commentary and systematization, and the dominant medical figures of that period were of Persian origin: Ali ibn Sahl Rabban al-Tabari (807 - 870 AD, 194 - 257 Hijra), Muhammad ibn Zakariya al-Razi (865 - 925 AD, 252 - 312 Hijra), Ali ibn al-Abas al-Majusi (930 - 994 AD, 317 - 381 Hijra) and Abu-Ali al-Husayn ibn Abdallah ibn Sina (981- 1037 AD, 368 - 424 Hijra). All their great works, however, have been written in Arabic, as it was the lingua franca of the period (1, 2). The Samanid dynasty (875 - 999 AD, 262 - 386 Hijra) established an autonomic state and nurtured the revival of Persian literature and traditions. Persian language that had lost its official status after the Arab conquest once again started to be used in the arts and sciences with increasing nationalistic vigor (1, 2). Undoubtedly the most substantial medical book of this period belongs to *Abubakr Rabi ibn Ahmad al-Akhawayni al-Bokhari* (died 983 AD, circa 370 Hijra), and his book, *Hidayat al-Mutallimin fi-al-Tibb (Learner's Guide to Medicine)*. The *Hidayat* consists of 185 chapters (*Bab*), the first six chapters are on the humors (*akhlāt*) and faculties (*quwa*), followed by 28 chapters on anatomy, 21 on physiology, symptoms and comments on diet and hygiene, and 130 chapters on the diseases of various organs. *Hidayat al-Mutaallemin fi-al-Tibb (Learner's Guide to Medicine)* is the oldest treatise on medicine written in Persian. Some years after the death of Akhawayni, three known manuscripts of the *Hidayat* were copied. The oldest one, copied in 1058, is the manuscript in the Bodleian Library, University of Oxford. Dr. Jalal Matini, a contemporary Persian writer, compared the three existing manuscripts and published a literary edition of the *Hidayat* in 1965 that has been published by Mashhad University Press (4). It is an attempt to increase our understanding of the dental problems and their management in medieval Persia. We intend to introduce specific chapters of this book to dentists and other specialists who are interested in the subject. This would increase our historical understanding of the dental problems that existed more than one thousand years ago, and some of those old remedies and herbal products may have certain clinical benefits and could reenter modern medicine.

Method

What we did in this research at first was to find chapters that are related to dental and oral medicine. Our criteria were to select those chapters that contained more clear descriptions of diseases and related therapies. We tried to understand the basic concepts and meanings of those chapters, and in order to preserve the genuine form of those passages, we tried to translate some segments word for word. In the discussion part we have tried to clarify the concepts and to compare them with those of Akhawayni's predecessors and successors, and modern medicine ideas.

There are two chapters related to oral and dental diseases in Akhawayni's book: a chapter on dental pain and one on buccal pain. What follows is a translation of some parts of these two chapters (4). At first we will present the original text and then try to explain them with a modern outlook. We have tried to translate the original passages word for word, and in those instances where it was difficult to convey the concept through existing words, we added some words or sentences in brackets.

Passages and Descriptions

In the following passage there is an interesting elaboration of the role of the dental nerve in generation of pain, and also considerations on the periodontal soft tissue inflammation, and infections that could mimic dental pain. The implementation of natural antiseptics such as vinegar and some other probable antiseptic and anti-inflammatory herbal and nonorganic remedies are also interesting. Nerve cautery has also been discussed and dental extraction has been mentioned as the last therapeutic option. There are also interesting prescriptions of some natural breath fresheners and the need for differentiation between different causes of this symptom including dental or gastrointestinal origins. [pages 298, 299, 302, 303].

Passage 1

If the tooth is painful, it means that the nerve that is under the tooth and around it [is painful]; if the pain is accompanied by inflamed gum that is red and burning, it could be alleviated with cold objects... and gurgling with Oxime, and chewing Plantago psyllium soaked in vinegar... and the tooth is not painful unless [because of] a faulty meal ... and if those incompatible matters remain there, they create inflammation and if they remain within the dental body, they decay the tooth and blacken the tooth... and if the pain does not improve with oil of flower (Salix babilonia) and Pistacia lentiscus, [in the second stage] you should use the vinegar and salt frequently until those faulty materials dry out.... [page 298].

Passage 2

And if the pain is without inflammation, it is phlegmatic ... and the patient should gargle [a mixture of] *Muscari comosum* mill and tar, and if the pain does not improve [then] boil the *Citrullus colocynthis* Schrad with vinegar and gargle until the phlegm is removed ... or boil dried leaves of *Ruscus aculeatus* and dried pine tree wood and two cloves of garlic with vinegar and gargle this mixture when it is still warm ... or grind and mix the *Anthemis pyrethrum* with the skin of the root of *Capparis spinosa* and then boil with vinegar and gargle the mixture. If the pain does not subside then incise the periphery of the tooth with a lancet

to separate the nerve from the tooth, and if [this method] is ineffective then one *deramsang* (4.6 grams) of the seed of black *Hyoscyamus niger* and two *deramsangs* of wet *Styrax officinale* should be ground, mixed, burned and the fume [of the burned mixture] should be conducted by a tube to the painful tooth to anesthetize it.... [page 298]. And if you did all and none was effective and the pain does not improve, then the tooth should be extracted or cauterized, and if it is hollow, extraction is inevitable.... [Page 299] (Look at Figures 1 and 2).



Figure 1 : Albucassis Dental Cautery and the tube through which it was applied. Albucassis (Abu'l Qasim Khalaf ibn Abbas, 1050-1122 AD) Genius of Arabian surgery. Born in alzahra and died in Cordova in Spain . he is the greatest medieval surgeon in regard to dental art. Among his book is the treaties *de Chirurgia* (the picture copied from Guerini V. A History of Dentistry. Chapter 8. Philadelphia: Lea & Febiger, 1909 with permission)

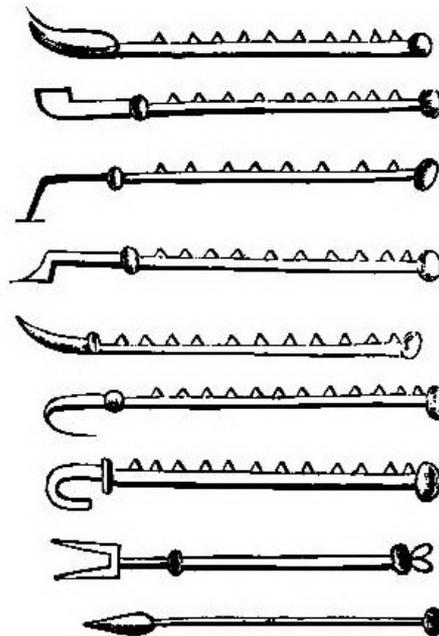


Figure 2; Albucassis (Abu'l Qasim Khalaf ibn Abbas, 1050-1122 AD) dental scrapers. (the picture copied from Guerini V. A History of Dentistry. Chapter 8 .Philadelphia: Lea & Febiger, 1909 with permission)

Passage 3

Under each tooth there is a nerve ... a tooth that does not have the nerve (sense) does not feel the pain ... the nerve that is under the tooth feels the pain (is painful)... When the tooth is painful, the nerve that is under the tooth or within the tooth is painful [page 298] ... and if the teeth are yellow,

they should be whitened with sea-salt and sea-foam (*meerschaum*) and *Ghozareh Chini* (we were unable to find the exact meaning of this substance) and *Khashar* (*cuminum Cyminum?*) all ground together, and you should brush the teeth with this mixture and you should be careful not to damage the gum ... [page 299].

Description 1

It is obvious in the above passages that Akhawayni had an anatomical insight into the diseases of the teeth and treated them based on a somehow logical framework. His methods of treatment included herbal gargles, pastilles, fumigations and purges as well as cautery and surgery. Akhawayni has mentioned that if application of herbal remedies with different methods fails then the physician should consider the cauterization of the area with hot iron, and if this step also fails, tooth extraction should be considered. Akhawayni and medieval Persian physicians were also aware that dental pain is directly related to the nerve and if we separate the nerve from the painful tooth it wouldn't be painful anymore. Anesthetizing the tooth by conducting a fume directly to the painful point is a very interesting method that has been discussed by Akhawayni. He prescribed sea-foam (magnesium silicate, $Mg_4Si_6O_{15} (OH)_2 \cdot 6H_2O$) for discolored teeth (5, 6).

Passage 4

... and the cause that is named malus spiritus (bad breath) could be from three sources.: from stomach and [it is] accompanied by a high fever ... from the teeth that should be extracted, and it is possible that it originates from the lung... (Page 300) and its treatment is

the tablet of Mask, [that includes] skin of dried bergamot, Caryophyllus aromaticus, Valeriana celtic, vinegar and Aquilaria malaccensis Lamk, one deramsang (4.6 grams) from each should be mixed and ground with a half dangsang (2.3 grams) of Moschus moschiferus. The tablet should be taken in mouth every morning...

... and painful oral cavity or cavitatis oris has three causes; one is because of bilious blood and [the oral cavity] is erythematous and burning...; and it is possible that painful oral cavity is accompanied by [mucosal] whiteness that is worse than the previous case ...; and it is also possible that painful oral cavity is because of corrosive ulcer, and the mouth and teeth are blackened and putrefied and the tooth may be destroyed and lost... [page 302] and this [situation] needs Foldfiun tablet, [which is made by] grinding and mixing yellow Auripigmentum lime, oak apple and aluminum sulphate together and then drenching [the mixture] in old vinegar for one week and then [Foldfiun] tablets are made [from this mixture]....

... if it is necessary, brush the mouth [gum] with a rough cloth (sackcloth) and vinegar until it bleeds, and [as a second stage] wash the mouth with vinegar and apply this medicine [powdered Foldfiun tablet] morning and evening until the condition improves.... I have treated many of these patients and what I have mentioned here are methods that I have experienced myself and I did

not mention those that I have not examined... [pages 302 – 303].

Description 2

In the above passages Akhawayni discusses the diseases of the mouth. He maintains that bad breath could be due to an infected tooth that should be extracted. Stomach and lung problems are two other reasons for bad breath. He also describes conditions that create a painful oral cavity. He categorizes them into conditions that are accompanied with erythema, conditions that are accompanied with malakoplakia, and a corrosive and gangrenous ulcer of buccal mucosa. For treatment of gingivitis gums should be rubbed with a strong linen cloth until they bleed in order to remove the rotten flesh, and then the mouth should be rinsed with vinegar and specific remedies may be applied (5, 6).

Discussion

Man has suffered from oral and dental diseases since prehistoric era. In Egyptian hieroglyphs there are remedies for relieving the throbbing pain of a dental blister. Dental diseases have been mentioned in Sumerian records quite vividly. During late antiquity, dental care and even prosthetic dentistry reached a high degree of development in the Roman period, but fell into decadence when Western Roman Empire began to decline and Christianity rose (7).

It appears that the major dental problems mentioned by Akhawayni are toothaches related to dental caries, oral ulcer and gingival disease. He starts with noninvasive methods mostly using herbal remedies, and if those are ineffective, then surgical interventions are applied. He reiterates that he has examined his methods of treatments many times and believes in their effectiveness. Akhawayni's treatments are mainly based on anatomical principles and less influenced by humoral theory, and there is no mention of charms, magic and amulets. False ideas of dental worms cannot be seen in his chapter on dental disease (4).

The idea of 'tooth worm' that was first mentioned in Sumerian scripts continued to be discussed by Romans and Arabs, as well as in medieval Europe and even late Anglo-Saxon documents (7, 8). Akhawayni describes the dental anatomy very minutely, and interestingly there is no mention of tooth worm gnawing away the dental substance. He believes in an incompatible material that remains within the dental body and decays the tooth (4). The medieval cure for tooth worm was, inhaling the smoke of burned *Hyoscyamus niger* as mentioned by Roman doctors (7, 8). Akhawayni prescribes the smoke of *Hyoscyamus niger* and *Styrax officinale* for toothaches but there is no mention of tooth worm.

Interestingly we can see this false idea entering Persian medical texts showing the weakness of

scientific thinking and lack of innovation until the world stepped toward the modern period.

Akhawayni subdivides toothaches into those that are associated with inflammation, redness and burning, and those that are not associated with severe inflammation. He prescribes gurgling with Oxime and chewing *Plantago psyllium* soaked in vinegar for the first group. Those without severe inflammation are due to a retained phlegm that should be removed through gargling *Muscari comosum* mill and a mixture of *Citrullus colocynthis* Schrad and vinegar and gargling until the phlegm is removed (4).

Medieval European manuscripts of Gilbert Anglicus and Guy de Chauliac (13th century AD) have mentioned effective pain relief using *Papaver somniferum* and oil of *Caryophyllus aromaticus*. Alum and *Punica granata* have been mentioned by Roger of Frugard as ingredients in a lotion to overcome suppuration (8).

Akhawayni's recommendations for periodontal disease and gingivitis include scarification of the gum to bleed and then application of vinegar and other solutions with probable antiseptic characteristics. The same prescription has been recommended by Razes (7, 8). He believes that tooth extraction is the last recourse when every other attempt has proven useless, a method that no doubt deserves high praise. In Akhawayni's writings we cannot find any direct description of drilling and emptying the painful teeth as described by Avicenna and late Byzantine-Roman physician Archigenes (7). Akhawayni is one of the few authors who have mentioned the cutting of the dental nerve for relieving the pain. He describes a method of gently pricking a lancet around the tooth and cutting the nerve (4). However, because Akhawayni wrote his book in Persian, which was not the lingua franca of the Islamic world in that period, it did not receive the credit that it deserved.

We should consider that Akhawayni was indirectly a student of Razes who created the great medical encyclopedia of "Alhavi", which covers most subjects and principles of medical science. One of those subjects is dentistry, which contains definitions, diagnosis, treatment and prognosis of dental and oral cavity diseases and associated medical care leading to oral health and management (9-11).

Alli ibn al-Abbas al-Ahvazi, the great pillar of the third century, also was a great pillar of medicine with very interesting ideas on dental and oral medicine, as he believed bad breath could originate from the stomach. Differentiation between gingival- and dental-originated pain is paramount because in the first case there is no need for the tooth to be extracted. Avicenna (370 - 428) also gathered the ideas of his great predecessors such as Razes al Ahvazi and Akhawayni and with his novel outlooks became one of the remaining figures of science worldwide (9-11).

It is interesting that in the more recent medical books we can see the entrance of false ideas such as the tooth worm, as well as some novel ideas such as using *Anthemis pyrethrum* (*Anacyclus prethrun*) in vinegar for loosening the painful tooth for its easier extraction (12).

Conclusion

Our article was an attempt to introduce *Hidayat al-Mutallimin fi-al-Tibb (Learner's Guide to Medicine)* as an important and forgotten 10th century Persian medical treasure. The passage on dental and oral disease shows the importance of oral and dental care in medieval Persia. It was very interesting that we found great considerations of anatomical based diagnosis and therapeutic considerations. It shows that medieval Islamic-Iranian physicians were aware of the importance of the dental nerve as a root of sensation, and the oral soft tissue and periodontal inflammation that can very easily be confused with dental originated pain.

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