



RESEARCH ARTICLE

The Millennial Origins of Dental Sciences

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Abstract

The dentistry history is a part of the history of medicine and the study of historical developments in dentistry, including biographies of people who influenced dentistry in their time. This story extends far into the past. In Denmark, evidence of the opening of a molar dates back to the Neolithic period.

The conservative treatment of the teeth among the ancient farmers of Pakistan could be evidenced in the period from 7000 to 5500 BC., and this with the intention of "repairing" the teeth and possibly filling the cavities (holes drilled in the tooth), too. Since the Sumerians, and until modern times, it was believed that a worm in the tooth was responsible for tooth decay. The first work on dental technology was done by the Etruscans and the Phoenicians. The influence of Roman and Greek scholars was decisive in the Middle Ages both in the Christian and in the Arab world. The Arab discoveries reached the Western world, where the profession of dentist was practiced by barbers, along with other knowledge from Antiquity, the School of Translators of Toledo and Salerno. At the beginning of the 18th century, science lays the foundations of dentistry in modern times.

Keywords: Dental medicine in history, dentistry in ancient times, popular dentistry.

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1 | INTRODUCTION

The history of medicine works with historical and partly ethnological methods. It finds its sources mainly in texts, such as medical texts from past eras, reports of illnesses, history or diaries, letters, literary texts and ethnographic descriptions or interviews.

The study of human remains, and ancient pathogens does not enter the field of medical history but in that of paleopathology. Some results are however reported below for completeness. Dentistry usually encompasses practices related to the oral cavity. According to the World Health Organization, oral diseases are major public health problems due to their high incidence and prevalence across the globe, with the disadvantaged affected more than other socio-economic groups [1].

The history of dentistry is almost as ancient as the history of humanity and civilization with the earliest evidence dating in prehistory.

Tooth decay was low in pre-agricultural societies, but the advent of farming society about 10,000 years ago correlated with an increase in tooth decay (cavities) [2]. Although inconclusive, researchers have suggested that rudimentary dental procedures have been performed as far back as 130,000 years ago by Neanderthals [3]. Regarding implants, one of the milestone progress is osseointegration which was termed in 1981 by Tomas Albrektsson.

Prehistory

It has long been believed that due to their diet, hunter-gatherers are not affected by tooth decay. In the middle Palaeolithic, during the Neanderthal era, there were known no cases of cavities, except as a consequence of a fracture of the enamel caused by food. But in September 2013, exam results of 52 skeletons aged between 13,700 and 15,000 years were published in the "Grotte des Pigeons" in eastern Morocco. It has been shown that these hunter-gatherers already suffered from tooth decay [2]. This contrasts with the hypothesis made so far that this disease was only due to the consumption of carbohydrates from the production of cereals, that is to say only in the Neolithic. Apparently, this is due to the acorns of the holm oak, the pine nuts of the maritime pine and the pistachios of the pistachio terebinth.

Considering the widespread elimination of incisors, perhaps ritual, it is very surprising that there is no indication that the decayed teeth have been extracted, even when painful abscesses have occurred. Ritual fractures of the teeth - although this cannot be taken as evidence of continuity - they were also common among many Aboriginal tribes in Australia. The Himba of Namibia and the Surmas of Ethiopia used to break the four lower incisors of children aged from 7 to 9 years. Originally, this breach was useful as the basis for adapting a stick or tray to the lower lip. For these two African tribes, a common cultural element is explained by their common ancestry of the Herero, a semi-nomadic people of East Africa. The ritual extraction of teeth also took place in the ancient Mediterranean agricultural space, as has been demonstrated for Italy and Tunisia. Apparently, it was common, at least for one out of three adult women, to have their teeth extracted. Since no other traces of violence were found in the facial region, it is believed that this was likely due to aesthetic, ritual or social reasons, perhaps status. The eradication may have been linked to the transition to adulthood [3].

The first treatment measures for dentition date back about 5,000 years ago, and they are noticeable in the evidence of molar perforation in excavations in Denmark [2].

Other indications of dental care can be found from 9,000 to 7,500 years ago at Mehrgarh, (in Belochistan, present-day Pakistan), one of the most important excavation sites for the archaeology of South Asian prehistoric dwelling groups. The inhabitants seemed to be skilled goldsmiths and seem to have also turned their skills to digging small, decomposed cavities (with a diameter ranging from 1.3 to 3.2 mm and a depth between 0.5 and 3.5 mm) with stone tools, as they used them to make pearl necklaces. The reconstruction of the origins of dentistry shows that the treatment methods of the time were apparently very effective. The first dental filling, based on beeswax, was discovered in Slovenia and dates back to around 6500 years (Figure 1). A fractured canine was thus remade [2].

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Figure 1. The Lonche jaw from a karstic cave of southern Slovenia, with the first dental filling, based on beeswax

The Egyptians and the Ancient Greeks

From the very beginning, within the various communities, men with special healing and relieving skills and knowledge were highly sought after. These people were the first preservers of medical knowledge, which was passed down orally from generation to generation until it began to be written. The earliest known written record of a dentist is the tomb of Hesy-Re. An Egyptian scribe who lived 4,600 years ago and was called "the best of those who care for teeth". The fact that Egypt was an attentive land to the teeth is also testified by a papyrus with the first known recipe for a toothpaste. This papyrus dates back more than 2,000 years later, to the 4th century BC [4].

In telling the history of dentistry, one cannot overlook the fact that, between 500 and 300 BC, both Hippocrates (Greek physician, geographer, and aphorist, considered the father of medicine, whose concept he revolutionized by laying the foundations for which, thanks to him, became a real profession) and Aristotle dissertated on dentistry talking about dentition, treatment of caries and gum disease.

Hippocrates and Aristotle wrote about dentistry, describing the eruption of teeth, the treatment of carious teeth and gum disease, extractions using forceps and talked about other methods used, for example for the stabilization of mobile teeth or to treat mandibular fractures.

A century before the birth of Christ, the Roman physician Celsus, author of the treatise "De Medicina", wrote about oral hygiene, stabilization of mobile teeth, and about the treatment of dental pain and fractures of the jaws.

To the Etruscans (between the 2nd and 3rd century AD), we owe the first evidence of dental prostheses, made using fixed gold crowns and bridges (Figure 2). These were interventions that still amaze today with their precision and robustness.

The use that was made of prostheses, unlike what we can conceive today (with the only exceptions of American rappers, ed) was often linked to aesthetics, and often represented a sort of ostentation linked to the high social class of those who could, in fact, allow the luxury of having gold teeth [4].



Figure 2. Copy of an Etruscan denture, Italy (Europe).

Obviously, the expertise of the Etruscans in the production of dental prostheses found its perfect use in the resolution of dental pathologies caused by caries or traumatic events.

Even today it is possible to admire the perfection of Etruscan artifacts in the most important Italian museum dedicated to this ancient civilization, which is located in Populonia, on the Piombino Gulf, province of Livorno.

Belief of popular dentistry:

A Sumerian text from around 5,000 BC. JC, say Suddick and Harris, first described the dental worm as the cause of tooth decay (Figure 3).



Figure 3. A modern painting over an 18th century Ottoman manuscript, depicting worms causing toothaches.

These authors have misinterpreted a 1945 publication by Hermann Prinz. If we follow Astrid Hubmann's dissertation, we see that four sources document the belief in the tooth worm; the oldest is a Nippur tablet that dates back to around 1800 BC. JC [3].

A tablet discovered next to Assur indicates that dental worm and toothache need to be treated differently, which could indicate the understanding of different diseases. In the library of the Assyrian king Ashurbanipal (669-631 / 27 BC), the book found a Nabunadinirbu, entitled "When a man has a toothache". It could be a copy of a substantially older Babylonian text, in which alongside the description of a treatment there is above all an important ritual conjuration. The worm, probably a demon or evil spirit, rejects the gifts of the high god An, ripe figs, apricot and apple juice, preferring the blood of the teeth [2].

In ancient India (around 650.), Egypt - in the papyrus Anastasi IV, 13, 7 (around 1.400 or 1.200 or 1.200 / 1.100. BC) - Japan and China, a sick tooth is a wormy tooth, but also, we find indications that among the Aztecs - who packaged tobacco in the cavity - or among the Maya, the tooth worm is the cause of tooth decay. The legend of the worm tooth is also found in the writings of Homer, and even the surgeon Chauliac Guy, in the 14th century, is convinced that worms cause tooth decay [1].

In the Old World the *Compositiones medicamentorum* of Scribonius Largus, personal physician of the Emperor Claudius, has a strong influence. It is recommended, for the treatment, fumigations and rinses, but also fillings and chewing substances, such as fumigations with henbane seeds, designated for this by *herba dentaria*. He suggests that some small worms are spat out from time to time during the treatment [5]. We too still believe in the worm, but we try, by applying the worms, to accelerate the fall of diseased teeth. Pliny the Elder, on the other hand, does not believe in the existence of the tooth worm, but in a similar treatment. Pliny also provides the ingredients of the toothpaste he recommended, called *dentificium* (ὀδοντότριμμα): bone, horn or pulverized or calcined shell, pumice powder, sodium bicarbonate, mixed with myrrh. Celso recommends powdered salt. Dental salt has been used mainly in Asia so far [6].

In the Arab world, they believed in tooth worms, referring to ancient traditions. This can be seen in the work of Rhazès who considers the relationship between body and soul as determined by the soul, or even in those of Avicenna or Abu Al-Qasim. Umar ad-Dimašqi, who teaches around 1200 in Damascus, rejects the worm of the teeth in his *Book of the Chosen One on the unveiling of secrets and the tearing of veils*, and above all the quackery with which it is claimed to hunt [6].

During this time, Hildegard de Bingen continued to believe in the tooth worm, but recognized the lack of hygiene as the cause. Rinsing with water should prevent plaque, a deposit that builds up around the tooth, which could trigger the dreaded worms. She recommends aloe and myrrh, in addition to coal smoke. Constantine the African, who comes to Salerno from Tunisia, the famous University of that city in the early 11th century. He brings to the north the knowledge of Antiquity and also the theory of humours, but also confirms the tooth worm. In the 17th century, the surgeon Antoine Lambert dedicates a treatise on cavities in which he mentioned a worm but says that the decay arises from external bruising or bone fractures, or from an internal corruption linked for example to the accumulation of favoured pus from another disease such as smallpox, leprosy or even phlegmon or a tumour. Other theories arise in the nineteenth century. In 1843, the worm theory was transformed by the anatomist Michael Pius Erdl (1815-1848) into a parasitic theory [7].

There follows a theory of inflammation, according to Leonhard Koecker, in which the products of the chemical reactions of the food fractions are made responsible for the decay. It was only Willoughby D. Miller (1890), after having perfected his bacteriological training during his work at the University of Berlin with Robert Koch (1843-1910), who developed a chemoparasitic theory, according to which lactic bacteria are considered responsible for caries in the 1960s. Miller developed a probe named after him, which is used in dentistry to find and probe the root canals of teeth. His sentence: "A clean tooth never rots" goes down in history. The most varied theories: theories of "dental lymph" (Bödecker, 1929), of "proteolysis" (Gottlieb, 1944), of "ulcificia" (Forshufvud, 1950), "organotrope of caries" (Leimgruber, 1951), "resistance" (Knappwost, 1952), "corrosion" (Rheinwald, 1956), "pulpaphosphatase" (Csernyei, 1956), "glycogen" (Egyedi, 1956), "non-acid decay" (Eggers Lura, 1962), "chelation" (Schatz and Martin, 1962) - followed without Miller's theory of "chemoparasites" being contradicted [1].

Only later the specific plaque hypothesis develops, followed by a paradigm shift leading to the ecological plaque hypothesis. Due to many pathogenic factors, tooth enamel is destroyed in several stages: the continuous availability of fermentable carbohydrates, which lead to a continuously lowered pH value is the engine for the destruction of plaque homeostasis.

This ecological pressure stimulates the multiplication of germs, some that produce acid and others that tolerate acids, such as streptococcus mutans and lactobacilli. There is also an interaction between streptococcus mutans and the yeast candida albicans, whereby the bacterium changes virulence. The yeast produces signal molecules, which lead the bacteria's genes to produce cell-specific antibiotics. Bacteria can, through yeast, acquire foreign genes.

However, until the end of the twentieth century, the belief in the worm tooth as the cause of the remains of pain in peasant areas of China is managed by many charlatans. Three of these deceptions are reported by Taiwan in 1985, 1987 and 1993 [1-3]. Although in modern times the macroscopic "toothed worm" is ridiculed, bacteria and yeasts are known to look like worms under the microscope.

CONCLUSIONS

Historical study and research in the field of medical disciplines is a difficult practice due to the complexity of the topics and the heterogeneity of the schools and currents of thought that come into play. It is even more difficult to retrace the history of dentistry, a discipline that has acquired its scientific dignity only over the last 100 years and that has been practiced in the past by improvised dentists or little more than amateurs.

Therefore, with this review, we try to understand what the evolution of modern dentistry has been in recent years, in order to guarantee patients the opportunity to make use of reliable and highly professional specialists.

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