



Periodontology – the historical outline from ancient times until the 20th century

Istorijski razvoj parodontologije

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Introduction

The diseases of the periodontium are considered as old as the recorded history of mankind¹⁻³. The historical evaluation of pathology and therapeutics can be traced through the variety of sources: anatomical findings from more or less well-preserved skeletal parts, details observed in mummies, instruments and equipments collected during archaeological investigations and evidence from engravings and various manuscripts². Studies in paleopathology have indicated that a destructive periodontal disease, as evidenced by bone loss, accompanied early human beings in diverse cultures¹⁻⁶. Almost all early historical records that involve dental topics have several chapters dealing with periodontal disease and the need for treatment.

The development of dentistry can be conveniently divided into three periods²: magico-religious medicine (5000–400 BC); empirico-rational medicine (400 BC–1500 AD) and scientific medicine (1500 AD – until today).

Magico-religious medicine

Early civilizations

The three oldest civilizations were the Sumerians, the Babylonians and the Assyrians¹⁻³. In these early societies with strong and pervasive religion, the cure of any disease depended on driving out the demons thought to cause that particular disease. A Sumerian text from 5000 years BC describes that apparently Sumerians were suffering from periodontal disease¹⁻³. They practiced oral hygiene, including gingival massage in combination with various herbal medi-

cations¹⁻³. This finding was further confirmed by decorated gold toothpicks founded in the excavations at the Nigél Temple, Ur in Mesopotamia².

Almost all of our knowledge of Babylonian and Assyrian medicine comes from the clay tablets of the great library of Ashurbanipal (king of Assyria), that includes a number of remedies for periodontal disease, such as “if a man's teeth are loose and itch a mixture of myrrh, asafetida and opopanax, as well as pine-turpentine shall be rubbed on his teeth until blood comes forth and he shall recover”².

Many Egyptian medical papyri (Ebers Papyrus, Kahun Papyrus, Brugsch Papyrus and Hearst Papyrus) preserved in the museums of Europe provide several details about medical herbs and adjuvants, such as milk, honey, mint, salt and beer, on the one hand and on the other magical invocations, amulets and other curative devices as remedies for many diseases, including periodontal disease, such as “one part each of powder of the fruit of palm, green lead and honey to be mixed and the teeth rubbed with it”¹⁻⁶. Radiographs of Egyptian pharaoh mummies confirmed that they suffered from periodontal disease¹⁻⁶. A specimen from Cizeh (2500 BC) shows two molars fastened with heavy gold wire, serving as an evidence that Egyptian practiced splinting of the loose teeth^{1,7,8}.

Hesy-Re (2686–2613 BC) was an Egyptian scribe, who lived in the 3rd Egypt Dynasty under pharaoh Djoser (Figure 1). He is often called the first “dentist” (“the greatest of the teeth”) and this is the earliest identification of a person as a dental practitioner^{1,2}. An inscription on his tomb includes the title “the greatest of those who deal with teeth, and of physicians”. He has also been credited as being the first man to recognize periodontal disease^{1,7,8}.



Fig. 1 – Relief of Hesy-Re⁹

Periodontal disease was also discussed in ancient Indian and Chinese books^{1-3, 6, 10}. An ancient Indian book written by Susruta (6th century BC), entitled *Susruta Samhita*, contains four descriptions of periodontal disease, such as “the gums of the teeth suddenly bleed and become putrefied, black and slimy and emit fetid smell”. It is believed that this is the most probably the first classification of periodontal diseases⁶. A later book, *Charaka Samhita*, discusses proper oral hygiene and toothbrushing: “The stick for brushing the teeth should be either adsringent or pungent or bitter. One of its ends should be chewed in the form of a brush. It should be used twice a day, taking care that the gums will not be injured”^{1, 11}. The oldest Chinese book written by Huang-ti (2500 BC) entitled *Huang-ti Nei Ching* (The Canon of Internal Medicine) describes various conditions affecting oral cavity, including periodontal disease (detailed description of gingival inflammation, periodontal abscess and gingival ulceration). At least seven remedies for periodontal disease are listed in it. He dedicated a significant part of the book to oral hygiene and to date, it is believed that Chinese were among the first people to use the toothbrush and toothpick to clean the teeth^{1-3, 6}.

The early Hebrews also recognized the importance of oral hygiene. Many pathologic conditions of the teeth and their surrounding structures are described in the Talmud (325–407 AD). Jewish medical practices were also with the attitude that a physician did not really cure a disease, but rather prepared the ground for nature, which was the actual healer. As for periodontal disease it was mentioned “...to start in the mouth but end in the gut”³. The Hebrew *materia medica* for periodontal disease was relatively primitive but pepper, salt, ginger and cannel were used to calm dental pain and halitosis^{1, 11}.

The Greeks

The lives of the ancient Greeks were dominated by Gods and they believed that illnesses were divine punishments and that healing was a gift from the Gods. By the 5th century BC there were attempts to explain natural rather than spiritual causes of illness and Greek medical practitioners began to take greater interest in the human body. They were constantly developing in all areas, including trade, sailing, craftsmanship, as well as science and culture. Their medicine developed accordingly, making a unique contribution in the development of modern scientific medicine^{1, 12}.

Hippocrates of Cos (460–377 BC) is considered the father of modern medicine, since he separated Greek medicine from superstitions, magic and religion (Figure 2). According to Hippocrates, health of the body was defined as a balance in between four humours – blood, phlegm, yellow bile and black bile. When these humours are in disproportion, the disease will occur. He wrote *Corpus Hippocraticum* (The Hippocratic Collection) devoting 32 paragraphs to dentition¹¹. In his work he discussed the function and eruption of the teeth and the etiology of periodontal disease. He believed that inflammation of the gums could be caused by accumulations of “pituita” or calculus, with gingival hemorrhage occurring in cases of persistent splenic maladies. One splenic malady was described as: “The belly become swollen, the spleen enlarged and hard, the patient suffer from acute pain. The gums are detached from the teeth and smell bad”^{1, 11}.

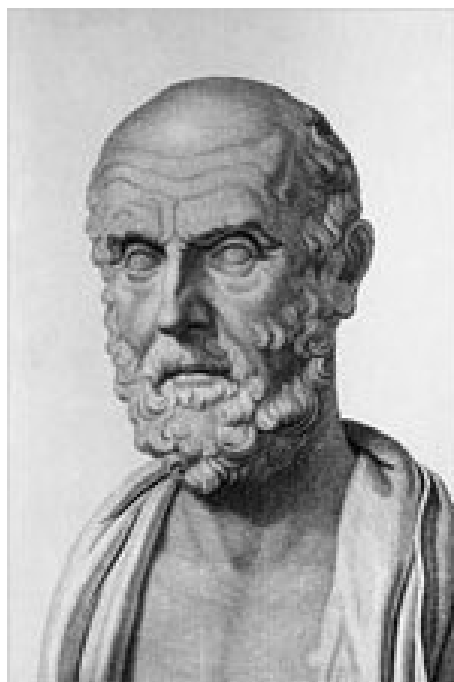


Fig. 2 – Hippocrates of Cos (460–377 BC)¹³

The Romans

Roman empire was one of the largest and most powerful empires in ancient history. Ancient Roman scientists and doctors were under the influence of ancient Greeks, and they continued researching Greek theory of diseases (fo-

ur humors). They were particularly interested in dental prevention (oral hygiene) rather than cure. Therefore, it is not a surprise that the use of the toothbrush is mentioned in many Roman poems¹⁻³.

Aulus Cornelius Celsus (25 BC – 50 AD) wrote *De Medicina*, extensively talking about diseases that affect the soft parts of the mouth and their treatment as: “If the gums separate from the teeth, it is beneficial to chew purslane or pears and apples and keep their juices in the mouth”¹⁻³. His book also contains important information about oral hygiene and stabilization of loose teeth.

Galen of Pergamon (129–200/216 AD) the doctor of the Roman Emperor Marcus Aurelius wrote the first article about dentistry. According to Galen, periodontal disease is caused by “relaxation of the dental nerve due to excessive abundance of humors”¹. Galen greatly influenced European medicine for several centuries.

Empirico-rational medicine

The decline of Roman Empire plunged Europe into the ages of darkness. This was a period of the expansion of Islam in Europe and golden age of Arabic science and medicine. Arabic physicians were mainly influenced by translated ancient Greeks' medical treatises (from Hippocrates and Galen) and the elements from Indian and Hebrew medicine. This period was characterized with the systematic novel approaches and refinements in techniques, mainly in surgical specialties¹⁻³. Empirico-rational medicine was characterized by observation and experimentation rather than influence of magic and religion. It greatly influenced future medieval and renaissance dentistry¹⁻³.

Paul of Aegina/Paulus Aegineta (625–690) wrote *Epi-tomoe medicoe libri septem* (Medical Compendium in Seven Books) where he described that tartar deposits must be removed with either scrapers or a small file and that the teeth should be carefully cleaned after the last meal of the day¹⁴.

Abu al-Qasim, also known as Albucasis (936–1013) was Spanish-Arabian physician. His 30-volume encyclopedia *Kitab al-Tasrif* (The Method of Medicine) is the medical text that contains illustrations of dental instruments with detailed description of its use (Figure 3).

Albucasis had a clear understanding of the major etiologic role of calculus deposits, writing: “sometimes on the surface of the teeth, both inside and outside, as well as under the gums, are deposited rough scales of ugly appearance and black, green or yellowish in color; thus corruption is communicated to the gums and so the teeth are in process of time denuded”. He invented and proposed the use of many elevators and scalers, described the techniques of scaling the teeth and splinting loose teeth with gold wire^{1-3, 15}.

Ibn Sina, also known as Avicenna (980–1037 AD) was possibly the greatest of the Arabic physicians (Figure 4). His 14-volume *Al-Qanoon fi al-Tibb* (The Canon of Medicine) was in continuous use for almost 600 years. Avicenna used an extensive *materia medica* for oral and periodontal diseases. His book discusses bleeding gums, fissures and ulcers of the gums, separation, recession and looseness of gums and epulis^{1, 2}.

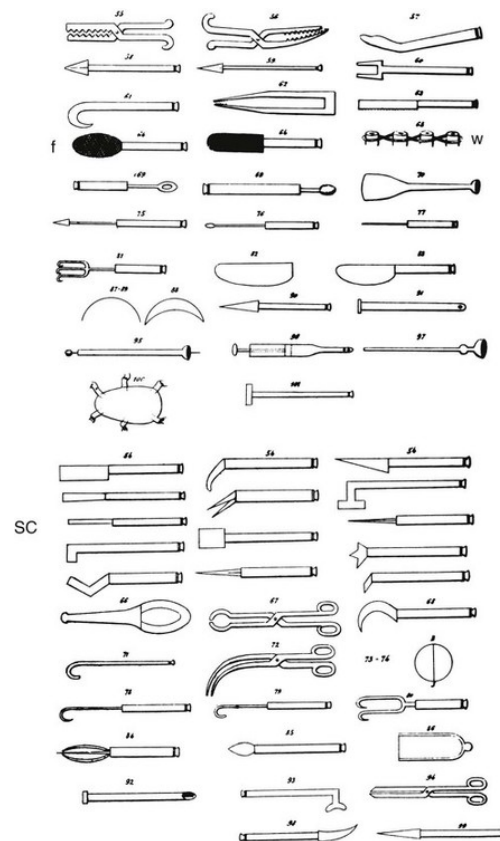


Fig. 3 – Illustration of Albucasis' periodontal instruments¹⁶



Fig. 4 – Avicenna (980–1037 AD)¹⁷.

Guy de Chauliac (1290–1368) was a French physician and surgeon who wrote his celebrated 7-volume book *Chirurgia Magna* (The Great Surgery). He invented the dental pelican (in the 20th century replaced by forceps) and coined the term “dentators”. According to de Chauliac, loose teeth are the result of different causes, such as “humidity which softens the nerve and ligament; dryness and lack of nourishment of the teeth and corrosion of the gums”^{1, 18}.

Serefeddin Sabuncuoglu (1385–1468) was the Turkish surgeon who wrote *Cerrahiyyetu'l-Haniyye* (The Imperial Surgery). In his book he basically expanded Albucasis' works by illustrations of the surgical removal of hypertrophic and swollen gingiva and lingual frenum. He suggested that “...drug treatment should be initiated if there are swollen gums, mobile teeth and pus formation present. If there is no

response, later surgical treatment should be performed with a tube placed on the gums. Gingival tissue cauterization is performed by hot cautery, inserted into the cannula”^{1-3, 19}.

Scientific medicine

Renaissance

The Renaissance was a great period in European history, during which there was an intellectual revival in the ideas of ancient Rome and Greece and artistic development. Regarding dentistry, the focus of treatments shifted from a divinely ordained natural balance towards a more scientific approach. Knowledge advanced through the scientific method, such as conducting experiments, collecting observations and reaching conclusions. Since printing press was invented, medical/dental ideas were printed in books that spread around Europe easily. The roots of scientific medicine were set.

Leonardo da Vinci (1452–1519) was an anatomist and original dissector of the human body. His manuscript presents the earliest accurate drawings of the teeth and associated structures¹.

Paracelsus (1493–1591) developed an interesting and unusual theory of disease: “The Doctrine of Calculus”. Paracelsus recognized the extensive formation of tartar on the teeth and related this to toothache. He considered toothache to be comparable to pain produced by calculus in other organs, such as the kidneys².

Girolamo Cardano (1501–1576) was the Italian physician and the first to differentiate the types of periodontal disease^{1, 14}. In his publication *De Dentibus* (About the Teeth), he mentioned a type of disease that occurred with the advancing age and led to progressive loosening and the loss of teeth, as well as a second very aggressive type that occurred in younger patients. In the 20th century Cardano's classification was rediscovered, modified and became widely accepted²⁰.

Ambroise Paré (1510–1590), French military head surgeon, is known as the “Father of Surgery” (Figure 5).



Fig. 5 – Ambroise Paré (1510–1590)²¹

Paré introduced the lancing of infants' gums using a lancet during teething. This belief and practice persisted until the

end of the 19th century, when lancing was abandoned. He understood the etiologic significance of calculus and used a set of scalers to remove the hard deposits on the teeth. He developed many oral surgical procedures, such as gingivectomy for hyperplastic gingival tissues^{1-3, 22}.

Andreas Vesalius (1513–1564) wrote a book *De Humani Corporis Fabrica/Libri Septum* (Fabric of the Human Body/Seventh Book) about teeth development and anatomy that included many excellent illustrations^{1, 2}.

Bartholomeus Eustachius/Bartolomeo Eustachi (1520–1574) wrote a 30-chapter book *Libellus de Dentibus* (A Little Treatise on the Teeth). This is the first original book about the teeth describing the accurate anatomy of the teeth and the phenomena of the first and second dentition (Figure 6).

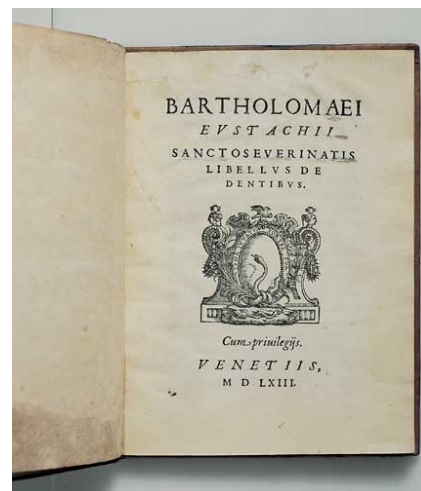


Fig. 6 – *Libellus de Dentibus*, written by Bartholomeus Eustachius²³

It also includes a description of the periodontal tissues, as well as information about the diseases of the mouth, their treatment modalities and the rationale for treatment. Concerning the treatment of periodontitis, Eustachius had very modern ideas and recommended both the scaling of calculus and the curettage of granulation tissue to promote reattachment of the gingival and periodontal tissue^{1, 24}.

The first book focused solely on dental practice and written in common language of German was entitled *Artzney Buchlein* (The Little Medicinal Book for All Kinds of Diseases) or *Zene Artzney* (Medicine of the Teeth). The book contains three chapters devoted to periodontal disease, including a crude concept of systemic and local infective factors associated with its etiology. As treatment remedies, variety of ointments, which are often astringent in nature, are suggested. Further, the binding of loose teeth with silk or gold thread is recommended. Cauterizing the gingiva with a hot iron is mentioned. Up to date, the author of this book remained unknown¹⁻³.

Anton van Leeuwenhoek (1632–1723) of Holland, was a layman, but he had an inquisitive mind and a hobby of grinding lenses that allowed him to develop the microscope (1673). He used it to discover and describe the microorganisms (“animalcules”), cellular structure, blood cells, sperm, and various other microscopic structures, including the tubular structure of dentin. Using material from his own mouth,

Leeuwenhoek first described oral bacterial flora, and his drawings offered a reasonably good presentation of oral spirochetes and bacilli. He even performed antiplaque experiments involving the use of strong vinegar in his own mouth and in vitro on bacteria in a dish^{1-3,25}.

The 18th century

Modern dental profession essentially developed in the 18th century Europe, particularly in England and France. During 18th century the treatises were published, scientific lectures were given, the first surgeons were trained specifically in dentistry, nonsense remedies were rejected and many inventions were patented.

Pierre Fauchard (1678–1761), French surgeon became known as the “Father of modern dentistry” (Figure 7). Fauchard truly metamorphosed the primitive “practice” of dentistry at the time into a new vocation now fully deserving of the term “profession”¹. His book, *Le Chirurgien Dentiste* (The Surgeon Dentist) covered all aspects of dental practice, including restorative dentistry, prosthodontics, oral surgery, periodontic and orthodontics²⁶. Fauchard described in details periodontal instruments he invented (“donkey snout”, “parrot’s beak”, “three-faced burin”, “convex-bladed knife” and “Z-shaped hook”). Further, Fauchard described the scaling technique using instruments he invented, in order to „detach hard matter or tartar from the teeth“ and many remedies to „strengthen the gums“. He also suggested immobilization of the loose teeth by golden wire^{1,26}. Even though there is nothing very original in his work regarding periodontal disease, he did have a great merit of presenting certain therapy (scaling and immobilization) and preventive (personal hygiene) concept in authoritative way. Fauchard’s book transformed dental practice, inspired and educated the succeeding generation of dentists¹. The famous are his words: “Should enlightenment grow in the practice of dentistry, we might attain to progress and engender new ideas...”

John Hunter (1728–1793), British surgeon who wrote an excellent treatise on dentistry entitled *The Natural History*

of the Human Teeth and Practical Treatise on the Diseases of the Teeth. In his books he offered remarkably clear illustrations of the anatomy of the teeth and their supporting structures, and he described the features of periodontal diseases. In collaboration with the London-based dentist James Spence, he began to theorise about the possibility of tooth transplantation from one person to another^{1-3,28}.

Thomas Berdmore (1740–1785) was known as “Dentist to His Majesty”. In his book *Treatise in the Disorders and Deformities of the Teet and Gums* he devoted several chapters (mainly Chapter 7) to periodontal problems¹⁻³.

The 19th century

The 19th century is described as a time of advanced science and education. By 1800 there were still relatively few dentists practicing the profession. By the middle of the 19th century the number of practicing dentists had increased markedly, although there was no legal or professional control to prevent malpractice and incompetence. Pressure for reform of the profession increased.

Leonard Koecker (1785–1850) was a Baltimore dentist. In a *Principles of Dental Surgery* he mentioned the careful removal of tartar and the need for oral hygiene by the patient, recommending that it should be performed in the morning and after every meal with the use of an astringent powder and a toothbrush, with care taken to place “the bristles ... into the spaces of the teeth”. Koecker was an early advocate of the “odontogenic focal infection” theory, and he recommended the extraction of all severely involved teeth and roots, including all unopposed molars, to prevent systemic infections¹⁻³.

Levi Spear Parmly (1790–1859) was a New Orleans, Louisiana, dentist who is considered the father of oral hygiene and the inventor of dental floss.

John M. Riggs (1811–1885) was the leading authority on periodontal disease and at the time, periodontitis was known as “Riggs’ disease” (Figure 8). Riggs seems to have been the first individual to limit his practice to periodontics



Fig. 7 – Portrait of Pierre Fauchard (1678–1761)²⁷



Fig. 8 – John M. Riggs (1811–1885)²⁹

and therefore can be considered the first specialist in this field. Riggs' publications contain a strong proponent of the so-called conservative approach to periodontal therapy. He developed the concept of oral prophylaxis and prevention, advocated for the cleanliness of the mouth and opposed surgery, which at the time consisted of gingival resection. Riggs designed a series of six hand instruments, that were not sophisticated and suitable for fine scaling²⁹. In 1867 at the meeting of the Connecticut Valley Dental Association, Riggs gave a presentation that was considered fundamental for teaching participants about his periodontal knowledge of his patients. He was followed by L. Taylor, D. D. Smith, R. B. Adair and W. J. Younger¹⁻³.

William J. Younger (1838–1920) formulated the possibility of “dento-gingival reattachment” succeeding the postoperative formation of granulation tissue¹. He designed the scaling instruments which have been the basis for modern instruments used until today¹⁻³.

Adolf Witzel (1847–1906) was considered first to identify periodontal bacteria, but the first oral microbiologist was Willoughby D. Miller (1853–1907), “Father of dental prevention”, who described the features of periodontal disease and their contribution in the disease development in his classic *The Microorganisms of the Human Mouth*. He believed that periodontal disease was not caused by one, but many bacterial species present normally in oral cavity (“non-specific plaque hypothesis”). Miller did not recognize, nor distinguish oral plaque^{2,3}.

Leon J. Williams (1852–1932) first described dental plaque as “gelatinous accumulation of the bacteria adherent to the enamel surface”^{1,2}.

J. H. Vinsent (1862–1950) described the spirillum and fusiform bacilli associated with what later became Vinsent's agina¹⁻³.

Moritz Karolyi (1865–1945) published an original idea attributing a possible role of dental occlusion in the aetiopathogenesis of periodontal diseases².

Edward Kells demonstrated the use of Röntgen x-rays in dentistry in 1896 (the first dental x-ray). This invention, as well as the discovery of anaesthetic dramatically changed the history of dentistry. Horace Wells (1815–1848) used nitrous oxide anaesthesia in 1844, while William Green Morton (1819–1868) used ether in 1846. In 1905 Alfred Einhorn introduced novocaine and adrenalin combination for local anaesthesia, what quickly became a golden standard in local anaesthesia.

Conclusion

What we know today as periodontology bears little or no resemblance to that which was practiced in the early centuries of humanity. Therefore, historical data of previous practices are of tremendous importance for understanding the development of periodontology from ancient to modern times. Developments of previous practices made modern periodontology completely different and far more successful than it was before.

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