



History of dentistry – from Ancient to Modern Era

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Abstract

The art of treating diseases concerning to the teeth and jaws has been a long and rich history and the progress of dentistry into an advanced science is truly remarkable one. This article scratches the surface of how dentistry evolved. Skeletal fossil records have revealed that dentistry is one of the oldest professions, dating back to 7000 B.C. The first known recorded description related to dentistry occurs in Sumerian text 5000 B.C. In the present article an attempt has been made to document the journey of this multifaceted profession from Hesy- Re, Huang Ti, Hippocrates-II, Aristotle, Mayans, Ibn Sina (Avicenna), Guy de Chauliac, Buchlein, Jacques Guillemeau, Fauchard, John Baker, Duchateau, Horace wells, Willim Thomas Green Morton, Charles Edmund Kells, Harris, R.Ahmad and others who have contributed in dentistry. Twelve dental specialties recognized by the National Commission on Recognition of Dental Specialties and Certifying Boards have been enlisted. The aim of this paper is to pay regards to our predecessors who laid the foundations upon which modern dentistry has been built.

Keywords: Dental History, Ancient Era, Medieval Era, Modern Era

INTRODUCTION

Present-day dentistry is gifted with the high-tech knowledge and advanced skill for diagnosis and treatment of problems related to teeth, gum and mouth. This gift has been given by the countless lives that came before us and worked hard with passion to advance this craft to an independent field of study and profession through innovation, education, organization, regulation and discussion. In order to see the future of where dentistry is going, It is belied that one must take time to learn about the past.^[1] Machiavelli^[2] in his book The Prince, wrote that “Whoever wishes to foresee the future must consult the past.....” Dentistry is one of the oldest medical professions and its history is vast and complex which can be divided and studied into following eras.

- Ancient Era (Before 5th. Century)
- The Medieval Era (5th. Century to 17th. Century)
- The Early Modern Era (18th. Century & 19th. Century)
- Modern Era (20th. Century to Present)

Ancient Era

Evidence of dental treatment efforts was found as far as back 7000 BCE (Before Current Era). This claim is based on skeletal fossil obtained from Mehr garh Pakistan (Figure-1a^[3]). The study showed that teeth were drilled with flint tools to remove decay.^[3] The first known recorded description related to dentistry occur in Sumerian (Iraq) text 5000 BCE which describes tooth worm as the cause of dental decay.^[4] (Figure-1b^[4]). It was widely accepted for quite a long time. It was proved false in 1700s. In fact, tooth worms don't exist at all.

The first known dental filling was made from beeswax, the evidence of these dates back to 4500BCE from a site located in Slovenia. Human mandible from Slovenia whose left canine crown bears the traces of a filling with beeswax.^[5]

Hesy-Re, an ancient Egyptian high official during 2600 BCE, was the first documented physician in the world. In addition to being the royal physician, he used to cater to the dental healthcare needs of the workers in the Egyptian pyramids. He drilled holes into the teeth of his patients to drain the infection using a bow drill (Figure-1c,d^[1]). He was called as “Toothier,” the treater of teeth. This mark the separation of dentistry from medicine as a surgical based practice. His most notable title was "Great one of the dentists", which makes him the earliest named dentist.^[1]



Figure-1: a-Fossil from Neolithic Mehrgarh^[3];
b- Tooth worm^[4]; c- A bow drill^[1]; d- How a bow drill was used^[1]; e- Gems decorated teeth⁹.

Huang Ti, the first Chinese to study oral disease, during 2698 BCE, developed the methods of diagnosis and divided oral diseases into three categories: *chong ya* or dental decay, *fong ya* or inflammatory conditions, and *ya kan* or diseases of soft tissue. He is believed to have introduced the toothpick and used wires to stabilize tooth. Some of the treatment that the ancient Chinese used for dental ailment included crushed garlic pills, other herbs, animal bones and excreta and they also developed acupuncture as a form of therapy.^[6]

In ancient India, the practice of dentistry can be traced back to Mahabharata, when in the battle field of Kurukshetra to test the “Dhanveerta” of dying Karan, Lord Krishna asked for gold in donation. Karan proved his worth by donating his gold filled tooth. This part of epic indicates the existence of dentistry even around 400 BCE, wherein defective teeth were restored with gold.^[7]

In the ancient Greece, Hippocrates-II, father of medicine (460-370 BCE) and Aristotle (384- 322 BCE) wrote about treating decaying teeth. Aristotle in his book “Comparative Anatomy” contributed towards medical field, including his study of teeth. He had advanced understanding of dental diseases, correctly attributed dental caries to sweet foods. This was an important step in developing prevention.^[8]

The Mayans (Ancient Mexian, before 5th.century) practiced a form of modern dentistry and were very advanced for their time. These ancient dentists filled cavities, cleaned tartar with copper instruments and removed teeth. The Mayans used precious stones and gems to decorate teeth (Figure-1e^[9]), which reflect how high a value was placed on oral health.^[9]

The Medieval Era

During the middle Ages, in Roman Civilization, dentistry was an amalgam of science, dogma, Superstition and sorcery. However, this was not the case in all areas of the world. In this era scientific medicine and dentistry were carried forward by Arabic Society. In this Islamic golden age of science Ibn Sina (Avicenna) who was called Prince of

Physicians wrote Canon Medicine in five volumes which was the medical thinking for centuries. Ibn Sina specialized many chapters in his book talking about the art of dentistry. His contribution in restorative dentistry is of historical importance. He filled carious teeth with camphor, pepper, yellow sulfur etc to fight pain.^[10]



Figure-2: a & c- Barber surgeon^[1]; b- instruments^[1]; d- dental pelican^[1].

In the ancient time and during middle ages, while there were specialized groups of people who conducted dental procedures, dentistry itself was not a profession. The most dental procedures were performed by barbers and blacksmiths, known as “Barber Surgeon”(Figure-2a&c^[1]). They had sharp metal tools necessary to do the job (Figure-2b^[1]). Barbers were mainly limited in performing extraction to alleviate pain and clear up tooth infections, but their skills and training improved over times. Guy de Chauliac (1300-1368) was the most famous surgeon of the fourteenth century. He invented the dental pelican (Figure-2d^[1]), an instrument used to perform extractions that was the predecessor to modern forceps.^[1]

Many medical texts were produced during this period which included sections on dentistry. The first book specifically devoted to dentistry entitled Artzney Buchlein (The Little Medicinal Book of All kind of Diseases and Infirmities of the Teeth”) was written in German with some segments in Latin. It contains 13 chapters written by different authors and originally published in 1530. It was a popular book and had seen 13 editions.^[11]

Replacement of naturally lost or extracted teeth by artificial ones was attempted even in antiquity. The earliest fixed denture was found in grave at Sidon (Lebanon) during 2000 BCE. The four substitute teeth were stung together and fitted to the adjacent teeth with gold wire. Ox teeth, hippopotamus or walrus ivory, artificial teeth made of bone was used. Jacques Guillemeau (1550-1613) of France first used inorganic materials for making artificial teeth.^[12]

The Early Modern Era

The eighteenth century saw dentistry advance from superstition and barber surgeon to specialist who studied dentistry as a science. During this century France emerged as a leader in dental field. The founder of modern dentistry was Frenchman Pierre Fauchard (1676- 1761). He published a book entitled “*Le chirurgien dentist*” (“*The Surgeon Dentist- a Treatise on Teeth*”) in 1728 (Figure-3^[13]). This was the first complete scientific description of dentistry. He discussed tooth decay, its causes and prevention and rejected the tooth worm theory. He identified that acids from sugar led to tooth decay and believed that caries were the result of a humoral imbalance.

Fauchard investigated oral pathology in great deal. He emphasized how necessary it is to retain the primary teeth until it is time for them to shed. He was first to write about nerves in teeth. Fauchard also dealt with transplantation of teeth from one individual to another. He gave a comprehensive system for caring and treating teeth. Fauchard first introduced the idea of dental fillings and the use of dental prosthesis. Therefore, for his tremendous contribution in the field of dentistry Pierre Fauchard is credited as the Father of Modern Dentistry.^[13]



Fig-3: Pierre Fauchard, Father of Modern Dentistry^[13].

Fauchard's philosophy was that dental knowledge should evolve through education, organisation, research and literature. He inspired many others to publish their knowledge and experience and as a result many books by other qualified surgeon dentists followed. This advanced dentistry greatly and set the framework for growth of profession. With an explosion of literature and innovations, dentistry continued to grow in Europe.

In 1760 John Baker immigrated to America from England. He was the first medically trained dentist to set up shop in America. The first American president Washington's denture was constructed by John Baker. Washington was afflicted with dental problems from an early age, and was constantly requiring the services of dentists such as John Baker throughout his life.

John Baker taught his techniques for fabricating and installing artificial teeth to a young Paul Revere. It is believed that Paul Revere became the first person to practice dental forensics when he identified a man by his teeth. The man was Maj.Gen. Joseph Warren, who had been killed in June of 1775 in the Battle of Bunker Hill. He had been buried in a mass grave by the British. As Revere had made a silver bridge for him, he was able to identify Warren's body.^[14]

In 1774, Alexis Duchateau made the first porcelain dentures. In 1746, Claude Mouton described a gold crown and post to be retained in the root canal. He also recommended white enameling for gold crowns for a more esthetic appearance. In 1789, Frenchman Nicolas Dubois de Chemant received the first patent for porcelain teeth.^[15]

The first dental chair was invented in 1790 by an American dentist named Dr. Josiah Flagg. He modified a Windsor writing chair for use in his practice. This was a plain wooden chair with a cushioned headrest and a tray for equipment^[1].

By the first quarter of 19th Century, the USA had become the leading centre in the world for dental development. A young immigrant from England, Richard Cortland Skinner published a book "A treatise on human teeth" in 1801. It is a sixteen page pamphlet which concisely explained the structure, and cause of teeth decay; and also included the most beneficial and effectual method of treating all disorders incidental to the teeth and gums; with directions for their judicious extraction, and proper mode of preservation. Moreover, it was an important contribution as well as the first literature on dentistry published in United State.^[16] The first reclining dental chair was invented in 1832 by Dentist James Smell of London.

During 1839-1841 four major events helped to establish dentistry as a true profession. In 1839 the first dental journal, the *American Journal of Dental Sciences*, was launched. In 1840, the first dental college (Baltimore College of Dental Surgery) was established in USA by two American dentists Horace Henry Hayden & Chapin Aaron Harris for the Doctor of Dental Surgery (D.D.S.) degree. This institution is now known as The University of Maryland School of Dentistry. In the same year the first national society of dentists, the American Society of Dental Surgeons, was founded in New York City. The first dental practice act in 1841, was enacted in the Alabama state of USA. It was made compulsory to obtain license for practicing dentistry. However, the act was never enforced.^[1]

Another interesting development in dentistry was the introduction of anesthesia. One of the earliest graduates (DDS) from Baltimore College of Dental Surgery, a young American dentist, Horace Wells discovered the anesthetic properties of Nitrous Oxide (N₂O- known as laughing gas or happy gas due to its intoxicating effects when inhaled) in 1844. He started using Nitrous oxide while performing tooth extraction. Unfortunately, his early demonstrations were unsuccessful. Willim Thomas Green Morton, an associate of Wells, used ether to produce anesthesia during tooth extraction in 1846. His demonstrations were successful and widely publicized. The two men would clash over who really

introduced anesthesia to the medical world, but both are considered innovators in their own right.^[1] Today, of course, ether is no longer used for anesthesia, as better methods have been developed to make sure pain less surgery.

In 1859 a dental convention was held where 26 dentists met in Niagara Falls, New York and formed the American Dental Association (ADA). Now this ADA has more than 1.61 lakh members and its building is in Chicago. The entire dental practice was revolutionized when James B. Morrison devised a pedal power burr drill in 1871. The first electric drill was patented in 1875 by American dentist George F. Green. In 1877 Basil Manly Wilkerson designed first dental chair of hydraulic nature, which improved working conditions for dentists.^[17] In 1896, Greene Vardiman Black, published a book entitled “Manual of Operative Dentistry” and included enormous new knowledge which is accepted even today. He performed enormous work on amalgam alloy, cavity standardization and preparation design and is known as father of operative dentistry. He deemed a day when dentistry will be practiced for prevention rather than restoration.^[17]

Another amazing technological innovation was the discovery of the X-ray by Wilhelm Roentgen and development of radiography in 1895. In 1896, American dentist Charles Edmund Kells, introduced X-ray technology to visualize the roots of the teeth in his practice. It has ushered in an area of accurate diagnosis.^[18]

Modern Era

The 20th.Century saw many significant advances that gave great impetus to the evolution of dentistry. In the early 20th. Century, radiography quickly became a staple of most dental office and an indispensable aid to detection, diagnosis and treatment.^[19] In 1903, Dr. Charles Land of Canada introduced the ceramic dental crown. In 1905, German chemist Alfred Eichorn synthesized “Procain” (Commercial name- “Novocain”). This is still used in dental procedures to numb the area around a tooth.^[20] A major breakthrough came toward the end of World War I in 1917, when Harvey S Cook introduced the cartridge system. He conceived the idea of putting anesthesia solution in cartridge. From this observation came the development of syringe system.

In 1907, Dr. Frederick S Mc Kay, while examining the teeth of his patients in Colorado Springs, USA, found mottled brown stain on the teeth of his patients. He discovered that high levels of fluoride in water supply were creating this brown staining. He also observed that these teeth were uniquely caries-free^[21]. His discovery of fluoride in drinking water prevents caries became a weapon to fight against cavities and brought dentistry into the forefront of public health. Further research into the relationship between caries and fluoride was conducted by H. Trendly Dean in 1930's. He discovered that safe level of fluoride in drinking water is 1ppm (part per million). This amount of fluoride in water do not cause fluorosis, rather it is actually beneficial to teeth.

The first dental college in India, “The Calcutta Dental College” was established in 1920 by a dentist Dr. Rafiuddin Ahmad, DDS (USA) financed by the New York Soda Fountain in Calcutta. The College was started with one year diploma course – LDS (Licentiate in Dental Surgery) and was affiliated with the State Medical Facility in 1936. It was recognized by the University of Calcutta in 1949. In the same year, Dr. R, Ahmad donated his college to the West Bengal Government and named it “Calcutta Dental College & Hospital” Dr. R. Ahmad was its Principal from 1920 to1950. In 1951, Calcutta Dental College was renamed as Dr. R. Ahmad Dental College, Calcutta, which is now affiliated to the West Bengal University of Health Sciences. In 1925, he started publishing “The Indian Dental Journal”. It is now published annually by Society of Medical, Dental and Public Health (SMDPH). Indian Dental Association (IDA) was also established by Dr. R. Ahmad in 1946. In 2016, IDA declared his birth anniversary 24th.December as a National Dentist Day. The Government of India awarded him the Padma Bhushan in 1964.

Another important step in the advancement of the dental profession was the introduction of specialization within the field. Various specialties and its establishment date and father of branch have been listed in table-1.

Table-1: Various specialties of Dentistry^[22]

Serial No.	Specialty	Father of the branch	Year of Establishment/ Recognition as specialty by ADA	Recognition by NCRDSCB
1	Orthodontics and Dentofacial Orthopedics:	Edward H Angles (1855-1930) is the father of orthodontics as he founded first postgraduate school for dentistry for treatment of irregularities of teeth and jaws in 1900.	1900/1950	May 2018
2	Oral and Maxillofacial Surgery:	James Edmund Garretson (1825-1895) the father of oral surgery because he named the specialty by writing a book entitled “Diseases and Surgery of Mouth, jaws and Associated parts” in 1869.	1918/1947	May 2018
3	Periodontics:	John M. Riggs (1811-1885) is the first specialist in this	1919/1947	May 2018

		field. Periodontal disease went by a variety of names in the 1800s, including “destructive gum disease” and “Riggs’ disease.”		
4	Dental Public Health/ Public Health Dentistry, PHD	John Gennings Curtis Adams(1839-1922) of Canada is known as father of Dental Public Health. In 1872 he opined that dental related diseases are largely preventable	1937/1951	May 2018
5	Pediatric Dentistry/: Pedodontics (Paediatric & Preventive Dentistry)	Robert Bunon (1702-1748) is considered as father of Pediatric dentistry as he published an essay on the teeth disease and discussed dental problem in children for the first time in 1743.	1940/1948	May 2018)
6	Oral and Maxillofacial Pathology:/ Oral Pathology & Microbiology	Robert Gorlin (1923-2003) of Columbia University, USA, is known as father of oral pathology as in 1940s, he conceived the idea to create the specialty of oral pathology and due to his contributions in identifying more than 100 Syndromes of the Head and Neck. Dr. Gorlin elucidated the genetics of cancer at the age of 80.	1946/ 1950	May 2018
7	Prosthodontics	Father of dentistry, Pierre Fauchard(1679-1761), a French surgeon, is regarded as pioneer worker of Prosthodontics as he during the late 17th and early 18th century discovered many methods to replace lost teeth using substitutes made from carved blocks of ivory or bone.	1948/ 1948	May 2018
8	Oral Medicine/ Oral Medicine & Radiology ,	Lester William Burket (1907-1991) is known as father of oral medicine as he was one of the first educators to promote the concept of integration of medicine into dental education and clinical practice.	-/1945	2020
9	Oral and Maxillofacial Radiology:	Charles Edmund Kells Jr.(1856–1928) an American dentist who used X-ray in dentistry is described as "the father of dental radiography".	-/1999	May 2018
10	Endodontics:/ Conservative Dentistry and Endodontics	Dr. Louis I. Grossman (1901-1988) is described as father of modern Endodontics dentistry. He wrote two book entitled “Root Canal Therapy” and “Endodontic Practice” in 1940 which have served as a foundation text on the art and science of Endodontics.	1940/1967	April 2021
11	Dental Anesthesiology	Horace Wells (1844) and Willim Thomas Green Morton (1846) who discovered the anesthetic properties of Nitrous Oxide (N ₂ O) and ether (C ₄ H ₁₀ O) respectively are known as father of dental anesthesiologists.	1953/-	March 2019
12	Orofacial Pain	Yet to decide.	--	September 2020

ADA^a- American Dental Association.

NCRDSCB^b- The National Commission on Recognition of Dental Specialties and Certifying Boards .

CONCLUSIONS

Modern dentists are gifted with the advanced skill and high-tech knowledge for diagnosis and treatment of diseases related to mouth, gum and teeth. This gift has been given by the innumerable persons that came prior to us and worked vigorously with passion to advance this craft to an independent field of study and profession through education, innovation, discussion, organization and regulation. In order to perceive the prospect of dentistry, one must take time to learn about the past.

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Conflict of Interest

None

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