

Research paper on the evolutions of technology in the dental dental hygiene profe...

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Historical Background

As far back as 5000 BC, Sumerians believed that tooth worms were the cause of the tooth decay. Next a 2600 BC Egypt scribe, called Hesy-Re, is considered to be the first dentist. The inscription on his tomb says, “ The greatest of those who deal with teeth, and of physicians.” Texts of the same region from 1700 - 1550 BC, the Ebers Papyrus, talk about diseases of teeth and various remedies. Next, from 500 – 300 BC, Hippocrates and Aristotle talk about “ eruption pattern of teeth, treating decayed teeth and gum diseases, extracting teeth with forceps, and using wires to stabilize loose teeth and fractured jaws.” Further, in 100 BC, Celsus a Roman medical writer wrote extensively about oral hygiene, stabilization of loose teeth, and treatment of various conditions. And in 166 – 201 AD, the Etruscans practiced gold crown and fixed bridge prosthetics.

This work in ancient times was carried forward in the middle ages. From 500 – 1000 AD, dentistry was practiced by monks, who were the most educated people during that time. Around the same time, in China, there is mention of the use of silver paste type of amalgam. After Papal edict forbade monks from any kind bloodletting: the barbers visiting the monasteries assumed these roles. Later in 1210, a Guild of Barbers was established in France. The more accomplished among them assumed the role of a surgeon, and the rest that of hygienists and dentists. This didn't last long as around 1400 AD, a royal decree in France prohibited barbers from performing surgeries. Next, by 1530 AD, the Little Medicinal Book for All Kinds of Diseases and Infirmities of the Teeth, the first book dedicated entirely to Dentistry, was published in Germany. Similar work was done later on in 1575 by Ambrose Pare, known as

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the Father of Surgery.

Against this background of historical work, the profession finally took shape in the 18th century. In 1723, Pierre Fauchard, a French Surgeon, published *The Surgeon Dentist, A Treatise on Teeth*. He has been credited with being the Father of Modern Dentistry. Next, in 1746, Claude Mouton described gold post and core to be used in root canal. Around the same time, in the year 1760, John Baker was the first medically trained dentist to work in America. In 1789, Frenchman Dubois de Chemant received the first patent for porcelain teeth. And a year later, John Greenwood manufactures the first known food engine. In the same year, Josiah Flagg constructs for the same time chair for dental patients.

Inventions in Dentistry, which started as a trickle in the 18th century became a wave in the 19th century. In the year 1801 AD, Richard C. Skinner wrote *Treatise on the Human Teeth*, which was the first book on dentistry in America. Next in 1825, Samuel Stockton begins the first commercial manufacture of porcelain teeth. He launched the company by the name of S. S. White Dental Manufacturing Company. Later in 1832, James Snell invented the first reclining dental chair. In the year 1833 – 1850, introduced amalgam filling in the U. S. by the name of Royal Mineral Succedaneum. Around the same time in 1839, the *American Journal of Dental Sciences* became the first dental journal to begin publication. In the same year, Charles Goodyear invented the vulcanization process for hardening of rubber. The resulting Vulcanite became a useful impression material. Later in 1840, Horace Hayden and Chapin Harries founded the first dental school. Thus the Baltimore College of Dental Surgery became the first to establish the Doctor

of Dental Surgery (DDS) degree. In the same year, the American Society of Dental Surgeon became the first dental organization. Next year, the state of Alabama enacted the first dental practice act, thereby regulating the profession in the U. S.

Further, in the year 1846, William Morton for the first time successfully demonstrated the use of ether anesthesia for dental surgery. In the year 1855, Robert Arthur devised the cohesive gold foil method for inlay. And in the year 1859, American Dental Association was formed in Niagara Falls, New York. In the year 1864, Sanford C. Beanum developed the rubber dam. Later in the year 1871, James B. Morrison patented the first commercially manufactured foot-treadle dental engine. In the same year, George F. Green got the patent for the first electric dental engine, a self-contained motor and handpiece. Later in 1877, the Wilkerson chair, the first pump-type hydraulic dental chair in introduced. In the year 1880, with the introduction of collapsible metal tube, began the era of mass-produced toothpaste. Later in the year 1887, the Stowe & Eddy Dental Laboratory opened as the first successful industrial-type laboratory. In the year 1896, C. Edmond Kells became the first to take dental X-ray in the U. S. In 1899, Edward Hartley Angle classified various forms of malocclusion.

Evolution of Modern Dentistry

Based on the foundation of basic research in dentistry in the 19th century, the researcher of 20th century took to the use of technology in a big way. In 1903, Charles Land created the porcelain jacket crown. Two years later, Alfred Einhorn, a German scientist formulated the local anaesthetic procaine,

and in 1907, William Taggart invented the “lost wax” casting machine. Later in 1930 – 43, Fredrick S. McKay convinced that the brown stains were related to the water supply. And in 1938, nylon toothbrush first appeared in the market. A year earlier, Alvin Strock was the first one to insert the Vitallium dental screw implant. In 1950, the first fluoride toothpaste was marketed. A year earlier, Oskar Hagger, a Swiss chemist, developed the first system to bond acrylic to dentin. In 1955, Michael Buonocore first described the acid etch technique, and two years later John Borden developed high-speed contra-angled air-driven handpiece. A fully reclining dental chair was introduced in 1958. More significantly, in 1960s Laser were developed for soft tissue work, especially for use in periodontal diseases. Same year the first commercial electric toothbrush was introduced. Two years later, in 1962, Rafael Brown developed Bis-GMA, which became part of composite restorative materials. It was much later in 1980s that Per-Ingvar Branemark described the techniques of osteointegration of dental implants. And much later in 1997, FDA approved the use of erbium YAG Laser for use on dentin to treat tooth decay.

Over the past two to three decades, the scientific methods and inquiry has had a profound impact on the dental professional. This phase has been called the renaissance in terms of the “depth, breadth, and the rate of scientific discovery.” Taking up the examples from epidemiology first, we learned about fluorosis, and the benefits of water fluoridation and topical application of fluoride. We also learnt “about infection control, dental sealants, xylitol, toothbrush designs, and an array of dentifrices, mouthwashes, and dental flosses.” Next we learned about the chronic and

destructive connective tissues disorders, such as periodontal diseases

Elaborating on individuals and their advancements, Herbert Cooper created the first craniofacial team in 1939. Such teams have now simulated a team approach commonly found in cardiology, oncology, and orthopedics.

Talking in general terms, digital x-rays have revolutionized performance and safety. And with digital x-ray, images can be viewed instantly. With the enhancement option, image can be adjusted thereby avoiding retakes.

Further, with the development of Cone Beam Computed Tomography (CBCT) has allowed the possibility of three-dimensional computer image of the jaw bones and teeth. It is helpful in determining jaw bone height, width and density, position of nerves and other structures like sinuses.

Advancements in Restorative Dentistry

CAD/CAM which is Computer Assisted Design/Computer Assisted

Manufacture is a technology actively being used in dentistry, allows for design and fabrication of dental restorations that give life like look and feel. To be specific, this can be used for dental bridges, porcelain veneers, inlays/onlays, and crowns.

Further, the major advantages of laser in dentistry is that it makes available a much less invasive alternative to many common procedures. The light emitted makes possible reduced and almost painless healing. This is particularly useful in the “ treatment of benign tumors, cold sores, crown lengthening, decay removal, gummy smile changes, dental fillings, tongue tie and speech impediment improvements, nerve regeneration for damaged nerves and blood vessels and scars, certain conditions related to sleep

apnea, TMJ and tooth sensitivity”.

Also, Oral Sedation Dentistry is actively being promoted because of its safety and effectiveness. As compared to traditional methods, it does not require needles and patients are conscious and respond to the dentist. And it is particularly helpful for anxious patients.

Dental implants can be considered the leading technological advancement in the field of dentistry. So it is the best possible option to provide fit and function closest to the natural teeth. The implants osteointegrate with the jaw bones, and there are very few contraindications for this procedure.

Air-abrasion drill is a next technological improvement over the traditional dental drill. It allows for accurate removal of carious dental teeth without needing a local anaesthetic. It uses a blast of pellets of air and aluminum oxide to treat conditions like cavity.

CT Scans are especially useful for dentists doing advanced procedures like implants, this technology allows them to view and work more effectively on the operative field, and produce better results. This allows the dentist doing precise implant work accurate imaging about placement the restorative device. Dental X-rays, Asides for reducing exposure of radiation, it allows for images to be displayed on the computer screen and stored in digital format. Similarly, it is a very versatile piece of equipment, which can be used for patient education; acceptance by the patient; and improved doctor-patient communication. It also allows for storage of images in digital format for future reference.

Further, NTI-tss devices are primarily for patients who are suffering from TMD and migraine headaches. These devices eliminate the need for invasive

surgery and can help in conditions such as Temporomandibular Joint (TMJ) discomforts. Also, composite resins are employed as a restorative material of choice, and also for bonding and as a veneer. As compared to the older techniques, such as gold and amalgam, they better replicate the tooth colour and function. Also, they are easier to apply, and more durable than earlier versions. Further, digital photography is used to help the dentist adapt a photo to get an idea about how it will look after a clinical procedure like “smile makeover or full mouth reconstruction”. This allows the patients to work with their dentist to explain how they want to look and explain their expectations.

Advancements in Orthodontics

The surgical grade titanium screws or Orthodontic mini screws, which have been used in Oral Surgery for a while, have found use as temporary anchorage devices. They are finding use in Orthodontic treatment, as well. This has enabled the dentist to overcome any unwanted movement of the anchor teeth.

Among other new exciting innovations is this unique method of indirect bonding combined with the use of custom-designed brackets and wires. This Insignia software converts a typical set of impressions into a precision 3-D virtual model of the patient’s teeth. The Orthodontist can thus make modifications on this virtual model to analyze the final outcomes.

Another technological innovation is passive self-ligating braces. Unlike the traditional system, they use a slide mechanism. This approach not only reduces friction, but also provides more effective forces. Similarly, the clear

brackets have helped reduce metal bulk in braces and are esthetically more acceptable.

Advancements in Prosthodontics

Among the most noticeable advancements in Prosthodontics is the intra-oral digital impression-taking scanner. Their attractiveness is primarily due to their ease-of-use, non-invasiveness and recent affordability. The new generation ones allow the dentist to make an impression without the use of powder or paste. This makes the whole process easier. Once the digital impression is made, it allows for modification of the image before it is sent to lab for processing. They are getting popular because of affordability and practicality.

Advancement in Periodontology

With the availability of the “ free-running pulsed Nd: YAG laser”, designed specifically for the treatment of periodontal pockets, the every challenging goal of “ regeneration of cementum, periodontal ligament, and supporting bone has now become a reality.

Techniques have also evolved that potentially can deliver more predictable outcomes by focusing on both on the effects and the causes of periodontal diseases. Therefore, these can result in greater longevity and better maintenance of oral hygiene. This in turn can result in better clinical outcomes and patient compliance.

History of Dental Hygiene

It was in 1913 that Dr. Fones established the first school dedicated to dental hygiene. The first class to graduate was in 1914. It only in 1917, that Irene Newman became the first woman to be licensed in field of dental hygiene. It only by 1920 that six of American states had licensed dental hygienist. The American Dental Hygiene Association made a modest beginning in 1923 with just 46 members. By 1944, the average salary of a dental hygienist was \$20 - \$25 per week. It was only after 1945 that the Forsyth School of Dental Hygiene in Boston was started. And Grand Rapids, MI was the first city to implement community water fluoridation. In 1955, Proctor & Gamble were first in adding fluoride in their Crest toothpaste. And in 1957, first ultrasonic scaler was introduced. A year later, in 1958, the very first reclining dental chair was produced. Soon afterward, in 1959, GE produced the first automatic toothbrush.

Advancement in Dental Hygiene

Among the diagnostic technology is the Diamond Probe, which combines the new technology with manual probing. It allows for visual scoring and also measures the sulfur compounds. Also, intra-oral camera is being used by hygienists to educate the patients. They are also using laser for curettage of soft tissues.

Regarding therapeutic technology, there are arrays of new antimicrobial. Similarly, DentalView has been working on endoscopes for use in periodontology. The most recent version has a smaller tip, larger monitor, and the size of the overall instrument is small. Also, fibre-optics and the

camera have also been revolutionizing periodontology. It can magnify to up to 40 times the actual size. In this category, the DV2 Perioscopy™ System be not only used as a probe, but also as a curette.

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