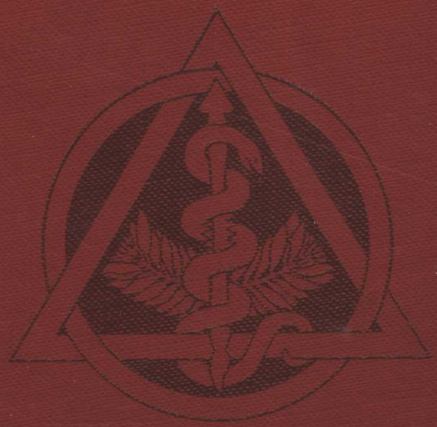

THE DENTIST AND THE ASSISTANT

Edited by Shailer Peterson

FOURTH EDITION

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Edited by

Shailer Peterson, B.A., M.A., Ph.D., F.A.C.D., F.I.C.D.

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Preface

The first edition of *The Dentist and His Assistant* was published in 1961, with subsequent editions in 1967 and 1972. This edition represents more changes in content, in philosophy, and in contributors than ever before.

As editor I studied the comments and suggestions made by over a hundred directors and faculty members of schools for dental assistants. As a result of this study, some chapters were dropped, others were completely revised, and new chapters were added. In contrast to the twenty-one contributors to the third edition, there are now thirty contributors; seven of the former contributors have not written material for this edition, and sixteen new contributors have been added. The new participants have added a great deal of new material. However, even the "old-timers" from the early editions of this book have made many changes and improvements in their chapters. A new Part IV, Supporting the Office Practice, has been added in this edition.

In compiling this revision my philosophy has been that no single book can act as a textbook to a whole educational program. A number of textbooks and reference books are required to provide the student with the classroom background as well as to provide information that the student will want to keep and place on the dental assistant's office shelf. This book includes subject matter for which the dental assistant student has a real need in the educational program and for which a textbook aimed at the needs of the dental assistant is truly needed.

There are probably enough other books to provide the basic science material that the dental assistant must know. However, the survey mentioned earlier demonstrated a need for information that would cut across the field of dental and oral anatomy and include some functional discussion of the chewing process. Therefore a new chapter on the chewing mechanism has been provided to complement other chapters by helping the dental assistant understand better the patient's problems that the dentist and his team are helping to solve and treat.

Although no single textbook can provide all of the subjects and all of the information that a dental assistant must learn and understand, it is hoped that this basic textbook will prove so indispensable that every dental assistant who uses it will want to keep it after graduation and have it at hand for ready reference in the office.

Many instructors of dental assisting students, as well as instructors of dental students, would like to write their own teaching material or their own textbook, but few can spare the time. The thirty contributors to this book have attempted to anticipate the needs of dental assisting instructors so that these instructors can use it as a basic textbook upon which they can build in their lectures, in their demonstrations, and in their choices of other reading references. There are many advantages in utilizing a book that is the product of many minds, many experiences, and many school programs.

Because there has been some increase in the number of men who are entering dental assisting and other auxiliary programs, and because many more women are entering the practice of dentistry, the style of writing in this book, when possible to do so without awkwardness, avoids pronouns that suggest stereotyped sex roles. When adjusting sentences would have been cumbersome, the more traditional pronouns have been used, but with the hope that the reader would realize that the book is truly speaking about both men and women who are dentists and also about both men and women dental assistants.

This book is dedicated to the contributors who have helped to produce it and to the hundreds of dental assisting instructors who use it to build upon as they go about the important task of preparing dental assistants for a career in the dental office.

This book is also dedicated to my wife, Ella, who has helped me with the typing of manuscript, proofreading, and preparation of the indexes for the books that I have authored and edited.

SHAILER PETERSON

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PART ONE

Professional background

CHAPTER 1

History and orientation

DEVEREAUX S. PETERSON, B.S., M.Ed., D.M.D., M.S.D.

HISTORY OF DENTISTRY

The history of dentistry is the story of the thousands of men and women who for centuries have initiated scientific, clinical, and social advances against the increasing incidence of dental disease. Perhaps the only time when dental disease and dental health were in a rough equilibrium was in the precivilized era when people subsisted on a natural diet that was healthier for the teeth and gums. With the advance of civilization and its increasing reliance on soft, refined foods, dental ills have multiplied exponentially.

The 1970s is an exciting time to be entering dentistry because the newest clinical advances and dental social programs currently proposed have the potential for eradicating dental disease in the forseeable future. But it promises to be a hard fight Twenty-five million Americans have no teeth, and the statistical probability is that 90% will have no teeth by the time they reach age 60. It will be tremendously expensive to reverse this trend and save teeth to preserve dental health. Americans now spend $4 billion annually on dental care. However, if all necessary dental work were done, it would cost $54 billion. The challenge is acute. As health care professionals, those on the dental team must meet the crisis in dental care delivery. The purpose of this chapter is to outline the historical progress that has been made to control dental disease and to relate some current moves in order to give the student a perspective on where dentistry has been and where it is going.

Although primitive people had comparatively few dental problems as a result of the reliance on natural food, prehistoric remains do demonstrate occasional dental illness. The primitive treatment included extractions with wooden or stone tools. Earliest peoples used magical incantations and prayers, a "cure" that has persisted through history and exists even today in underdeveloped areas. The reliance on magic and religion was especially prevalent in the earliest civilizations since these people believed that sickness was a result of visitation by evil spirits into those who had offended deities.

During the ancient Egyptian era the sun was venerated because of its effects on crops in an agrarian society. For some reason the mouse was presumed to be under the protection of the sun. When toothaches occurred, the body of the animal was opened and placed on the cheek adjacent to the aching tooth to ward off the evil spirits. Despite the "hocus-pocus," there developed a leisure class of priests who devoted themselves to study and learning. Many of their writings mention medical and dental treatments. Although many of their treatments were absurdities, others were clinically sound. The Egyptians

extracted decayed or periodontally unsound teeth, drained dental abscesses, ligated loose teeth, and applied cloves for toothache. No restorative procedures have been noted from examination of skeletons of that period.

One of the reasons more is known about Egyptian society than its contemporaries in the Euphrates and Yangtze Valleys is the Egyptian propensity for mummification of the dead and the consequent preservation of tissue. In fact, a fascinating study of these mummies by the University of Michigan gives insight into the evolutionary progress of the skull and jaws by comparing the mummies, dead for thousands of years, with the area's present tribal populations. It was found that human jaws are becoming smaller. Not only would this development cause a smaller face, but since the teeth are remaining the same size, crowding of the teeth is resulting.

It is interesting to speculate how people may appear a thousand years from now, particularly in view of other projections such as the universality of male baldness. Egyptian mummies also demonstrated a high rate of decay and periodontal disease as a result of the change of diet from earlier times. The Egyptians used stone to grind their grain for bread, which left sand particles in the food. The constant chewing on sand actually abraded some of their teeth through to the pulp, and large abscesses resulted. The Egyptians also were the first healers to specialize in dentistry.

The Greeks made few new contributions to dentistry. However, they gave us the "father of medicine," Hippocrates, in the fifth century B.C. His most important contribution was an attempt to place medicine on more of an empirical and less of a religious basis. The Greeks did not produce dental restorations.

It was the Etruscans (1000 B.C. to 400 B.C.) in Italy who really advanced restorative dentistry. They constructed crowns and bridges that were as good as any made prior to the invention of the dental engine in 1871. They used both human and animal teeth as replacements. When the Etruscan Empire declined and the Roman Empire became dominant in the third century B.C., the Romans continued the scientific impetus for dentistry.

Both the wish to relieve pain and the desire for good looks seemed to promote interest in dentistry. The Romans sometimes went to absurd lengths to have a good looking and fresh mouth. For example, toothpicks, especially gold ones, were popular in Rome. One report has an old gentleman with no natural teeth strolling around with a toothpick in his mouth for the pretense of having teeth and looking younger. Some Romans even employed special slaves to clean their teeth, usually with sticks and pumice. Unfortunately, these first dental hygienists customarily cleaned only the front teeth since the others did not show. One of their more interesting practices was using the urine from an "innocent" boy as a mouthwash.

During the height of the Roman period dental and medical superstitions were displaced to a great extent by a scientific clinical approach, and this new approach was exemplified by the physician Delsus (25 B.C. to 50 A.D.). His dental writings included treatises on treatment of jaw fractures by ligating the teeth with silk and manually pushing malerupting, permanent teeth into correct position. This is the first mention of stabilization of maxillofacial fractures and orthodontics. However, because of the disintegration of the Roman Empire, this scientific approach prevailed for only about 300 years until the onset of the Dark Ages.

The Dark Ages was a 1,000-year period of scientific inactivity in Europe. With the break-up of the Empire into a myriad of hostile fiefdoms, the primary social and intellectual force was the church, whose emphasis was emphatically on peoples' afterlife and not their earthly life. This removed the sciences from the picture.

Consequently, the priests and monks became the most educated of the period, and they acted as physicians and dentists for the people.

By the twelfth and thirteenth centuries, many of the small fiefdoms were uniting into politically more powerful units called nation-states, and the church's dominance was diminishing. In 1163 the pope helped divorce the church from health service by signing an edict preventing priests from any operation involving blood. As a result, lay people took up the practice of medicine and dentistry with more enthusiasm than skill. Barbers began extracting teeth and splashed blood all over their windows to advertise, which was the primogenitor of the modern red and white barber pole. Many jauntily dressed vagabonds, called tooth-drawers, shouted about their painless extractions at fairs and often performed their extractions on large elevated platforms for the audience to see. The public executioners were even asked to perform extractions because of their abundant experience in pulling the teeth of heretics. Restorative dentistry was aided by some who pulled teeth from the dead to sell as replacements, an act of daring in those days when grave robbing was a capital offense. Obviously, none of these "practitioners" had any scientific training.

True science began to emerge in Europe with the further weakening of the church in the Renaissance period beginning about 1500. People began to rely on empirical investigations rather than religious dogma to discover the meaning of the natural world. These experimental advances formed the basis for the kind of logical scientific inquiry necessary for the professional scientific community as a whole. By the 1700s newer ideas and personalities were emerging that would shape dentistry, in particular, into a legitimate profession.

The disciple of this trend was Pierre Fauchard, the father of dentistry. He is noted most for his book, *The Surgeon Dentist*, published in 1728. Previously, most dentists recognized dentistry only as a competitive business situation and kept their special knowledge secret. Fauchard initiated one of the finest traditions of dentistry—the sharing of technical information by publishing it for dentists with the ultimate public benefit in mind. This is one of the criteria or hallmarks of a true profession. The social climate at the time he was practicing in Paris certainly helped him since Paris was the Mecca of Europe, a city of wealth and pleasure. In fact, during most of the eighteenth century Europe was prospering economically from trade with the New World colonies and intellectually with the empiricist philosophy and science now freed from religion. It was a time when people valued the present, including health and good looks, and these attitudes stimulated dental discovery. Fauchard constructed full and partial dentures, filled root canals with lead, resolved periodontal disease by the now accepted method of scaling, realized that all decay must be removed before restoration, and even transplanted teeth.

The most important dental technical advance of the period, however, did not belong to Fauchard but to Duchateau, a pharmacist. Pharmacists of those days had to taste their medicines to ensure their strength, a procedure that discolored Duchateau's ivory dentures. One day he realized that his porcelain mortars used for mixing drugs did not discolor and that porcelain teeth might be logical for dentures. Heretofore, the carved ivory or human teeth used in dentures were expensive, difficult to manipulate, and the ivory stained easily. The porcelain tooth experiment worked beautifully. However, dentistry still had to wait for an inexpensive and suitably fitting material to use as a denture base for the teeth to be mounted. Before the 1800s gold was used for the denture base but was too expensive for most people to afford.

This new material used as a base was rubber; it was first adapted for use in

dentistry in America. (In fact, beginning in the 1800s Americans dominated in the field of dental innovation.) Charles Goodyear's invention of the rubber "vulcanite" in the 1840s was the beginning of many advances in dentistry that occurred in the U.S. The new material was utilized as an inexpensive, well-fitting, and easily constructable denture base so that almost everyone could afford dentures. Although rubber had been known since the Spanish first colonized South America, it was structurally too unstable to be used for many things without chemical adaptation. Goodyear, who was not a dentist, was consumed with the idea of discovering the process and spent a poverty-stricken life finding it. In fact, his neighbors used to say if one saw a man dressed in an all rubber suit and a rubber purse without any money in it, this was Goodyear.

Another giant step for dentistry was the discovery of anesthesia. Despite the inexpensive dentures available, many people were reluctant to go to dentists because of the pain often involved. Although narcotics and hashish had been known for centuries as pain relievers, they were not found useful for dental operations and were not widely administered. The gases that were used as the first inhalation anesthetics, nitrous oxide and ether, had also been known for some time as chemicals but were not used as anesthetics. In fact, they were often employed in "ether frolics" where groups got together to get intoxicated from them. Horace Wells, a dentist, was first introduced to nitrous oxide at one of these parties and later had one of his own teeth extracted under its effects to test its usefulness for surgical anesthesia. Horace Wells is credited with the discovery of inhalation anesthesia since he was the first to demonstrate its use publicly at a hospital in Boston. Unfortunately, the Boston venture failed. Wells became depressed and later committed suicide in prison where he had been committed for a drunken attack on a woman. It is a curious irony that both his attack and suicide were committed under the influence of another anesthetic drug, chloroform.

In spite of this early failure, others soon demonstrated more public success with inhalation anesthesia and it became the peoples' savior from pain. Dentistry also needed a local anesthesia, and Karl Koeler, a Vienna medical student, discovered that cocaine had local anesthetic properties. William Halstead, an American dentist, introduced conductive anesthesia for dental procedures in 1884, an innovation that has made the syringe a familiar item to all dental patients.

Another familiar item in dental offices is the dental drill. Although it is still viewed by some as an instrument of torture, its operations are painless when properly used with anesthesia. In fact, some clever dentists by sleight-of-hand cause children to believe the drill is made of rubber and so it becomes a totally innocuous instrument, like "a rubber eraser to rub out the bad Mr. Tooth Decay." The dental drill was probably the single most important invention for dentistry since it permitted swift removal of tooth structure for cavity preparations that could then be designed to more successfully hold restorations in place. Although Dr. John Greenwood, the dentist who made George Washington's famous wooden dentures, experimented with a crude dental drill in the 1700s, it was James Morrison in 1871 who invented a suitable drill based on the same mechanical principles as the first Singer and Howe sewing machine.

The cavity preparations made possible by the dental drill were structurally refined and categorized by G. V. Black, the man who was for dentistry the bridge between the nineteenth and twentieth centuries. Black made a science out of the anatomy of the tooth and related it to the requirements for retention of the restoration in the tooth. He also emphasized the resistance of the filling material to masticatory forces. Students today are still taught according to his concepts of cavity preparation. Black also discovered how to pre-

vent the expansion and shrinkage of amalgam restorations, which had discouraged their use since their introduction from France to the United States in the early 1800s. The filling materials that had been most commonly used before his discovery were gold leaf or lead. These were pounded into the cavity preparation much like crushing metal foil into a hard, dense form—a long, tedious procedure that antedated Fauchard. Black designed and built most of the machinery for his experiments himself and even constructed a new set of hand instruments to refine his new concepts in cavity preparations. He was certainly one of the mechanical geniuses of the nineteenth century, but he will be remembered more for his twentieth century vision and scientific expertise. Black wrote books on bacteriology, pathology, and anatomy along with publishing numerous articles and giving hundreds of academic presentations before professional meetings. He had a basic science orientation that presaged modern dentistry's realization that the oral cavity is attached to a human patient with important reciprocal physiological and pathological ramifications.

Black's thinking really introduced twentieth century dentistry, and modern dentistry, like historical dentistry, has benefited from a number of technical improvements. A new inlay casting technique rescued gold fillings from the old "crush" technique. The high speed dental drill radically reduced working time for cavity preparations and increased patient comfort. Plastics made possible more color compatible restorations. X-rays enabled early detection of dental disease and enabled diagnosis earlier than had been possible previously. Antibiotics controlled most infections, and when such infections were present, new sterilization techniques prevented their spread to other dental patients.

FUTURE OF DENTISTRY

Modern science has equipped dentistry to conquer most dental disease; ironically, however, dentistry's modern era has developed into a period of considerable controversy. The controversy involves the future direction of the profession, and students' opinions as dentistry's future representatives will provide impact on the decisions. As previous examples in this chapter have shown, dental history is necessarily contingent on the social, political, and religious milieu of the times, and the modern era is no exception.

The supply-demand problem

Controversy has developed from current social consciousness. This century's increased recognition of public needs, particularly those of the poor, has prompted demands for greater availability of less expensive dental health care for everyone. The demand promises to be staggering when legislative and financial mechanisms are activated to avail everyone of inexpensive dental care and when advertising techniques demonstrate the importance and comfort (painlessness) of care. At present, only one out of two Americans sees a dentist once a year. Some are deterred by expense; some are fearful; and some do not yet realize dentistry's importance to overall health. Sixty-four percent of the American poor children have never been to a dentist. Eighty-five of every 100 decayed teeth in poor children go unfilled. When these millions of people present themselves for dental care, the dental profession will be faced with the enormous task of extending adequate services.

Dentistry delivery problems can be illustrated by the example of the average dental treatment required for every 100 soldiers accepted by the armed forces—850 tooth surfaces must be filled, 101 teeth must be extracted, and 59 bridges and dentures must be provided. And these are presumably healthy young people!

Dentistry is obviously faced with problems of how it will meet the expanded demands since dentists now barely keep up with current demands. The discussion has focused on four solutions that promise

the increased delivery of dental care: (1) the increased use of dental auxiliaries, (2) an increase in the number of dentists, (3) amendments to state dental licensure laws, and (4) third party insurance programs or national health insurance. These proposed solutions have generated considerable controversy in the profession.

Increasing the use of dental auxiliary personnel and allowing these paraprofessionals to perform more complicated dental procedures are the most often mentioned solutions to dentistry's supply and demand problems. Numerous studies have shown that when the dentist employs more auxiliary personnel the patient load increases and the patient costs can go down. Other studies have shown that auxiliaries, when properly trained, can perform many procedures traditionally done only by the dentist and more patients can be treated. Controversy has developed over expanding the functions of dental auxiliaries since many dentists are reluctant to assign to lesser trained individuals irreversible procedures, like cutting cavity preparations that, once accomplished, cannot be corrected if an error is made. Many dentists also fear a destruction of the traditional physician-patient relationship. State dental practice laws, which define the responsibility of the dentist and each auxiliary, still reflect the opinions against expanded function. However, many people also believe these must be amended in order to permit greater patient care.

In any case, dentistry has been moving toward what is called the team concept for many years. Inherent in the team concept is the idea that dental practice efficiency is enhanced if the dentist and auxiliaries perform specific tasks. A dentist working alone is not as productive as one aided by auxiliaries who are specially trained and have expertise in certain aspects of dental care. The dentist and the auxiliaries make up the team. The dentist performs the diagnosis and most of the direct care for the patient. The dental technician executes many of the laboratory procedures that involve construction of dental appliances. Dental hygienists' duties include cleaning the teeth and teaching oral hygiene. The dental assistant is the member of the team whose modern role seems to be changing the most rapidly. Dental assisting probably began thousands of years ago when individuals helped the early practitioner in restraining a patient during a painful extraction and assisted in the maintenance of dental instruments. Until 1885 when Dr. C. Edmund Kells, a New Orleans dentist, hired a woman to assist him, the field had been open only to men. This idea of women dental assistants caught on in the early 1900s, particularly because of the Victorian concern for women patients' reputations who were being seen alone by a male dentist. The profession of assistant rapidly became dominated by women; however, the situation is going full circle and more men are now entering the field. Traditionally, the responsibilities of the dental assistant have included chairside assisting (handing the dentist instruments to reduce time spent reaching for them), general assisting (taking and developing radiographs and doing some laboratory procedures), and acting as receptionist. However, with the current trend toward increased auxiliary responsibility, most plans for expanded function assign the dental assistant the new delivery roles, including some direct patient care. The debate within dentistry and recommendations from intervening social and government agencies will determine how the dentists' and assistants' roles will be changed throughout the profession.

Another suggestion for alleviating the supply and demand for dental services is to produce more dentists. The reasoning for this is a projection by the American Dental Association that by 1980 and 1990 there will be a deficit of over 7,000 and 16,000 dentists, respectively. Those figures are based on current demand levels and do not allow for the increased demand

that is surely to come as a result of the social and political factors mentioned earlier. There are currently fifty-nine dental schools in the United States that graduate about 6,000 students annually and a current national ratio, or total population to professionally active dentists, of about 2,000:1. Most experts agree that it would be impossible to annually train the additional thousands of dentists needed to meet the projected demands or to substantially change the dentist/population ratio. Dental schools, aided by financial grants from a concerned federal government, have been trying to educate more dentists. Why are they failing? Even with federal aid there is not enough money; in fact, two schools have closed for lack of funds. Most schools are already too crowded to accept larger classes, and expansion of their physical plants to accommodate more students costs more money than is available. Although many new schools have been built, they are tremendously costly.

The Carnegie Council on Policy Studies in Higher Education is the successor to the Carnegie Commission on Higher Education that recommended in 1970 that a sharp increase in both dental and medical school graduates was needed to overcome the shortages that it predicted.

Implicit within the high cost of dental education is the excellence of training. American dental schools require either 3 or 4 years of dental training prior to graduation, and they teach the newest techniques. Their applicant pool is composed of college students with high grades who must pass a competitive dental aptitude test for admission consideration. Eighty percent of the students accepted have completed 4 years of college. The public realizes the excellent product of United States' dental schools and consistently places dentistry among the top three on occupational surveys.

However, to achieve this high regard dental education has had to come a long way from its early struggles. The Baltimore College of Dental Surgery, founded in 1840, was the first school in the world for dentists. Until then dentists had had to learn their skills by apprenticeships. Soon, several reputable universities recognized the need to teach dentistry and organized high quality dental schools. However, the invention of the dental drill caused dentistry to become more profitable, which created a demand by many people to enter the field. As a result, many new private dental schools, called proprietary schools, were organized for financial profit by the owners. Their main concern was profit from student tuition and not educational excellence. As the number of these schools multiplied, professional educational standards plummeted. In 1890 there were only seven dental schools, and in the next 30 years another eighty were formed, mostly for profit. Some students of these schools never saw patients. It was common for jaw to be spelled with g on examinations. The basic sciences, considered superfluous by many schools, were virtually eliminated in favor of a totally mechanical approach, which meant that many graduates were unable to recognize symptoms of oral pathology, much less treat it. Agitation from professionally sincere dentists and the press initiated a reversal of the trend prior to World War I, which culminated in a study on dental schools by the Carnegie Foundation in 1927. The study concluded that quality dental education could not be adequately funded by student tuition and, therefore, the dental schools must be subsidized as components of large universities. The proprietary schools closed. Dental schools are now integral parts of universities and are accredited after frequent and thorough inspections by the American Dental Association to ensure their excellence.

Another suggestion aimed at alleviating the supply-demand problem is the amendment of existing dental licensure laws. Dental licensure is the process by which