
DENTISTS AND DENTISTRY IN ANCIENT EGYPT

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ABSTRACT

This article addresses the questions of whether a dental profession existed in ancient Egyptian times, and, if so, whether they were operative dental surgeons or mere dental pharmacists? This article will confirm the first theorem, although, as in modern times, the Egyptian dentist may well have been both a dispensing practitioner, as well as an operative surgeon. Evidence from archaeological research, principally from the medical papyri, hieroglyphic inscriptions found in tombs, stelae, and physical examination reports of dental conditions in mummies and from dry skeletons are taken into account. The medical papyri's dental entries will demonstrate that dentists were mainly focussed on diagnoses and that the science was mostly pharmacopoeial in nature, providing pharmacotherapy and magical incantations. Information on operative treatment is limited and limited to the Edwin Smith papyrus. Lastly, physical evidence of prosthetic and surgical dentistry is presented as further evidence.

INTRODUCTORY REMARKS

There are reservations among some scholars¹ as to whether the discipline of dentistry existed in ancient Egypt, and whether it links with the observable dental maladies, in particular diseases that stemmed from poor oral hygiene² and dental wear due to the ever-present sand that the entire Egyptian population seems to have suffered from. The innovative question would be whether the population that suffered from life-threatening dental diseases and conditions was in any way aided by professional dentists, and if so, then the question has to be asked whether dentistry as a professional service resulted in any alleviation of the condition. Dentistry, in a modern

¹ Nunn (1996:205) quotes Smith & Jones' (1910) disbelief that there were dentists in ancient Egypt. Among other disbelievers are Weinberger (1947:172), Leek (1971:92) and Forshaw (2009b:481).

² The importance of oral hygiene in ancient Egypt appears not to have been appreciated. O'Reilly and Claffey (2000:13) related that conditions affecting the oral cavity may have severe implications on peripheral tissues and organs, compromising the health of the individual.

definition, is the practice of preventing, diagnosing and treating diseases of the teeth, gums, and other tissues of the mouth. If not treated, dental health problems can lead to complications in other parts of the body, even death. Hawass (2000:89) revealed the intimidating statistics that untreated severe tooth infections resulted in death 50 to 90 per cent of the time in ancient Egypt.³ Ultimately an infection of this severity in the absence of modern day antibiotics may still be fatal. Craffert (1999:5, 8) concurs with the incidence of this unfortunate condition, and mentions that within the boundaries of the Roman Empire two thousand years ago, 5 per cent of all deaths were caused by dental disease and it may be one of the reasons that life expectancy in the ancient biblical world was very low with estimations that the life expectancy in the Graeco-Roman Empire was 25 years (Craffert 1999:8-9).

In the process of searching for possible evidence that dentistry as a profession existed in ancient Egypt, a number of research fields will be explored. First, the physical examination of prosthodontic appliances as well as other forms of dental treatments, such as fillings and extractions, will be examined. Reports of the dental conditions of mummified human remains and from dry skeletons are taken into account (Pahor 1995:39). Informative data would unquestionably be obtained from the various medical papyri that were discovered in the nineteenth century. Other fields explored are textual data in the form of chronicles, a number of nonmedical documents, biblical accounts, mural inscriptions and drawings within burial chambers (Ghalioungui & el-Dawakhly 1965:vii).

PHYSICIANS, DENTISTS AND MAGICIANS

The history of medicine and dentistry is so inextricably interwoven that the consideration of one involves the other (Prabhakara 1985:369). Nunn (1994:5) reported the parallel and associated roles of doctors, priests and magicians⁴ in health

³ Evidence from Roman Egypt suggests a life expectancy at age 14 of 29.1 years, whereas research at the cemeteries of Gebelen and Asyut suggests 36 years for the Dynastic period (Nunn 1996:22). The average life expectancy at birth taking in consideration that infant mortality was very high meant life expectancy may have been much less than 20 years. Baines (1991:133) is of the opinion that although these figures may seem shocking, its plausibility for all but the elite is corroborated from a number of sources.

⁴ Ancient medicine and modern day homoeopathy have much in common in that the patient was treated holistically – body and mind were taken into consideration and the illness was dealt with symptomatically. In ancient Mesopotamia and Egypt, magic and religion were inseparable and medication was administered to the patients while the on-lookers were chanting and dancing

care. He claims that all doctors had a relatively low standard of knowledge of pharmacopoeia⁵ and a very limited repertoire of operative surgery. However, dentists were grouped amongst physicians as one of the specialities with perhaps similar shortcomings and imperfections (Nunn 1996:114). The disciplines of medicine and dentistry may thus have had a common origin. Chohayeb (1991:66) holds that dentists had no training in medicine at medical schools. Training schools for physicians, and which may have included dentists as well, are however attested by Halioua & Ziskind (2005:22). The practice of dentistry was essentially limited to the royal court. The rest of the commoners probably had to rely on the *swnw*, commonly known as a doctor, for their dental needs (Nunn 1996:131).

Magic and religion

The Egyptians believed that disease was caused by supernatural forces (gods) and that demonic agents were embedded in the diseased flesh of a patient (Walker 1993:87). Egyptians turned to doctors and magicians for healing as each used different methods – the doctors used herbs and the magicians employed amulets (Nunn 1996:98,110). Magic and religion⁶ were inseparable from medicine in the time of the ancient Egyptians (Nunn 1996:96). The Egyptians knew that appropriate spells and remedies, illnesses and their causes were mysterious but nevertheless regarded it as the work of the gods, caused by the presence of evil spirits or their poisons. From the Ebers papyrus the following is noted: Magic is effective together with medicine. Medicine is effective together with magic. Magicians, also known as the *sau*, were also sorcerers and bone setters. The *sau* dealt with diseases of an inexplicable nature and aided the application of prescriptions with magical incantation (Vinel & Pialoux 2005:7).

Doctors and dentists

Reeves (2001:22) reveals that each physician was a specialist who worked under the

(Williams 2009:11).

⁵ The analysis of the medical papyri reveals that the Egyptians had a vast pharmacopoeia that included herbal and plant matter, human by-products, animal, insect and also a number of essential minerals. Referring to pharmacopoeia, it is uncertain whether they made use of written texts, or if the information was perhaps passed on during their training and never set to paper (Bouwer 2012:71).

⁶ Oppenheim postulates that magic and medicine were generally applied separately but there were times when the two were used concurrently as they jointly produced a more effective remedy (1962:103; cf Biggs 1969:96). According to Biggs, a disease that was considered incurable was not treated (1969:95).

auspices of a patron deity; for example Isis, the solar goddess, was responsible for the liver and Taurt was the childbirth goddess. This can be substantiated by Pliny the Elder who quotes Herodotus (fifth century B.C.E.), saying that all Egyptian physicians were specialists: there were so-called doctors of the stomach (gastro entomologists), eye doctors (ophthalmologist) and dentists amongst others. Herodotus' book *Histories* reflects his admiration for the Egyptian medical profession, the specialisation of the physicians in particular. He also coined the term *ietros ton odonton*, Greek for a "tooth doctor" (Nichol et al. 1995:110). Herodotus wrote:

The practice of medicine they (sic) split up into separate parts, each doctor being responsible for the treatment of only one disease. There are, in consequence, innumerable, some specialising in diseases of the eyes, others of the head, others of the teeth, others of the stomach and so on (Forshaw 2009b:485).

The majority of physicians were probably designated simply as *swnw*⁷ in hieroglyphic script, conventionally pronounced *sewnew* (Nunn 1996:114). Dentists were regarded as one of the medical specialities⁸. Titles of some of the other specialists are: dentists, ophthalmologists, doctor of the eye, doctor of both eyes, man of cautery (a surgeon), doctors of the stomach, "herdsmen" of the anus, doctors of "hidden diseases" and in one case a dentist was also named a guardian of the anus, perhaps because suppositories were common treatment in both disciplines, designed to be administered rectally (Halioua & Ziskind 2005:12, 13). See dentist and physician's titles below in Figure 1.

Leek (1969:18) is of the opinion that only philologists can argue what the hieroglyphic symbols represent. He argues that the followers of Junker (1928) believe that the hieroglyphic symbol of an elephant tusk represents a human tooth, accepted

⁷ After the 27th Dynasty, the word *swnw* had come to mean embalmer as well as doctor (Nunn 1996:115).

⁸ Dentists will naturally fall under the auspices of physicians in many of the following pages where reference is made only to 'physicians', only separated in hieroglyphic symbols: (*ibh*) for dentist and (*swnw*) for physicians (see figure 1). There were two other diverse titles within the dental profession in general practitioner-levels: one meant 'one who is concerned with teeth' and the other meant 'one who treats teeth'. Marion (1996:17) suggested that the first symbolised a junior or student dentist, while the other was an established dental practitioner. Forrai (2009:188) concurs that there were dentists in ancient times, also mentions two classes of dentists but differs in her hieroglyphic approach to the meaning and naming the classes: *iryw-ibew*, with the meaning of dentist, is the lower class dentist whilst the elite dentist was referred to as *ir-iryw-ibew*, with the meaning of either 'great of those who are concerned with teeth', or 'great of dentist' [sic].

today universally as the hieroglyphic of tooth.

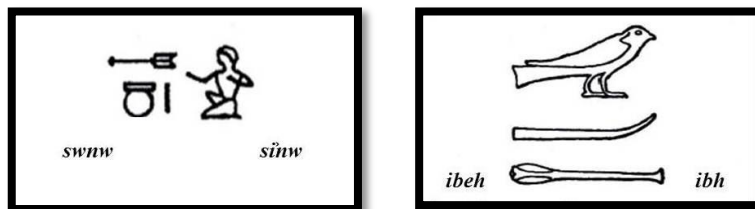


Figure 1: Designated title and hieroglyphic symbol of a dentist (*ibeh*) and (*ibh*) on the left (Leek 1967:51) and that of a physician (*swnw*) and (*sinw*) on the right in ancient Egyptian hieroglyphics (Nunn 1994:6).

Followers of Kaplony prefer to translate the elephant tusk as a reference to an office of state. The tusk of the African elephant (*Loxodonta africana*) measures up to 3.35 metres and weighs up to 110 kg. Although Leek (1969:18) is sceptical to accept the elephant tusk as the symbol of a human tooth, the author feels that the enormity of a tusk would unquestionably be the ultimate symbol for a tooth, human or otherwise (see figure 2).







 Tooth (Ebers)	 Tooth (Ebers)	 Tooth (Kahun veter)
 Tooth (Ebers & Kahun med)	 Toothache drug (Ebers)	 Toothache (Edwin Smith)

Figure 2: A number of hieroglyphic symbols, each representing a tooth or a declension thereof, as is found in the various medical papyri. Note the presence of the elephant tusk in all.

There were doctor/dentists who functioned on different levels, forming a formally ranked group of specialists or a typical hierarchy (Reeves 2001:21; see Table 1 below).

Nunn (1996:119) suggested that there were specialists of the Old Kingdom and First Intermediate period who were known to be a dentist and a doctor, and others again regarded only as a dentist.⁹ One in particular was Hesi-re, the first known dentist

⁹ Some practitioners were involved in more than one speciality. Three examples of dentist/doctors were described emanating from the Old Kingdom and First Intermediate periods (Nunn 1996:119).

in history. Dentistry was an established profession in ancient Egypt in the early Old Kingdom, as Hesi-Re is probably archetypal. Clarke (1980:80) is also convinced that dentistry was practised in ancient Egypt although the profession consisted primarily as a form of sacerdotal dental medicine. The period, starting from pre-dynastic times through the pharaonic period, hardly had more than a hundred physicians (including dentists) accounted for in archaeological research (Ghalioungui 1971:94).

1. The ordinary doctor: <i>swnw</i>	2. The supervisor doctor: <i>imyr swnw</i>	3. The chief doctor: <i>wer swnw</i>
4. Eldest of doctors: <i>msw swnw</i>	5. The dentist or toother: <i>ibnh-swnw</i>	6. The inspector of doctors: <i>shd swnw</i>
7. The overseer of all the doctors of Upper and Lower Egypt		

Table 1: The hierarchical positions of doctors and dentists, see Reeves 2001:22.

Hesi-re, the first known dental specialist

The Third Dynasty tomb of Hesi-Re was discovered in the nineteenth century in the course of an excavation at Saqqara by the Frenchman Auguste Mariette. Eleven wooden panels were found set into the wall at the back of stepped niches, of which five were badly decayed and the remaining six are on exhibition in the Egyptian Museum in Cairo (Wood 1978:9). Reisner identified the table scene in the fifth niche (fourth according to Mariette) as the principal offering niche (see Figure 3 below). It is this scene that most clearly shows Hesi-Re as a dentist of high ranking (Reisner 1936:271). The relief of Hesi-Re seated also displays the more complete list of his titles, as well as his name (Wood 1978:12).

Hesi-re¹⁰ (*hsj-r'*) or Hesire¹¹ was a contemporary of Imhotep,¹² a man of great

¹⁰ Because vowels did not exist in ancient hieroglyphic writing, scholars have unanimously decided to compromise by substituting any possible vowel in all relevant translations with a short “e”. In modern transcriptions, a short “e” is added between consonants to aid in their pronunciation. For example, *nfr* “good” is typically written “nefer”. This does not reflect Egyptian vowels, which are obscure, but is merely a modern convention. Likewise, the *ḏ* and *ʿ* are commonly transliterated as *a*, as in Ra (Allen 2000:17).

¹¹ Hesire’ is proposed by Forshaw (2009b:48 and Weinberger 1947:176).

¹² Imhotep should have the honour of being the first physician in history. It will nevertheless be irrational to believe that in the period from Athosis, the second king of the First Dynasty up until Djoser, the third king of the Third Dynasty (a period of more than 300 years) there were no physicians in Egypt. It is, however, more likely that there must have been other physicians who took care of the Egyptian kings, as well as the broad population. Until archaeology reveals further evidence of earlier physicians, it will be accepted that Imhotep was the first physician in history (Nunn 1994:9).

distinction who carried many exalted titles under the same king (Nunn 1994:8). In the event that Imhotep is to be acclaimed the first doctor in history, then Hesi-re should then be given the honour of being the first authenticated dentist in history.



Figure 3: “Chief of the Toothers” as Hesi-re was known, is reproduced on a wooden panel showing a rebus or heraldic emblem of a swallow, a tusk and an arrow on the upper right corner, confirming his status as a dentist (Berghult 1999:27).

This remarkable man was a polymath. His title was that of “the greatest” (or chief) of physicians and dentists. It is not clear whether he was the “chief” of practising dentists/physicians, or that he was responsible for the administration as such. Hesi-re is mostly known from his *mastaba*¹³ (Egyptian tomb at Saqqara, located to the north of Djoser’s Step pyramid). Of the original eleven wooden steles that once may have stood in the chapel of his *mastaba*, only six remain. Hesi-re’s claim to fame was inscribed on a niche-stele on which his title was inscribed as *wer-ibnh-swnw* (chief of dentists and doctors), thus proclaiming him perhaps as sharing the title with Imhotep as the first authenticated doctor in history (Leek 1967:55).

Three other physician/dentists were described by Ghalioungui (1971:91). Ghalioungui postulates that their titles coincided with the “*ibh*”¹⁴ symbol, analogous to that of Hesi-Re, signifying “tooth”. The three were:

1. Ni-ankh-Sekhmet, *wr swnw pr-c3* = Palace physician to King Sahure (ca. 2700

¹³ Egyptian tomb: in ancient Egypt, a brick tomb built with a flat base, sloping sides, and a flat roof. Its design inspired the pyramids.

¹⁴ According to von Deines et al. (1959:25) the term “tooth” is written as *ibh* (m.gen), whereas *nhd.t* denotes “tooth”, similar to the official transliteration of a tooth of a donkey or a pig.

B.C.E.) as well as *wr ibhy pr-c3* = Chief of the dentists of the palace (see also Yahuda 1947:551).

2. Khouy¹⁵, *swnw pr-c3* = Physician of the palace, Dean of the physicians of the palace = *smsw swnw pr-c3*, Chief of the physicians of Upper and Lower Egypt = *wr swnw mhw smc* and Chief of dentists = *wr iry ibh*.
3. Psametic-Seneb, Chief of physicians (*wr swnw*), Chief of the dentists of the palace *wr ibh (y) pr-c3* and Dean of physicians *smsw swnw* of the Twenty-Sixth Dynasty. Other examples of dentists – *iry ibh*, but without the title *swnw* (physician) – were: Menkaoureankh¹⁶ (*iry ibh*) whose name was mentioned on the same stele as Ni-ankh-Sekmet; and Neferiretes, of this *iry ibh* nothing further is known. Weinberger (1947:173), however, attested Pepi-ankh¹⁷ as an *iry swnw*, an eye doctor and dentist. Hawass (2012:1) has revealed a necropolis dedicated to another three dentists in Saqqara west of the First Dynasty tombs: E-Emery, the chief dentist of the fing of the Fourth Dynasty; Ka-Me-Su, dentist to the king of the Fifth Dynasty; and Sekhem Ka, dentist to a king of the Fourth Dynasty.

DENTAL REFERENCES IN THE MEDICAL PAPYRI

The evidence of dentists in ancient Egypt is further cemented in the discovery of the medical papyri.¹⁸ The procedures of all medical disciplines were found written on at least ten medical papyri of which only five contain prescriptions and treatment of dental maladies. The five were the papyri Ebers, Hearst, Berlin, Kahun and Edwin Smith. Marion's (1996:15) deduction is that most of the papyri date from 1550 to 600 B.C.E., although most scholars feel, based on palaeographic evidence, that the discovered medical papyri actually date as far back as the Old Kingdom (2686-2181 B.C.E.).

Medical science¹⁹ in ancient Egypt was perhaps reactionary to a great degree.

¹⁵ Marion (1996:17) appended two more titles to "Khuwy", namely "interpreter of the secret art of the internal organs" and "Guardian of the anus".

¹⁶ Marion (1996:17) ascribe the titles of chief dentist and physician of the palace of the Fifth Dynasty to Menkaoureankh.

¹⁷ Blackburn (1977:26) furnished Pepi-Ankh with other official titles, namely physician of the belly of the pharaoh; guardian of the anus of the pharaoh; and surveyor of the physicians of the pharaoh.

¹⁸ For a broader discussion on the above papyri and other medical papyri not mentioned here, such as the Chester Beatty Papyrus IV, London Papyrus' Brooklyn Papyrus' Carlsberg Papyrus VIII' Ramesseum IV and V papyri and papyrus Anastasi, see Reeves (2001:49-53).

¹⁹ Read "medical" inclusive of dentistry.

Ritner (2000:107) stated that ancient Egyptian medicine had been viewed as a quintessentially conservative culture, stubbornly refusing changes made to the wonted medicine of their past. More importantly, according to Ritner (2000:108), it seems that any updated or altered diagnoses and treatment plans of the original sacred writings (medical papyri) were not just frowned upon but totally prohibited, to the extent that the death penalty could be the specified punishment because of disrespect in changing a medical tradition.

The Ebers papyrus

The Georg Moritz Ebers Papyrus (1872), commonly referred to as the Ebers Papyrus, contains a number of prescriptions or recipes referring to teeth and periodontal tissues (Joachim 1973:12).

The Ebers Papyrus is crucial for palaeodontological research because it has by far the most important prescriptions relating to the oral structures. Von Klein attested the extent of the dental maladies: “Diseases of the tongue and teeth (the ailments of the tongue are not specified), but for the teeth there are prescriptions to strengthen them, to make them grow, to heal ulcers of the gums, swellings of the gums and bloody congestions of the teeth” (von Klein 1905:7).

The following is the first classical English translation from the hieratic text²⁰ of the Ebers papyrus by Ebbell (1937:103-104). No numbering system was offered other than “Ebers LXXXIX”.

Ebers LXXXIX

The beginning of remedies to fasten a tooth: powder of ammi /, yellow ochre /, honey /, are mixed together, and tooth is filled (?) therewith.

Another: scrapings (?) of millstone /, yellow ochre /, honey /, the tooth is filled (?) therewith.

To expel growth (?) of purulency in the gums: fruit of sycamore /, beans /, honey /, malachite /, yellow ochre /, are pounded and applied to the tooth.

Another to treat a tooth that gnaws against an opening in the flesh: cumin

²⁰ The hieratic text were transliterated in Ebbell’s presentation.

/, frankincense /, d3rt /, are pounded and applied to the tooth.

Another to fasten a tooth: frankincense /, yellow ochre /, malachite /, pounded and applied to the tooth.

Another: water /, s3m /, likewise.

Another to treat the gums with rinsing of the mouth: bran (?) /, sweet beer /, swt dhwtj /, are chewed and spit out, others to expel eating ulcer on the gums (i.e. stomatitis ulcerosa) and make flesh grow: cow's milk /, fresh dates /, manna /, (it) remains during the night in the dew, rinse for 9 [days].

Another: inst /, sycamore /, yellow ochre /, sebesten /, gum /, tj3m /, bsbs /, belanites-oil, water, likewise.

Another to strengthen the gums and treat the gums: celery /, dw3t /, sweet beer /, chewed and spit out.

Another remedy to treat "blood-eating" (scurvy) in the tooth: kbw 1 ro, d3rt ½ ro, gum 2 ro, fruit of sycamore 4 ro, inst 1 ro, water 10 ro, (it) remains during the night in the dew, rinse for 4 days.

It is inexplicable beyond comprehension that dental wear per se does not feature in any manner in any of the diagnoses and recipes of the Ebers Papyrus, nor within any of the other medical papyri ever discovered in ancient Egypt. Dental wear was a major health threat that entire populations over millennia suffered from.

The author has ventured the following translation from German to English, of the recipes mentioning dental structures in the Ebers Papyrus, and the Anastasi and Hearst papyri where the recipes are cited under the headings of mouth and teeth in the original translation from the hieratic Egyptian scriptures into German by von Deines, Grapow and Westendorf in *Übersetzung der medizinischen texte* (1958:65-67). The following study reveals the site, diagnosis, cure, dosage and period to be treated of the dental malady.

Ebers' dental references translated

II E 1. The mouth²¹

²¹ Numbering system according to von Deines et al. (1958:65ff.).

The two recipes that were prescribed for painful conditions of the mouth (undisclosed conditions) are: Ebers papyrus (Eb) 122 (27,7 - 11): similar to the Berlin papyrus 35 (3,8 - 11)²². “A mixture for prevention of painful conditions in the mouth. The ingredients are mixed, exposed to the night dew, pressed and then taken for four consecutive days.”

II E 2a. The teeth: general treatment (filling, fastening and parallel recipes).

Eb 739 ~ (89, 2-3): the remedy or cure to firming up (*smn*) a [loose] tooth: flour from the germ of emmer (*mjmj*), 1 quantity; ocker (*stj*), 1 quantity; honey 1 quantity; mixed and made into a paste and the tooth should be filled with the mixture.

Eb 740 ~ (89, 3-4): another cure (healing substance) presumably for a loose tooth as above: fine grit from a grinding stone, 1 quantity; ocker (*stj*), 1 quantity; honey 1 quantity; mixed and the tooth should be filled with the mixture.

Eb 743 ~ (89, 7-8): another cure for the firming up (*smn*) of a tooth: terebinth resin (*sntr*) 1 quantity; ocker (*stj*) 1 quantity; malachite²³ (*w3dw*) 1 quantity; pulverised and applied on the tooth.

Eb 744 ~ (89, 8): another cure (presumably for a loose tooth again): water, 1 quantity; (*8c3m*) plant (?), 1 quantity; similar to... (ebenso).

Eb 748 ~ (89, 12-13): another cure/treatment to firm up/tighten (*festmachen*) a tooth: celery (*m3t.t*), 1 quantity; (*dw3.t*) plant, 1 quantity; sweet beer 1 quantity; a mixture made and given to the person to chew, and afterwards spat out on the ground (given to the earth).

Eb 745 ~ (89, 8-9): another cure for a tooth with a chewing substance: (*c^{mcc}*) plant 1 quantity; sweet beer, 1 quantity; (*šw.t - dhwti*) creeping firefinger-cabbage 1 quantity; mixture should be masticated, then spat out on the ground.

II E 2b. Special illnesses (of teeth)

Eb 742 ~ (89, 6-7): another treatment for a tooth that is being eaten at the opening of the gingiva (*h^cw*): Kummel (cumic & caraway seeds) 1 quantity; terebinth resin (*sntr*) 1 quantity; colocynth (*d3r.t*) 1 quantity; made into a powder and apply onto the tooth.

Eb 746 ~ (89,10-11): another cure for the elimination of an abscess growing from the gingiva (*h^cw*) (gum tissue): milk of a cow 1 quantity; fresh dates 1 quantity; (*w^{ch}*) fruit

²² Some recipes described in the Ebers Papyrus are basically the same as that found in the Berlin Papyrus, otherwise referred to in von Deines et al. (1958:243) as Eb = Bln. Within the Ebers Papyrus there is similarity between a number of recipes, written as Eb ~ Bln.

²³ Malachite is a green mineral stone: a green copper carbonate mineral. Use: decorative stone and is a source of copper (Microsoft Encarta 2009).

(Hulzenfrucht) 1 quantity; this mixture should be exposed to the dew one night, then chewed and swirled around the mouth and should then be spat on the ground.

Eb 747 ~ (89, 11-12): another treatment: (*ins.t*) plant 1 quantity; grated sycamore fruit, 1 quantity; ochre (*sti*) 1 quantity; (*išd*) fruit 1 quantity; plant gum 1 quantity; (*tj^cm*) plant 1 quantity; (*b8b8*) plant 1 quantity; behen oil 1 quantity; water, the same (presumably) as above.

Eb 554 ~ (72,14-16): elimination of the abscess from a tooth that grows from the gingiva (*h^cw*): (*bsbs*) plant 1 quantity; grated sycamore fruit 1 quantity; (*ins.t*) plant 1 quantity; honey 1 quantity; terebinth resin (*sntr*) 1 quantity; water 1 quantity, mixture should be exposed to dew for a night, should then be chewed and swirled around the mouth.

Eb 555~ (72, 16-18): another treatment: (*tjcm*) plant 1 quantity; (*ins.t*) plant 1 quantity; terebinth resin (*sntr*) 1 quantity; (*m^{cc}*) plant 1 quantity; Celery (*m3t.t*) 1 quantity; (*nw3n*) plant, 1 quantity; root of (*tj-šps*) cinnamon tree? 1 quantity; (*innk*) plant 1 quantity; (*gjw*) Cyprus grass 1 quantity; colocynth (*d3r.t*) 1 quantity; water and similar (to above).

Eb 553 ~ (72, 13-14): another treatment for an aggressive abscess of a tooth: (*šps*) plant 1 quantity; gum from a tree 1 quantity; honey 1 quantity, oil or fat 1 quantity, abscess should be covered (bandaged) with it.

Eb 749 ~ (89, 14-15): another remedy for the blood eating condition in the tooth (possibly scurvey): (*kbw*) plant $\frac{1}{32}$; colocynth (*d3r.t*) $\frac{1}{64}$; gum $\frac{1}{16}$; grated sycamore fruit $\frac{1}{8}$; (*ins.t*) plant $\frac{1}{32}$; water 10 *ro*. Mixture should be left overnight in the dew, should then be chewed for four days.

Eb 741 (7, 2-3): elimination of an abscess that is causing pain in a tooth: grated sycamore fruit 1 quantity; beans, 1 quantity; honey 1 quantity; malachite (*w3d^w*) 1 quantity; ockre (*stj*) 1 quantity; the products should be milled and pulverised and should be put to the tooth.

Author's remarks on Ebers' diagnoses and prescriptions

Ebers 89, 2-3: for fixing a loose tooth: A mixture of crushed seeds, ochre and honey made into a paste and applied to the tooth, presumably in a manner that would immobilise or splint the tooth by employing surrounding teeth as buttresses. The ochre and seeds is presumed to be fillers with honey the binding factor. The treatment may merely be a mechanical method of splinting a loose tooth, with honey as the disinfectant agent.

Ebers 89, 3-4: presents a prescription similar to 89, 2-3, but presumably for toothache. Due to the fact that the causative agent for the pain is not specified, periodontal pain is presumed. The pain relief due to pulpal irritation because of caries or for whatever reason does not seem feasible, unless the crushed seeds have anaesthetic or narcotic²⁴ properties preponderant to the pain-causing effects of honey.

Ebers 89, 4-6: the prescription seems to be treatment for toothache. A paste of ground-up vegetable and mineral substances with honey is suggested. A similar argument is valid as above due to the lack of more information given.

Ebers 89, 6-7: a prescription for a septic tooth (literally “a tooth that gnaws or eats into an opening in the flesh”) the ingredients are an astringent concoction of nature: cumin,²⁵ colocynth²⁶ and frankincense.²⁷ Cumin (*Cuminum cyminum*) seeds are indigenous to Egypt, they were chewed for gumboils and for sore and abscessed throats. This plant has weak analgesic properties and is used nowadays to treat the common cold (van Wyk & Wink 2004:407).

Ebers 89, 7 & 9: is a prescription for the fixing of a loose tooth.

Ebers 89, 8: describes a method for fixing loose teeth.

Ebers 89, 8-9: relate to a prescription for treating teeth by rinsing the mouth. In this case two unknown plants should be chewed and spat out. The vehicle is sweet ale.

Ebers 89, 10-11: a prescription for the inflammation of the gums, thought to be a form of stomatitis. The drugs are the homely dates and beans, which are to be exposed to early morning dew, mixed with milk, then chewed as a masticatory and spat out; repeated for nine days.

Ebers 89, 11-12: this seems to be another prescription for the same condition as in

²⁴ Opium was used in the treatment of pain, see Merrillees (1962:289).

²⁵ Cumin (*Cuminum cyminum*) is a seedlike fruit, native to the Middle East. The oil of the seed is medicinally used as a disinfectant. The cumin black (*Nigella sativa*) seed is medicinally used as a vermifuge, an anthelmintic drug. One cannot help to think of its use against the “toothworm” (Jacob & Jacob 1992:813).

²⁶ Colocynth (*Citrullus colocynthis*) is a member of the wild gourd family; also known as bitter apple, the pulp of the fruit dries to a bitter powder. Colocynth may cause colic, and at times may “excite the intestine nerves but has no known influence on oral soft tissue like the gums” (Jamieson et al. 1997:s.v. Colocynth).

²⁷ Frankincense (*Boswellia serrata*) is native to India (Kramer 2006:49) and was used in Egypt during pharaonic times as incense. It has, however, many medical uses, such as a purgative and a drug to expel worms (Jacob 1993:35). Frankincense is an important ingredient of incense. Medicinally it is used as a fumigant, to apply smoke, vapor or gas for the purpose of disinfecting or of destroying pests (Jacob & Jacob 1993:813). Today its resin, the main components of which are boswellic acids, are used for its anti-inflammatory, antiseptic, decongestant and sedative properties (van Wyk & Wink 2004:69).

8. In this case the vehicle is oil and water.

Ebers 89, 12-13: a paste is prescribed for “making healthy” the teeth. Two vegetable drugs: mandrake and species of *Potentilla* should be chewed and spat out. The vehicle is sweet ale.

Ebers 89, 14-15: is a prescription for “eating blood in a tooth”. This idiomatic expression is understood by Leake (1940:311) to mean scurvy. Weinberger (1981:111) also mentions Lefebvre’s (1952) translation to imply a diagnosis of pyorrhoea.

Ebers 325, (54, 18-55, 1) mentions fumigants which were common treatments for both vaginal and anal problems; however, Weinberger (1981:110) believes that it was not an uncommon treatment for dental maladies either.

All the above remedies are unassertive external applications to teeth. Leek (1967:53) held that the choice of drugs in these and other prescriptions was probably dictated by the belief in their magical rather than their therapeutic value. Most of the prescriptions seem to be for “fastening” loose teeth, or for some malady associated with the gingiva and/or periodontal tissues. Ebers 739 and 743 use the verb *smen* which has the attested meaning of “to make fast” or “make to endure”, which unquestionably implies loose teeth due to periodontal disease. In Ebers 748 the verb *serudj* is used, meaning “strengthen” or “secure” (Nunn 1996:205).

The “secondary medical papyri” mentioning teeth

The Papyrus Anastasi IV

The Papyrus Anastasi IV of Gardiner (1937:48) mentions that toothache is caused by a worm. Comment is made of the lament of an Egyptian official bewailing his suffering from toothache: “every muscle of his face twitches, the disease has developed in his eye and the worm grows into his tooth ...”.

The Edwin Smith Papyrus

The Edwin Smith Papyrus is the earliest treatise dealing with surgery. It is also viewed by Wilson (1952:76) as a curious mixture of science and superstition.

For each case brought to the physician/dentist there is a summary of the diagnosis with an indication of either “an ailment I will treat” or “contend with” or an “ailment not to treat”. Amongst one of the 48 mainly cranial trauma cases Forshaw (2009b:485) describes the instruction given for the manipulation of a dislocated mandible²⁸ in the

²⁸ Von Deines & Westendorf (1958:187) in their translation of this manipulation refer to both thumbs being

Edwin Smith (*Sm Fall 25*) papyrus: “if you examine a man having a dislocation in his mandible [and] you find his mouth open [and] cannot close it for him, you should place your thumbs upon the ends of the two rami in the inside of his mouth [and] your two groups of fingers under his chin, and you should cause them to fall back so that they rest in their place (sic)”.

This technique cannot be better expounded by a maxillo-facial surgeon today. Von Deines & Westendorf (1958:187) also describe the fracture of a mandible in Edwin Smith (*Sm Fall 24*) which when palpated with the fingers the bones are found to move under the fingers, you should declare: “one with a *hsb* fracture of the mandible which has been broken off (*sd*) with an open wound; and the temperature feels warm; it is an illness, the man cannot be treated”.

The Kahun Papyrus

The Kahun Papyrus is dated to circa 1800 B.C.E.; the Kahun Gynecological Papyrus is the oldest known medical text. It was found at El-Lahun by Flinders Petrie in 1889 and first translated by F. Griffith in 1893. The papyrus contains 35 separate paragraphs relating to women’s health, such as gynaecological diseases, fertility, pregnancy, and contraception. It does not describe surgery. It does however mention teeth. Kah 5: contains the following prescription:

Knowledge of a woman pained in her teeth *ibh* and jaws *nhd*; she knows not [how to open?] her mouth. Say thou to her it is the itching (?) determinative a toothache *tj3.w* of the vulva (uterus?). Do thou for her (thus): you must fumigate her with oil and terebinth *sntr* resin in a bowl *d3d3* (?), pour *iwh* in her vulva the urine of an ass that has engendered two colts on the day that it has passed it (the urine). If her...is pained from her...shoulder (?) to her...hips (von Deines & Westendorf 1958:269).

Physical evidence of dentistry in ancient Egypt

Conservative dentistry and tooth extraction

Odd, bizarre, extraordinary, peculiar, inexplicable and/or mysterious are a few of the expressions used by some scholars when they are faced with the quandary of the paucity of dental restorative prosthetic evidence in ancient Egypt. Ghalioungui

positioned “under” the chin (... deine beiden Daumen unter sein Kinn), followed by the words after treatment of the dislocation “one with a dislocation of the mandible: it is an illness that I treat. Then you shall bandage (or strapping or put a dressing) soaked in *imr.w* – mineral, honey every day until it is better”.

(1971:93) suggested that if professional dental care had been given to anyone in the empire, it would surely have been to the royal family. However, none of the pharaohs' mummified remains which have been discovered show any sign of dental intervention, apart from a number of molar extractions.²⁹ Ghalioungui's riposte on this matter is that tradition has it that should an individual be interred with a bodily defect it would create the danger of resurrection in the afterlife with the same defect (1971:93). This, however, would not explain the many severely broken and carious teeth found in mummified royals. Chohayeb (1991:67) is of the opinion that dentists serving royalty avoided filling cavities. The general philosophy on health at the time was that a healthy mouth meant a healthy body; in the event that any procedural treatment on any royal should have failed and a limb, eye or tooth was lost, the physician or dentist had to give up that part of his own body to serve as witness to his professional incompetence. The dentist would therefore rather have used conservative treatment as the Ebers Papyrus is testimony to (Chohayeb 1991:67). Removal of loose teeth affected by periodontal disease can sometimes be done with the fingers alone, otherwise the use of forceps or elevators becomes unavoidable. Nunn (1996:204) asserted that no such instruments have ever been found from the pharaonic period, neither has it been mentioned in any of the medical papyri. However, sturdy jaws have been found where teeth were removed where no sign of any periodontal disease was present. Nunn therefore believes that some method of removing teeth must have been practised, unknown to modern science.

To recognise restorative dentistry as the only criterion to identify dentists is erroneous because oral pathology and oral medicine are as much a part of dentistry as restorative dentistry (Clarke 1980:80). However, there are signs of restorative dentistry in the form of fixed prosthetic appliances, and even signs of surgical dentistry have been found in ancient Egypt (Weinberger 1947:180). Ghalioungui (1971:93) speculates that in the treatment prescribed in Ebers 739 and 740, the word *ws3* transliterated into German as "ausstopfen" or "plombage" hypothetically refers to

²⁹ In neighbouring Israel, Asbell (1941:1106) attests that the practice of extracting teeth was frowned upon; the Talmud specifies that tooth extraction should be avoided (B. Talmud, *Pesahim*, 113,a). Nevertheless, the extraction of teeth was performed regardless of the prohibition; Preuss is quoted by Asbell (1941:1107) as follows: "At first, the investing gum was incised. Then the tooth was well-shaken until it was loosened. Then, with *summon periculo evellitur*, the extraction was attempted with the fingers and, if this failed, a forceps was used which was more like a blacksmith's instrument than any surgical appliance." The author is of the opinion that the same procedure was probably followed in ancient Egypt.

a tooth filling material.

A mummy of a wealthy young man was described by Jarus (2012). His teeth were in horrible condition (see Figure 4 below). He had numerous abscesses and cavities, conditions that appear to have resulted at some point in a sinus infection, a condition potentially fatal. The pain the young man suffered must have been excruciating. A 3-D reconstruction of the 2 100-year-old mummy's teeth revealed a linen mass that was inserted into a cavity on the mummy's left side between the first and second upper left molars. The linen wad may well have been saturated with some sort of unknown medication. This linen wad may have acted as a "barrier" preventing food particles from getting into the cavity and the medication may possibly have relieved the man's pain. This can certainly be regarded as evidence of a therapeutic-palliative dental filling.

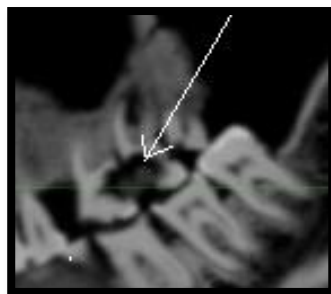


Figure 4: A CT scan of 2100 year old mummy reveals much dental pathology, but of interest here is the inclusion of a linen wad filling placed in the gross carious lesion between the upper left first and second molar teeth (see arrow). Observe the extent of the generalised dental wear as well as carious cavities. (Jarus 2012)

Historically, Duval (1808; in Weinberger 1947:171) held that some royal mummies wore "sets of artificial teeth [that] were wood carved to fit the roofs of mouths, while the teeth, which were of brass, were generously attached". Weinberger also cited Linderer (1851) who attributed to Belzoni (1820) the fact that he, Belzoni, had discovered such prosthetic work in some mummies – no confirmation has unfortunately been found to substantiate such claims. Weinberger (1947:171) further reveals claims by Belzoni himself of "sets of artificial teeth, the base is of solid gold and the teeth of ivory" and even "gold filling of teeth". Notice should however be taken of the claims of Raymond (1893:632): "Egyptians were well advanced in the art of prosthetics; teeth filled with gold were found in the mouths of mummies as well as

artificial teeth made of sycamore wood". Rosner (1978:288) opposes this viewpoint; he cites George Ebers³⁰ speculating that gold covering on teeth and "bridging" of teeth by means of gold wire were affixed post-mortem, probably during the process of mummification.

Prosthodontic dentistry

The degree of dental science in the prosthodontic field in the Old Kingdom, Fourth Dynasty is underscored by the discovery in a cemetery at Gizeh by an expedition of the *Wiener Akademie* and reported by Junker in 1914 of two teeth³¹ that are ingeniously held together by fine gold wire. The first had probably been a loose molar that is fastened to a neighbouring sound molar tooth to keep it from falling out (Weinberger 1947:176). Hoffman-Axthelm (1970:81) believes that there may have been many more such specimens that have escaped the eyes of dental writers

A second prosthodontic appliance, the "el-Quattra bridge" dated around 2 500 B.C.E., was excavated at el-Quattra near Cairo. This dental bridge was not found *in situ*, but was found amongst scattered remains of skulls elsewhere, and is described by Forshaw (2009b:483). The el-Quattra bridge consists of a maxillary right upper canine, around which a double stranded gilded wire had been wound, finishing in an "eye-loop" on its distal surface. A separate upper central and lateral incisor was found with similar gilded wire connecting the two teeth. It is believed that the brace at one time was connected to the canine tooth's eye-loop by some form of hook, perhaps passing palatal to the canine. The central incisor had a hole drilled from the mesial aspect to the distal aspect through which the wire passed, then labially through a groove in the labial aspect of the clinical crown and which then encircling the lateral incisor. All three teeth were rooted, although the root of the central incisor showed signs of root resorption. It is thought that the two central incisors were the pontics, the upper right canine the distal abutment,³² whilst a missing upper left central may have acted as the mesial abutment tooth, thus completing a four unit bridge. Calculus was found on the lateral incisor and the canine; it is therefore claimed that the bridge had been worn for an extensive period of time.

³⁰ George Ebers in Geist-jacobi, *Geschichte der Zahnheilkunde* (Tübingen, 1896:9), not handled by author.

³¹ The crown of the lower left third molar showed extreme wear and its root resorbed while linked by gold wire to the second molar as support, a method still practiced today (Weinberger 1947:180).

³² Abutment: A term referring to the teeth on either side of a missing tooth or teeth, which are used to anchor a fixed or removable dental prosthesis or bridge.

A third bridge, excavated from Tura el-Asmant, was found *in situ*, attached to the skull. This bridge was dated to the Ptolemaic period around 332-323 B.C.E. The bridge consisted of a single pontic,³³ a right maxillary central through which two holes were drilled, from the mesial aspect to the distal aspect. The pontic tooth had been fixed to adjacent abutment teeth of unknown status (Forshaw 2009b:483). The “Tura El-Asmant” bridge has been reported in much detail by Iskander and Harris (1977:86-87), naming the bridge found by El-Hetta in the skull of body T-121 the “silver bridge”.³⁴ The name refers to the discovery of a pontic tooth (upper right central incisor) attached to the upper left central incisor and the upper right lateral incisor tooth by means of silver wire. The silver wire passes through two holes drilled through the upper right central in a mesio-distal dimension. It is clear that the holes were drilled outside the mouth because of the lack of space intra-orally. The wire attracted interest because it had suffered from complete corrosion and the resultant amorphous silver chloride was completely devoid of any metal.

Surgical dental procedures

The procedure of the surgical treatment involving a dental abscess was first raised by Hooton (1917:900). A mandible belonging to a fragmentary skeleton from an Old Kingdom tomb at Giza showed evidence of two holes being drilled³⁵ on the buccal surface on the right side of the mandible, one between the roots of the second premolar and the first molar at a slightly higher level than the mental foramen (see Figure 5 below). The other hole was drilled more distally between the roots of the first molar tooth. Radiographic evidence indicated an abscess in the region of the two holes on the roots of the molar tooth. Caries on the disto-buccal surface of the first molar may have been responsible for the abscess. The following suggestion was posed by Hooton for the holes being drilled in the junction between the alveolar bone and the compact bone of the mandible to alleviate the pain due to pressure that the abscess caused. A hole was drilled in a downward angle of 150° to the sagittal plane which then reached the anterior border of the abscess in order to drain the puss. It is thought

³³ Pontic: the portion of a dental bridge that substitutes for an absent tooth, a false tooth.

³⁴ Silver, until the Eighteenth Dynasty, was much rarer than gold, therefore more expensive. Silver was still valued more than gold even in the Ptolemaic Period (Iskander & Harris 1977:88).

³⁵ These holes were drilled by the use of some specialised instrument, probably by a bow-drill with a tip of bronze, for the purpose of draining the abscess present at the apices of the first molar (Asbell 1948:125).

that the required drainage did not ensue and another attempt was made by drilling³⁶ a hole slightly higher up and more distal, between the roots of the molar tooth.

The author is of the opinion that the differential diagnosis of supernumerary *foraminae mentalis* is not valid, neither is the natural drainage through the area of least resistance viable because the anterior hole that was drilled went through a thickness of 2,5 mm of sound bone tissue before reaching the infected area, cf. Forrai (2009:189, 190). Others scholars like Leek (1967:56) erroneously believe it is quite impossible that the holes are the result of human intervention.

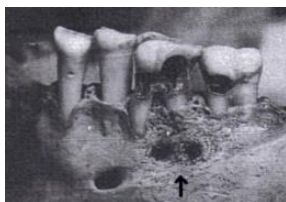


Figure 5: Buccal view of lower left premolar/molar area of mandible, two cylindrical holes similar in size and depth below first molar. To the left is the typically positioned mental foramen. Gross caries is visible on the buccal aspect of the first molar with severe periodontal lesion exposing both roots (Hawass 2007:22).

Physical evidence of surgical instruments per se has not been found in ancient Egypt. However, inscriptions of surgical instruments were found depicted on the wall of the Twin Temple of Kom Ombo on the Nile. This was the centre for medical care in ancient Egypt. A hieroglyphic relief depicting various medical and dental surgical instruments on the walls of a tomb was thought to be inscribed during the Grecian Period. The relief details medical instruments, including bone saws, suction cups, knives, scalpels, retractors, lances, chisels and dental tools (Nunn 1996:165). See relief in Figure 6.

³⁶ Breasted (1930:XIII, XIV, 8, 9 & 53) alluded to specialised instruments of metal, presumably bronze, already in existence in the age of the Edwin Smith surgical papyrus, where mention is made of a 'fire drill'. Hand-held bow drills with flint bits were common tools in ancient time, although no miniature specimen has been found. The author wishes to note the holes that were drilled in the pontic teeth of the bridges mentioned elsewhere, for which no information or explanation has yet been found. Drilling a minute hole through the enamel of a tooth required a highly sophisticated tool.

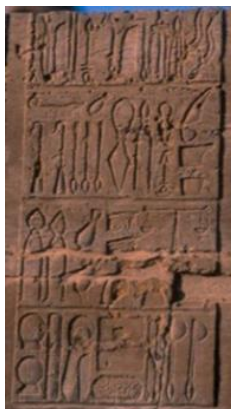


Figure 6: Surgical instruments depicted on the entrance wall of the Twin Temple of Kom Ombo. (Reeves 1980:6). Many instruments are labelled according to the resemblance to known medical devices today, some probably used in the dental field, see dental forceps lower left second row (Nunn 1996:165).

CONCLUSION

The question posed whether dentistry was practiced in ancient Egypt, and whether the dental profession existed receives a resounding yes as an answer from the author. There seems to be a general consensus amongst anthropology scholars that ample Egyptian literary evidence exists of an established dental profession in ancient Egypt. There are however still scholars disputing this assumption, quoting no proof or indubitable records substantiating dentistry. Forshaw (2009a:422) is one who does not commit himself to this question, but nevertheless writes about ancient dental hygiene and health factors respectively and concludes that in pharaonic Egypt dental care was effected by the application of medicaments and not by surgical means, and that there did not exist a separate dental profession.

Clarke (1980:80) justly argues that one should not only recognise restorative dentistry as a criterion to identify dentists, because oral pathology and oral medicine are as much a part of dentistry as restorative dentistry. Operative dentistry is undisputedly seen in the treatment for a dislocated mandible, and the drilling of holes through teeth³⁷ and into cortical bone confirms adeptness of an operator that knew

³⁷ Gorelick & Gwinnett (1978:38) show that there were indeed drilling phenomena in ancient Egypt. They found perfect holes drilled through ancient seals, probably using a bow drill.

what he was doing and obviously why he did what he did. The specific mentioning of dental maladies and treatment thereof should stand out as sufficient for the argument that dentistry existed in ancient Egypt – add to that the titles of certain care-givers as “those who deal with teeth”.

The principal medical papyri – the Ebers, the Edwin Smith, the Kahun and the Papyrus Anastasi, all of which contain medical and dental recipes – were more than sufficient as the primary source of evidence on diseases in ancient Egypt. “Time has spared for our admiration a mass of documentary evidence – the so-called medical Papyri” writes Nunn (1996:40). Science will forever be indebted to these papyri.

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