

Review

# Reproduction concepts and practices in ancient Egypt mirrored by modern medicine

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Received 5 December 2004; accepted 25 March 2005

## Abstract

The treasured ancient papyri provide a glimpse into understanding of common concepts and practices in ancient Egypt. The Kahun gynecological papyrus and other texts unveil the traditions of reproduction, conception and delivery. This article addresses the rationale of beliefs and practices of that era. Frequently, the reason for common traditions exercised at the time is based on medical knowledge of female anatomy and physiology during pregnancy. Surprisingly some of the remedies commonly used in ancient Egypt were recently explored and found intriguing. This paper was aimed to look at the reflection of archaic practices and concepts of ancient Egypt by the modern mirror of evidence-based medicine.

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**Keywords:** Ancient Egypt; Birth; Conception; Contraception; Reproduction

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## 1. The papyri—a glimpse into medicine in ancient Egypt

A great deal of our knowledge of ancient Egyptian medicine comes from the medical papyri: Edwin Smith papyrus, the Ebers papyrus and primarily from the Kahun papyrus [1]. The former two date from the 17th and 16th centuries B.C., discuss the symptoms and diagnoses of a variety of diseases and contain recipes and spells for their treatment. The Kahun papyrus is a gynecological text that let us into the ancient Egyptian concept of human reproduction. Discovered by Flinders Petrie in April of 1889 at the Fayum site of Lahun, the Kahun papyrus was dated during the Middle Kingdom, principally under the reign of Amenemhat II and his immediate successor (ca. 1825 B.C.). The gynecological text is divided into 34 paragraphs, of which half deal with women medicine, e.g. infertility diagnosis, pregnancy diagnosis, methods to improve conception, contraception methods, complications of vaginal delivery and reproductive disorders. Additionally, the Chassinat parchment, a collection of 237 prescriptions from the 9th and 10th centuries B.C. contains a few gynecological texts, the Berlin papyrus consists of 15 columns dealing with childbirth and infants, which dates from about 1350 to 1200 B.C. and the incomplete Brooklyn papyrus deals with birth and postpartum care. These treasured ancient texts provide a pathway to understanding common concepts and practices in ancient Egypt.

## 2. The practice of obstetrics and gynecology in ancient Egypt

The Egyptians were zealous in their embrace of the divine. Its influence permeated all aspects of society, including medicine. This has led to the disingenuous view that ancient Egyptian medicine was wholly irrational. However, only when unable to influence the outcome of a disease, ancient Egyptians resorted to the divine. Magical spells were whispered for the treatment to work based on the belief that diseases were demonic in origin, as well as for their moral support value [2].

In the ancient Egypt, the main treatment modalities provided by the “*swnw*” (pronounced *sounou*, physicians) (Fig. 1) were founded on pharmacopoeia from animals, plants and minerals while surgical intervention was never recommended. The ancient Egyptian *swnw* made extensive use of herbs and plants. Unfortunately of the 160 plant products described in the medical Papyri only 20% have been identified [27].

Certain *swnw* in ancient Egypt had additional titles suggesting that they specialized in various parts of the body, such as physician of the eyes, physician of the abdomen and shepherd of the anus. Herodotus (ca. 440 B.C.) wrote: “The practice of medicine they split into separate parts, each doctor being responsible for the treatment of only one disease. There are, in consequence, innumerable doctors, some specializing in diseases of the eye, others of the head,

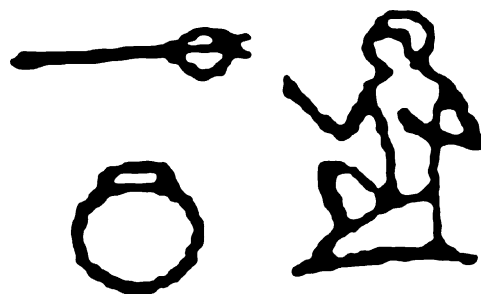


Fig. 1. Hieroglyph determinative for a person skilled in the art of healing (*swnw*).

others of the stomach, and so on; while others, again, deal with the sort of troubles which cannot be exactly localized” [3]. The latter, however, does not apply for practitioners in the fields of obstetrics and gynecology in ancient Egypt.

Religious decrees may have prohibited men in attendance at births, therefore *swnw* were not present during labor rather there were typically two to three midwives to assist the parturient, particularly if the pregnant woman was of noble lineage.

There are few examples of women as physicians. In the Leyden papyrus, the lady overseer of lady physician Peseshet (*swnw.t*) is the first historical record of a woman as a care provider. There are only two other medical references for women as medical care provider in ancient Egyptian medicine; Tawe (*t-w*) ca. 300 B.C. and a midwife (*iat-rini*) from the third century A.D.. By this late date, a recognizable system of midwifery may have developed, although this latter reference is the sole surviving historical testament [2]. Another testimony for the existence of midwifery in ancient Egypt comes from the bible where the Hebrew midwives Shifra and Puah (Exodus 1:15) disobeyed the law of the Pharaoh to kill the male newborns.

## 3. Conception

Ancient Egyptians have recognized the procreative relationship between sexual intercourse and pregnancy. They regarded the male’s contribution as a “seed” that is planted onto the fertile ground of the female uterus. The semen was believed to originate in the spinal cord. This misconception was set forward by Egyptian priests who were engaged with sacrifices of bulls to the gods. They perceived the phallus of the bull as an extension of the spine, since bovine *retractor penis* muscles are attached to the sacral vertebrae. It was conceivable that it takes a large bone, such as the sacrum (actually a fusion of five vertebrae) to protect the fluid that holds the spirit of life and to mythically dismember Osiris, the good god of fertility [1]. According to Egyptian tradition, the god Seth murdered his brother Osiris, torn his body apart and buried the parts of his body throughout Egypt. The growth of new crop every year was regarded as a sign of Osiris resurrection. Interestingly, the *os sacrum* (“sacred bone”) has later developed in the Jewish Kaballah to be the only non-

decayed bone that would be the first to be resurrected on the day of redemption (Zohar, Book 2, 28.2).

Another speculative thesis considered the semen to arise from the heart and to be transferred to the testicles. The sexual act was described in an ancient text as “man laid his heart in the woman”. The Egyptians believed that the monthly cycle ceased during pregnancy because the blood was being diverted to create and sustain the embryo. The maternal part in reproduction was unclear since they did not realize that sperm traveled to the uterus and to the tubes, nor did they recognize the ovaries. The female body served as an incubator for the fetus; the uterus was but a vessel, but the vital role of the placenta in fetal nourishment was already appreciated.

#### 4. Pregnancy diagnosis

Of all the diagnostic methods of pregnancy in ancient Egypt that survived, none was based on the date of the last menstrual period. The first method suggested counting the number of times the woman vomits when placed on a mash of beer and date. The aversion of strong aromatic odors, nausea with or without vomiting is also specified today as a presumptive evidence of pregnancy. The second method could be later found in Hippocratic writings (460–377 B.C.). It instructed to place an onion bulb deep in the vagina overnight. The onion’s characteristic smell detected in the woman breath was a sign of pregnancy [1]. Previous texts accused the Egyptians of anatomical ignorance as if the rationale for this pregnancy test was a direct connection between the uterus and the digestive tract. Such connection would be lost in a case of obstructed Fallopian tubes. However, absorption of the onion’s sulfuric compounds into the woman’s blood via engorged sub-mucosal blood vessels may result in “onion breath” and could serve as a better explanation for this ancient practice. In 1886, Chadwick described dark-blue discoloration of vagina that bears his name as a sign of pregnancy reflecting congestion and increased blood flow of the vaginal mucosa [4].

#### 5. Duration of pregnancy

The length of the human gestation was based on Horus gestation which lasted 294 days according to prototypic myth. Horus was the son of Isis, the devoted spouse of Osiris, who was magically impregnated of her dead husband after collecting his scattered body. The penis of Osiris was never found and was believed to have been swallowed by fish of the Nile. Plutarchus (ca. 100 A.D.) indicates that this was the main reason for the avoidance of fish by Egyptian priests. Another text of unknown date specifies pregnancy length as “up to the first day of the tenth month” that is approximately 270 days. Today the mean duration of pregnancy drawn from the first day of the last normal menstrual period was reported to be 280 days or 40 weeks

[5]. If two standard deviations of 17 days are taken into account, the normal pregnancy duration can surprisingly be close to the two quoted pregnancy durations.

#### 6. Prediction of fetal sex

The Berlin papyrus gives instructions for predicting the sex of the fetus [1]. Urine from a pregnant woman was poured on grains of barley and emmer wheat. If they sprouted, a pregnancy was confirmed. If barley sprouted first, the fetus was a male. If the emmer wheat sprouted first it meant a female and if none grew the pregnancy would fail. The origin of the test lies in the separate divinities of wheat for male and spelt for female. The hypothesis that the urine of a pregnant woman can reveal the sex of the offspring was investigated at the University of Cairo and deferred [6]. However, pregnant urine samples were found to significantly enhance germination compared to non-pregnant urine samples. Another method to influence the sex of the fetus was to let a pregnant woman consume breast milk of a parturient who had delivered a male newborn.

#### 7. Delivery

Little is directly known of the ancient Egyptians concept of childbirth, although a separate hieroglyph appears as a determinative for birth. This hieroglyph aptly depicts the head of the newborn emerging (Fig. 2). The medical papyri say nothing about the normal conduct of labor, and only representations of the magical birth of kings exist (Fig. 3), as in the Westcar papyrus. Isis placed herself in front of (the woman), Nephthys behind her, and Heqet hastened the birth.

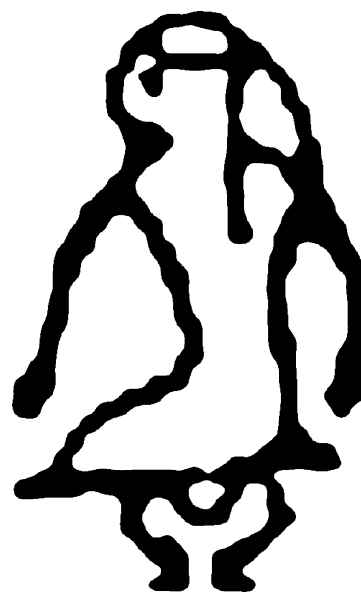


Fig. 2. Hieroglyph determinative for birth depicts the head of the newborn emerging of a squatting female figure.



Fig. 3. The ritual of divine childbirth. The goddess Ritho giving birth to the god Ra assisted by midwives.

The child rushed forth into (Isis) arms, his bones strong then they washed him and his umbilical cord was cut. He was placed in cloth on a couch of brick.

Wall paintings from the workmen's village at Deir el-Medina depict the birth arbor to where women were secluded during childbirth. Delivery was performed in the squatting position, with the woman supporting her arms on knees and sitting on two bricks (Fig. 4). The squatting position is considered by many today as the most natural position for delivery. The physiological advantages of upright birth positions, such as squatting consist of: (i) the added force of gravity to the baby's weight, (ii) reduced aorto-caval compression known to affect fetal pH values [7], (iii) improved alignment of the fetus [8] and (iv) contribution to stronger and more efficient contractions [9,10]. Upright positions were found to enlarge the pelvic outlet by some [11–14], but not others [15,16]. Recently pelvic dimensions in squatting and traditional supine position were measured in a 0.5-T low-field vertical open configuration magnet system. The squatting position enlarged the sagittal outlet, the interspinous diameter and the intertuberous diameter [17].

In a latest Cochrane analysis use of squatting position for delivery, compared with supine or lithotomy positions, was



Fig. 4. A woman squatting to give birth accompanied by the cow-faced goddess of fertility, sexuality and childbirth, Hathor.

associated with reduced duration of second stage of labor; a small reduction in assisted deliveries; a reduction in episiotomies; reduced reporting of severe pain during second stage of labor and fewer abnormal fetal heart rate patterns. However, the squatting position was associated with an increase in second-degree perineal tears and increased blood loss [18].

Difficult labors were aided by burning resin, or massaging the abdomen by saffron powder and beer. A group of remedies were used to “release a child from the belly of a woman”, and “to cause a woman to give to the earth” [19], statements presumably meaning to treat dysfunctional labor and to augment uterine contractions. The Ebers papyrus suggests a number of therapies, including intravaginal insertion of ground corn and celery ground in cow's milk. Remedies that were taken orally included date juice and fresh salt from lower Egypt. Intrapartum analgesia was provided by wine and hashish ground in honey. There are no descriptions in medical papyri of obstetrical instrumental intervention, which probably reflected the hopeless situation when sometimes faced with labor distocia. In the tomb of King Horemheb at Saqqara, the remains of his queen Mutnodjmet and the bones of a fully developed fetus were found. Perhaps the queen had died in childbirth, as her pubic bones bore signs of previous difficult deliveries [2].

That the dangers of childbirth were appreciated is only too evident from the number of Egyptian gods and goddesses that were associated with labor. The god Bes was a familiar tutelary deity of the Egyptian pantheon emerging in the Middle Kingdom and rising in popularity well into the New Kingdom. The function of Bes was to assist women during pregnancy and delivery, and his grotesque appearance as a dwarf of clay is thought to be apotropaic, i.e. to scare off evil demons. Associated with Bes in a later period was Hathor, goddess of fertility, sexuality and childbirth, who often appears in papyrial prayers to invoke a speedy, pain-free birth [2]. Delivery sayings were repeated, such as one that asked Amun, the god of fertility to “make the heart of the parturient strong, and keep alive the one that is coming”. Another spell was used to assist the separation of the placenta: “Come down, placenta, come down! I am Horus who conjures in order that she who is giving birth becomes better than she was, as if she was already delivered . . . Look, Hathor will lay her hand on her with an amulet of health! I am Horus who saves her!”

## 8. Assessment of the newborn

Assessment of the neonate was based on his cry and muscle tone and was performed on the first day of life. The Ebers papyrus states: “. . . if, on the day the child is born, it says ‘ny’ it will live and if it says ‘mebi’ it will die”. It was also thought that if the child moaned or turned its head downwards, it would also surely die. Today, the Apgar score performed after 5 min of birth consists of five parameters, including cry and muscle tone [4]. A sick baby was put on a



diet of milk containing ground fragments of his placenta for 3 days. If he did not vomit, he was believed to survive [28].

## 9. Complications of vaginal delivery

### 9.1. Perineal tears

The Ebers papyrus provides treatment methods for perineal lacerations occurring during birth, that are primarily topical oil application to the vulva and vagina in order to relieve pain and swelling. There has also been a suggestion that the ancient Egyptians were actually suturing postpartum perineal tears. An obscure passage in the Kahun papyrus denotes the, “bringing together (ndry) of the vagina”. The use of the word “ndry” occurs in other medical papyri (Ebers, Edwin Smith) where there is little doubt that it refers to the stitching of wounds. However, surgical practice in obstetrics still remains speculative [2].

### 9.2. Prolapsed uterus

There are few references in the medical papyri to the treatment of long-term complications of pregnancy. A prolapsed uterus was certainly recognized as such in the Ebers papyrus, where it was treated with medications “fumigation of the genitals with ibis of wax” rather than by manipulation [2]. It was thought that if the patient stood over a burning fire of ingredients, her uterus would be magically forced back into its normal position.

### 9.3. Vesicovaginal fistula

A vesicovaginal fistula between the bladder and the vagina with incontinence of urine “in an irksome place” [19] was a long-term sequela of traumatic labor, even high social class women had no protection of. It has been argued that the Princess Hehenhit (XIth dynasty) died after giving birth from an infected vesicovaginal fistula [2].

## 10. Contraception

In ancient times, women practiced birth control with little interference from religious or civil authorities. They employed their knowledge of plants in their surroundings obtained probably by herders of domesticated animals who noticed that when animals grazed on certain plants, they failed to reproduce. Midwives were apparently the carriers of such knowledge. In time, plants were chosen on the basis of their word-of-mouth information and a traditional lore has gradually developed based on cumulative experience and reputation [20].

The ancient Egyptians practiced birth control and regulated family size. The Kahun papyrus listed several

recipes for contraceptives to be used intra-vaginally. The suggested ingredients, such as acacia gum, sour milk, crocodile dung and natron minerals were mixed with plant fibers and honey and formed into a pessary. The recipe of linen soaked with honey steeped in acacia spikes described in the Ebers papyrus and later adopted by Soranus of Ephesus (1st century A.D.), as probably used as today’s modern sponge and diaphragm. Modern researchers have found acacia to be spermicidal [21]. Triterpene saponins from *Acacia auriculiformis* were found to have sperm immobilizing effect in vitro. This acacia derivative successfully prevented sperm entry into the cervical mucus, disrupted spermatozoa plasma membrane and disintegrated the acrosomal cap. Exposure of sperm to the lactic acid-rich vaginal environment leads to its digestion by vaginal enzymes. Enhancement of the acidic environment of the vagina with the introduction of sour milk may establish an effective spermicide [22]. Natron is a sodium carbonate ( $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ ) salt which forms clear, white, yellow or gray crusts and crystals and is naturally found in the beds of several playa lakes in Egypt. It dissolves in water and absorbs water readily, making it an excellent desiccant. Natron is a key ingredient in the process of mummification, whose preservative properties are exceptional [23]. Surprisingly, sodium bicarbonate was shown to induce alteration in sperm plasma membrane lipid architecture, leading to head to head agglutination at the acrosomal membrane of boar spermatozoa [24]. The desiccation effect and the specific effect of sperm agglutination could be hypothesized to be spermicidal in humans. A most peculiar practice involved the use of crocodile dung as contraception would have undoubtedly occurred by way of deterrence of the partner.

## 11. Reproductive disorders

### 11.1. Sexually transmitted diseases

Genitourinary symptoms in women were prevalent as attested by the medical papyri [25]. Symptoms of a genitourinary infection were addressed as “d’fyt” describing the burning sensation during micturition. Leucorrhea, “void of thick urine” may respond according to the Ebers papyrus to mud baths and brewed beer. Purulent urethritis could also be remedied by consumption of balanites oil derived from fruits of *Balanites Aegyptiaco* mixed with honey and flakes of copper. Balanites oil is still used traditionally in Senegal to treat infectious jaundice, but search of the literature has not revealed any tested antibacterial properties of this herb. Assessment of pelvic adhesions in some mummies attributed them to sexually transmitted diseases (STDs), such as Chlamydia and Gonorrhea, however, modern microbiological tests have not been pursued on pelvic material to confirm this hypothesis.

### 11.2. Impotence

As today erectile dysfunction was a major problem in ancient Egypt. Great efforts were made to overcome it. Small pieces of a young crocodile's heart were placed into hijabs designed to protect people from evil. These were mixed with narguin wood oil to create the correct concoction and then smeared on the penis to restore his potency. In the Ebers papyrus, the average prescription contains 4.2 ingredients however another oral remedy for impotence consisted of 37(!) different ingredients. Of those which could be identified, the following are believed to have had active components; carob, juniper, hyoscyamus, pine and watermelon [27]. The carob, for example, has high content of histidine, a major component of histamine. Only recently it has been shown that histamine deficient mice have low reproduction rate due to decreased male mating behavior [26].

## 12. Summary

Reproductive science is a new-born medical expertise. However, obstetrics and reproduction complications have a history as old as medicine itself. Ancient Egyptian medicine exercised obstetric practices and reproductive concepts based on some extremely accurate observations. It has also made important contributions to our knowledge of reproductive anatomy, physiology and pathology. Therapies used then although controversial frequently resulted in relief of symptoms. Reflection of archaic practices and concepts of reproduction of ancient Egypt by the modern mirror of evidence-based medicine often reveals a strong rationale embroidered with profound beliefs.

## Acknowledgement

We would like to express our gratitude to Mrs. Miriam Segal, a beloved midwife in Hadassah Mt. Scopus hospital in Jerusalem who fermented our interest in ancient Egypt.

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