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THE HISTORY OF UROLOGY IN EGYPT

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Alexandria, Egypt

BECAUSE of the exceptionally dry climate of upper Egypt mummies and papyri have been found in good enough condition to be able to trace the existence of certain diseases of the urogenital system even after an interval of four to six thousand years. Dr. Ruffer^{1,2} could examine the kidneys of three mummies, one of which showed congenital atrophy of the left kidney; another (18th dynasty, 1500 B.C.) showed multiple abscesses in which it was possible to find masses of bacilli, most probably colon bacilli, and in the third (12th dynasty, 2000 B.C.) bilharzia ova were situated mostly in the right ureter. (Fig. 1.)

In the famous Ebers Papyrus (approximately 2000 B.C.) deciphered by Ebell,^{3,4} a Norwegian physician, there is among many other things mention of hematuria "in the heart and belly" which is most probably bilharzia.

Ruffer does not mention circumcision which was so currently practiced in Ancient Egypt. A panel in Ankh-Mahor's tomb at Sakkara gives a very clear idea of this operation. (Fig. 2.) Herodotus said that "Egyptian priests were circumcised because they considered that 'cleanliness' was more important than beauty."

In 525 B.C., right after the Persian conquest, a medical school was founded at Sais in Lower Egypt. It was then that Herodotus praised the high standard of Egyptian medicine and made mention of its peculiar division into different specialties among which figured that of the lower abdomen.

GRECO-ROMAN PERIOD

Greek medicine was introduced in Egypt during Alexander the Great's conquest and after the foundation of the city of Alexandria which became a center of learning under Ptolemeus.

Erasistratus, one of the great teachers of the School of Alexandria, laid great stress on urine inspection and was the inventor of the S-shaped catheter which was used up to the modern era. He was also the first to observe the pulse, unknown to the Hippocratic school, and to establish a theory on circulation.

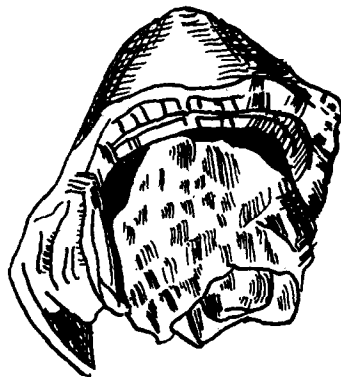


FIG. 1. Calculus found in the bladder of an Egyptian mummy by Cyril P. Bryan near Abydos and dating back to 3000 B.C. Cyril Bryan. The Papyrus Ebers (Introduction), p. 14. London, 1930.

Lithotomy was also practiced in Alexandria. Ammonios, one of the surgeons who used to perform it, introduced an instrument to crush calculi in the urinary bladder.

In the 1st century A.D. in Alexandria, Rufus of Ephesus, a prominent physician, was the first to describe the prostate as well as the relations of the vasa deferens. He also gave an account of pyuria, urinary retention and prostatic abscesses. In his "Treatise on Kidney and Urinary Bladder Diseases" Rufus describes a form of hematuria that is similar to bilharzial hematuria so frequent in Egypt: "On Hematuria: The kidneys can no longer secrete urine; their channels having become too wide, part of the blood that comes from the vena cava

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escapes through them together with other thick material; this is why when the urine rests there are deposits and, floating on the surface, are shreds which could very well be compared to jelly-fish. Cleopanthia, son of Cleobrontia, also used this comparison. When the food has

occurs unless a great quantity of thick, purulent urine is passed or unless the inflammation does not go to the outside, or unless the pain subsides." This description is very much like that of the infection that follows prostatic hypertrophy in men or as a result of an affection of

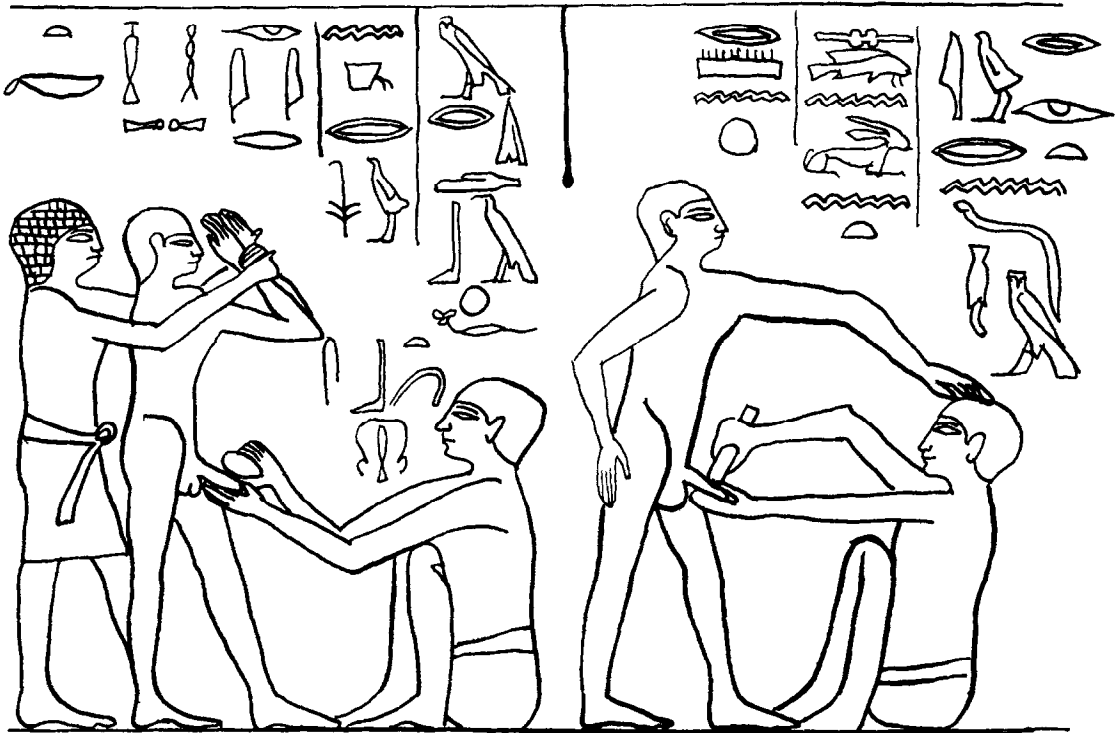


FIG. 2. Circumcision scene sculpted on tomb of Ankh-Mahor (4th dynasty).

undergone coction and has reached the veins, urine, looking very much like the one described above, is secreted. But when the food has been digested, the urine is clear without deposits and watery, having matter in solution. The reason is that the food is not yet mixed with the drink and is not transformed into blood. The disease is described as follows: The patients do not suffer or suffer very little; some are relieved after passing urine; all of them lose weight with time, especially those who pass a great quantity of blood."

Concerning inflammation of the bladder Rufus says, "Of all bladder affections the most dangerous and deadly is inflammation, the patients have high fever, insomnia, delirium and they vomit pure bile, they cannot pass urine, the hypogastric region is rigid, the pubic area is very tender, the hands and feet cannot be warmed, pains are particularly felt at the level of the pubis and a little lower. Death soon

the genital organs of the female (Bitschai). Rufus recommends prolonged seat-baths, fomentation and catheterization, the latter only for women because it is too painful when practiced on men.

Concerning hemorrhage: "There is still another acute disease of the bladder: a vein ruptures, blood escapes, partly to the outside and partly clots in the bladder. As a result there is restlessness, cold extremities, urine cannot be passed and in this, as in other cases of hemorrhage, both arms should be promptly tied by surrounding them with wool, while sponges dipped in vinegar and water are put on the pubis and perineum and fomentation of therms, pomegranate flowers, celery, and coreander are applied."

In regard to stones of the bladder: "When stones are formed in the bladder, one should first start to expel them by means of remedies, that is marrubia seeds and other roots and

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seeds mentioned above. When one does not succeed in expelling the calculi, one has to perform a perineal incision because, in general, huge hard stones are formed in the bladder which produce ulceration and bring about dysuria—more so if the stones are trapped in the urethra. If one does not wish to incise the perineum to remove stones engaged in the urethra, one should push them back with a catheter, while those not engaged in the urethra are dealt with by shaking and turning the patient from side to side in the recumbent position. In this way the stone will be driven away from the opening and urine will be able to pass. When one stands erect it is impossible to urinate owing to the blocking by the stone of the entrance of the urethra. Pain forces the patient to squeeze the penis, thus affording him relief because tension on the penis closes the urethra and prevents stones from entering it. Many patients have ulcerations in the bladder produced by the stone because of its irregularities and its big size. This is why urine is bloody, purulent or full of mucus. They suffer more than others whether passing urine or not. If there are no ulcerations but only stones, the urine is clear, watery and a sediment of gravel is formed. Pain accompanies the emission of urine, thus when the signs enumerated above exist, one may recognize the presence of a bladder stone.

“This is how to catheterize: With a patient lying on his back, the legs flexed and held apart, introduce the fingers of the left hand as far into the rectum as possible, explore the bladder in this way while an assistant presses on the lower abdomen until he feels the stone. It will be enough to introduce one finger in case the physician is used to this manœuvre and his fingers are long; in case he deals with a child and if the stone is not too big, the physician can himself compress the lower abdomen with one hand, this will be less disturbing to the patient and to the surgeon. Once the stone is caught and pushed to the opening of the urethra where it is kept steadily lest it should escape, a transverse incision is made in the perineum; if the stone is within reach, it is removed with the handle of a scalpel, but it is necessary that this handle be covered with asperities and that the end be curved in the best way fit for the operation. If it is not within reach, one should use the instrument invented for the circumstance. Do not make the opening

too big because you may run the risk of wounding the bladder itself and this should be avoided at all costs. . . . This is the best way to recognize and treat bladder stones, most physicians succeed by using this method.”

Antyllus and Heliodorus, two great surgeons in Alexandria in the 2nd century A.D., practiced the treatment of fistula on exactly the same principles as it is done today. They discussed the symptomatology and treatment of many common urologic entities such as urethral strictures, phimosis and paraphimosis, gangrene of the penis, etc.

Areteus of Cappadocius,⁵ who lived in the beginning of the Christian era, revived the Hippocratic spirit and took advantage at the same time of the technical teaching of the School of Alexandria. Areteus was the first to describe the effect produced by calculus arrested in the ureter on the urine secretion. He also dealt with the different forms of cystitis. He attributed the susceptibility of the bladder to inflammation to its vicinity to the rectum in males and to the uterus in females.

Galen was the last of the great physicians of the Antiquity. Although he spent the greater part of his life in Rome, he still belonged to the School of Alexandria because he acquired his knowledge of anatomy there. His greatest contribution to urology was the creation of a physiology based on experimentation. He demonstrated for instance that the ureters conveyed urine and not spermatic fluid to the bladder as advanced by Erasistratus and Asclepiadius.⁶ He ligated the ureters of a dog and showed that urine stopped flowing into the bladder and that the ureters were dilated with urine. He also dealt at length on what he called gonorrhea (in reality spermatorrhea), priapism, dysuria, strangury and anuria. He mentioned the frequent occurrence of vesical calculi in young boys, a fact often reported by physicians of the School of Alexandria and, interestingly enough, not at all recorded in the writings of European physicians. We believe that this is an indication that bilharzia, which is such an important etiologic factor in urinary bladder lithiasis of young people, was also responsible for it in the time of Galen.

From the Death of Galen to the Arabian Conquest (201–640 A.D.). In Alexandria medicine was slowly but surely degenerating as mysticism and superstition were destroying its scientific tradition. At the transition of the

pagan to the Christian era we find Oribasius, a student of the famous Zenon of Cyprus. His greatest contribution was to collect and record the writings of Rufus and Galen.

The greatest physician of the Hellenic period was, without any doubt, Alexander of Tralles.^{7,8} He added to the writings and knowledge of his predecessors his personal experience. His twelve books of medicine are quite pleasant to read. His eleventh book deals exclusively with the urogenital system. He first discusses the differential diagnosis of renal colic. He emphasizes the importance of finding pus in the urine before making the diagnosis of pyelonephritis, the pus being thoroughly mixed with the urine in contradistinction with pus from the bladder which comes out separately from the urine at the beginning of micturition.

Next we have the last Greek physician of Egypt, Paul of Egina,^{9,10} known to the Arabs as "the obstetrician." His work in seven volumes, "The Memorial," is a compilation of his predecessors' knowledge. His original contribution was, together with the Latin Celsus, to deal separately with operative surgery. In the section on operative urology he describes plastic operations for phimosis, paraphimosis, hypospadias and adhesions of the prepuce. He also deals with the art of catheterization. The following is an extract of Chapter 59 on the use of the catheter and the bladder wash: "When urine is retained in the bladder by any kind of obstruction, for instance clots, we introduce a catheter to free the way. We use a catheter appropriate to the sex and age of the patient and introduce it carefully in the following way: we attach a fluff of wool in the middle with a linen thread, pass it with the help of a reed through the catheter up to the hole near its tip. If the wool sticks out from the hole, we cut the extra pieces with scissors and dip the tip in oil; we then place the patient on a chair and apply hot fomentations if there is no contra-indication to it, we hold the catheter and introduce it first straight up to the base of the penis, then pull the penis up to the level of the umbilicus as in this part the urethra is curved. And this is how we push the catheter in. When it reaches the perineum near the anus we replace the penis with the catheter in its original position, because from that point onwards the neck of the bladder turns up. We then push the catheter until it reaches the bladder and pull the linen thread so that the fluff of wool

as it comes out is followed by a stream of urine—in the same way as it is observed in the case of siphons.

"This is the method used to introduce the catheter. Since we are often obliged to wash the ulcerated bladder, we use auricular syringes if it is possible in the way mentioned previously. In case this is impossible, we adapt a leather pipe or a bull's bladder and wash through the catheter."

He also describes in great detail a perineal urethrotomy for removing calculi in the bladder neck: "When we proceed to operate, we first shake the patient either with the help of an assistant or by making the patient jump from a high place in order that the stone may slip into the bladder neck. We then make him sit with his hands stretched under his thighs so that the bladder lies in a narrow space. If by palpation we find that the stone has come down to the perineum as a result of the shaking, we proceed to operate. If it did not descend, we introduce—in the child—the first finger of the left hand after oiling it, and in the adult, the middle finger, into the rectum and seek with the finger curved backwards to locate the stone. If we have found it, we push slowly towards the bladder neck, or we fix it by instructing one assistant to compress the bladder with his hands and another to maintain with his right hand the testicles and stretch the perineum with the left hand to the side opposite to that in which we intend to make the incision. Holding the instrument—called the Lithotome—we make an incision between the anus and the testicles, not in the middle of the perineum, but rather in the vicinity of the left buttock across the stone. The incision is larger towards the outside and is just enough to the inside to permit the escape of the stone. The latter occasionally jumps out with ease at the moment of the incision as a result of the pressure exerted by the finger in the rectum without any need for extraction. If it does not show up, you extract it with the help of the 'lithoulque (calculus hook).' If the calculus is small and has slipped in the urethra and cannot be expelled by urine, we pull on the prepuce, tie it at the tip of the glans and we put another ligature at the base of the penis; we then incise over the calculus which protrudes and by bending the penis we bring out the calculus. We remove the ligatures and clean the wound. The posterior ligature prevents the calculus from



FIG. 3. Heat cautery for treatment of hydrocele.

slipping back into the bladder, the anterior one to allow the wound to be covered by the prepuce after the extraction."

Paul of Egina later discusses hydrocele, sarcocoele and varicocele; he describes the castration operation and recommends excision and not crushing of the testicles as he noted that sometimes sexual power was retained after the latter procedure. (Fig. 3.)

The School of Alexandria and the Near East. Although very few evidences are available, we know that most physicians of the Near East had come to Alexandria to study medicine. We find in Coptic⁹ and Arabic manuscripts¹⁰ several references to the School of Alexandria as well as many translations of Greek medical treatises.¹¹⁻¹³

UROLOGY AMONG THE ARABS

Real medical science started with the Arabs around the middle of the 8th century A.D., thanks to the protection of Abbassyde Caliphs who encouraged translation of scientific Greek manuscripts. The first translator was a Persian Jew by the name of Massarjawaih. The most prominent and prolific of all was, however, Honain ibn Ishak.¹⁴ He translated almost all the important Greek medical literature. (Figs. 4 and 5.)

An original contribution was brought in 850 A.D. by Ali Ibn Kabban el Tabbari in his "Paradise of Wisdom"¹⁵ in which in chapters 149 to 157 he deals with urogenital diseases. Among other things he discusses urinary incontinence which he attributes to a relaxation of the sphincter or to cystitis. He also mentions oligospermia and espermia which are not found in the Greek literature.

A second book published around the same period was most probably by a student of the famous Thabit Ibn el Qora. It is entitled "Al Dakhira fi Ilm el Teb"¹⁶ which literally translated means The Treasure in Medical

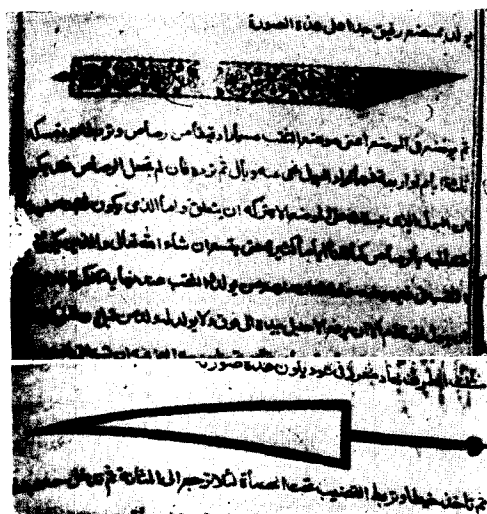


FIG. 4. Scalpel for congenital stenosis of the meatus. The meatus is slit and a nail inserted. The latter is removed during micturition.

FIG. 5. Bore for stones impacted in the urethra. The penis is tied below the stone and the stone is bored with this instrument.

Science. In the chapter on the uropoietic system we find for the first time a mention of polyuria as a disease separate from diabetes.

Rhazes. As soon as the Greek sciences were translated into Arabic by Christians, Moslems—especially Persians—took advantage of it and studied them with enthusiasm and zeal. One of them, Mohamed Ibn Zakaria al Razi (865-925), was by far the most famous and prolific.¹⁷ His important work is called "The Book that Comprises Medicine." The chapters devoted to urology are especially interesting because of the many personal annotations that Rhazes had added to the classical translations of his Greek predecessors. Rhazes was an excellent observer. What follows is a description of a case of renal infection:^{18,19} "Abdullah ibn Sawada was suffering from a fever which occurred once every six days. Sometimes it had a tertiary, quaternary or quotidian form. Those attacks were preceded by a slight chill and frequency of micturition. I expressed the opinion that those attacks would be transformed into a quaternary fever and if not, that we were dealing with a case of renal abscess. The only thing which prevented me from maintaining my point of view was that the patient previously had had attacks of fever of different types which confirmed my inclination to suppose the existence of inflammatory processes which would develop to a quaternary fever. Further-

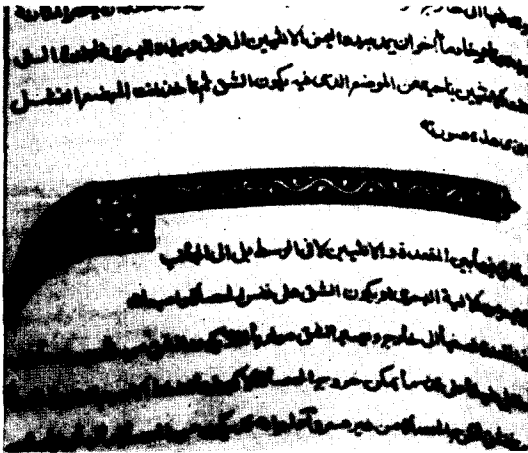


FIG. 6. Scalpel for perineal incisions in treatment of bladder stone.

more the patient had not informed me that he felt a heaviness in the lumbar region when standing erect and I had neglected to question him on the subject. The frequency of micturition should have reinforced my suspicion of a renal abscess since I did not know that the father of the patient had suffered of the same weakness of the bladder and that the patient himself had suffered from it when he was still enjoying good health. One can thus see that it is our duty to avoid all lack of attention very carefully with the permission of Allah."

In case of acute retention of urine due to calculi obstructing the bladder neck he recommended incision of the perineum (Fig. 6) and the introduction of a catheter to push back the stone and free the passage. Rhazes attributed incontinence to cold and cured it by hot baths. In a treatise on calculi of urinary bladder and kidneys, which manuscript²⁰ is conserved at the Leyden University Library, he deals with the etiology, symptomatology and treatment in great details. He gives among other things the formula of "A diuretic which increases the secretion of urine, cleans the urinary passages and expels the matter that is going to form the calculus: one part of melon seeds, a quarter of wild carrot seeds, one half of the whole of sugar—two mithkals (approximately 12 gm.) to be taken two hours before and ten hours after the meal."

A contemporary of Rhazes, Isaac Judaeus, wrote a treatise which was translated into Latin and called "De Urinis."^{21,22} It is a summary in ten chapters of the knowledge of the ancients on the significance of the physical qualities of

urine. This work was highly appreciated during the Middle Ages and up to the present time.

In the second half of the 10th century Abul Kassem Khalaf el Zahrawi, known to the Latins as Abul Kasis,²³ gave in one of his numerous books the detailed description of the surgical treatment of urethral calculi. He used a pointed instrument to pierce the calculus with a rotatory movement. He also used a piece of diamond fixed at the tip of a metal wire that he introduced up to the stone which he then gently pulverized. Abul Kasis also deals with a subject which is not discussed by any other physician, the extraction of calculus in women. Besides the surgical technic he goes into the details of the social problem which was faced by the physician. Abul Kasis proceeds to give some details about accidents that occur during lithotomy: "Let it be known to you that there are stones with angles and asperities, the extraction of which is difficult. There are others—smooth ones—which resemble acorns and are rounded, their extraction is therefore easy. For those stones which are irregular you will enlarge the incision slightly. If the stone does not come out in this way, one should try other methods that is, catch it with forceps with file-like tips—so as to have a good hold on it,—or by introducing under it an instrument curved at the tip. If you cannot extract it you will enlarge the opening and if some blood comes out of it you will stop it with prussic acid. If there is more than one calculus you will push, first, the most voluminous towards the opening of the bladder and you will make an incision over it, then you will push the smaller and you will do the same if there are more than two. If it is too big, it would be foolish to make a large incision because one of two things would happen to the patient, he would either die or be affected by a continuous dribbling of urine as the wound would not heal. One should try to push the calculus until it comes out or crush it with forceps so that you can extract it piecemeal."

In the case of calculi in women Abul Kasis recommends the following treatment: "... if the patient is a virgin, she (the midwife) should introduce her finger in the rectum and search for the calculus; if she has found it and immobilized it under her finger, you will order her to incise over it. If the patient is not a virgin and has had sexual relations, order the midwife to introduce her finger in the vagina

of the patient and let her search for the calculus after having placed her left hand over the bladder and compressed it strongly. As soon as she has found it, she should push it gradually from the opening of the bladder downwards as far as it will go until it reaches the upper part of the thigh, she will then incise over it opposite the middle of the vulva near the beginning of the thigh from whatever side the calculus has presented itself. Her finger will not leave the stone but will compress it; the incision should be a small one at first; she will then introduce a catheter through the small incision and when feeling the calculus would enlarge the incision as much as she would judge it necessary for the extraction."

Ali Ibn Abbas, another physician, wrote a voluminous encyclopedia²⁴ in which we find detailed discussions on catheterization, lithotritry, castration, hermaphroditism and so forth. The following is an extract of his book, "El Kamil Fi El Sina'a El Tibbyia" (The Complete Book in Medical Art): "Description of the Penis:—The penis is a nervous organ, round and hollow, free from humidity, which takes its origin from bones called pubic bones; there are two muscles on each side, placed one opposite the other. The penis has two functions, the first, that which Nature had in mind in the first place, is the passage of sperms through the spermatic canals towards the "matrix." For that reason it is made of nervous tissue and has an exquisite sense of touch so that man can enjoy the pleasure of sexual intercourse. It is made free of humidity so that its cavity can get full, during erection, of air that fills it, enlarges it and allows it to be introduced into the "matrix" (vagina). On either sides of the penis are two muscles situated one opposite the other to pull on it at the time of coitus towards the two opposite sides so that by this way the urethra becomes straight. At the same time spermatic canals straighten in the same way and become wider thus allowing spermatic fluid to pass rapidly and easily. The second use—that which Nature had next aimed at—is that the bladder, which is situated near the spermatic canal (urethra) contains urine and Nature has made urine pass through that canal too. At the neck of the bladder there is an elongated accessory part in man at the end of which starts the cavity of the penis. When urine comes down in women, it does not pass through that accessory part because they do not have any penis,

but the neck of the bladder is made in such a way that it terminates at the vulva where the urine flows. This is the description of the genital organs of men and women. You have to know that these organs are, in men and women, the same, they only differ by their shape, and their substance. In women, the testicles (ovaries) are rounded and hard, while in men, they are elongated and soft. The spermatic vessels in men are long and hard, while in women, they are short and soft. In men the penis is long and hard, while in women, the neck of the matrix (vagina) is short and soft and the clitoris in women has the same function as the prepuce in men. This was the description of the penis and its uses. This is the end of the speech on the genital organs, God only be Praised."

Ibn Sina (Avicenna), the Urologist. Abou Ali el Hosein Ibn Sina was the most systematic of all the Arabo-Persian physicians. His "Al Kanoun fi't-tibb"²⁵ (The Cannon of Medicine) is a huge piece of work systematically divided into books, the books into sections and the sections in turn into lectures, the latter being subdivided into chapters. In his section on urology he mentions among many other things a disease entity that is very much like interstitial nephritis.

In other sections he discusses the different types of urine, micturition and its derangements. The chapter devoted to catheterization is too long and too complicated in its details to be summarized but there are certain points that Avicenna stresses which are worth mentioning. He warns the physician not to catheterize an inflamed bladder. He goes next into a detailed description of the manufacture of good catheters. He advises the use of certain sea animal skins and cheese glue to stick the skins. He recommends the use of extreme gentleness in introducing the catheter to prevent traumatizing the mucosa. In a further section he deals with the male sex organs, their anatomy, pathology and abnormal sex physiology.

On the complications following cystostomy Avicenna declares: "Urine makes the man operated upon suffer very much. That is why one must not give them much water. Every time they pass urine the assistant must protect the part of the organ with his hand, and compress it so that the urine does not reach the place of the incision. Two things can next happen: either the blood does not flow in suffi-

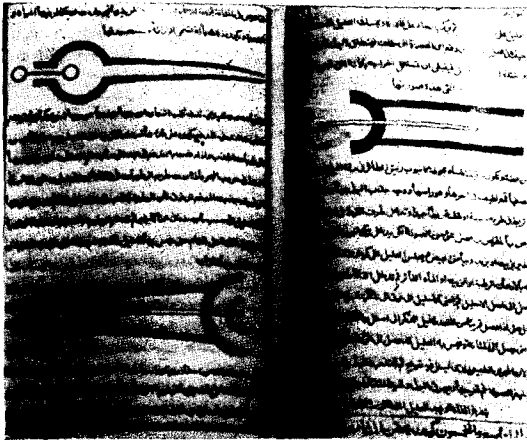


FIG. 7. Syringes for bladder wash.

cient quantity so that an inflammation is to be feared following the 'corruption' of the organ especially if its color changes from red to black, or if it bleeds too abundantly so that haemorrhage is feared. You must treat the first case as soon as you see the above mentioned symptoms. Immediately make scarifications, so that the blood flows and apply vinegar and salt which prevents the corruption. As for the second case, when a haemorrhage is feared, the best is to sit the patient in decoctions of well-known astringent medicines and to put on the place incense and crushed vitriol, covered with a fluff of cotton and over it a larger one dipped in vinegar and water. If you notice that a big vein or artery is opened, you proceed to apply a ligature, and if the haemorrhage resists and does not stop and the patient does not get well, you will make him sit in strong vinegar. Sometimes it is necessary to bleed him to attract the blood and sometimes it is necessary to put some narcotics over the pubis and on the lower back. One of the things that can happen after the incision and the haemorrhage is that a part of the blood flows towards the bladder and hardens at the opening of the bladder neck so that it is difficult to pass urine, it is then necessary to introduce the finger in the incision to take from its opening and the bladder neck that which causes the damage and remove it, and to treat the place with vinegar and water until the coagulated blood is dissolved and taken away. Another thing that may occur is that the power of procreating is abolished. As for the bad symptoms that, once revealed, give the doctor the certitude that the patient will die, it is first that the pain under the umbilicus

is violent, that extremities become cold, that the fever increases, that there are chills and a diminishing of strength later; if the intensity of the pain at the spot of the incision increases, if there are hiccups and if the belly moves in a painful way, then death is near.

"As for the favorable symptoms, these are that the patient regains consciousness, that appetite is reestablished and that the color and complexion become normal."

During the 12th century, after the defeat of the Crusaders, the center of learning shifted from Baghdad to Damascus and Cairo in the kingdom of the powerful Saladin. Jewish physicians were particularly favored. Many of them became famous, particularly Ibn Djomai and Maimonides. There is no mention, however, of the urinary system in their writings. A contemporary physician of Mosul, Mohaddhab ad-Din Ali Ibn Hobal wrote a treatise on renal calculi. He recommended a low fluid intake after Cystostomy for vesical calculi to reduce the flow of urine and enhance the healing of the wound. He also advised having the big calculi crushed with clamps before removing them, great care being taken not to leave any piece behind.

Another surgeon from Damascus, Ibn el Qoff, wrote a book, "The Pillar of Surgical Art,"²⁶ in which he deals in the sections devoted to urology with the technic of catheterization and describes a sort of syringe for bladder irrigation. (Fig. 7.) He also gives a very accurate description of bladder irrigation: "As to bladder 'injection' with the 'Zaraq'a' (syringe), this is used when the urine continues to be infected because of an ulcer in the bladder. . . . you will inject soothing remedies in the way we recommended for the urethra. The technique is to grasp the hollow instrument, the width of which allows the thumb to be introduced into it and you take another pipe which thickness corresponds to the diameter of the urethra. This instrument is made out of ivory, which is the best kind of all. You introduce the catheter into the penis with utmost gentleness, then you raise the penis slowly as described previously, then lower it; we fill the wider pipe with liquid which soothes the burning and push the liquids which are found in the wider tube with the help of a 'midfa' (piston), all together into the thinner tube which is found in the urethra."

This is where the history of urology among the Arabs comes to an end. From here on all

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medical writings are nothing but compilations of classical works and nothing original is added to them.

Notice that there is no detailed description of gonorrheal urethritis either in the Greek or Arabic literature. They have described, however, its complications: orchitis, epididymitis, cystitis and so forth. The first mention of syphilis under the name of "French sore" appears in 1498. This speaks in favor of the American origin of the disease. It was described for the first time in the 16th century by Daoud Al Antaki, chief physician of Egypt.

In the meanwhile Egypt passed through a period of political, economical and intellectual decadence, having become since 1517 a Turkish province exploited by the pashas sent from Constantinople and the Mameluks.

Prosper Alpin. This Italian physician lived in Egypt from 1680 to 1683. He was the private physician of the consul of Venice. In his works²⁷ he notes the frequency of occurrence of renal calculi in Egypt which he attributes to sexual excesses and water impurities. He also describes a very ingenious method of "non-surgical" extraction of vesical calculi. A wooden tube is introduced into the urethra while an assistant manipulates the stone with the finger in the rectum and pushes it toward the neck of the bladder. The surgeon then suddenly withdraws the tube and with it the stone.

It is strange that Prosper does not mention the Egyptian endemic hematuria.

MODERN TIMES

This period begins with Bonaparte's campaign in Egypt (1798 to 1802). There is, however, very little mention of urologic diseases in the reports of the army physicians^{28,29} as they had to deal mostly with epidemic diseases that affected the soldiers.

In 1807 Mohamed Ali the Great, founder of the reigning dynasty, decided to improve the health conditions in Egypt and called on Dr. Clot, a young physician from Marseilles, to organize a sanitary service in the country.³⁰

In 1827 a medical school was created at Abu Zaabal and was later transferred to the palace of Kasr el Aini which is now the seat of Fouad I University faculty of medicine. Clot Bey describes in one of his books two methods which were then practiced in Egypt for extracting vesical calculi: the perineal and rectal procedures.

Pruner, a Bavarian anatomist and surgeon, was the first to perform autopsies in Egypt, which is why his reports³¹ have a greater value. He was the first to note the extreme frequency of hematuria especially among young boys. He also described cases of renal calculi under the name of acute nephritis. He attributed chronic nephritis to the presence of calculi and gravel. Pruner has undoubtedly observed bilharzial lesions, describing them in the following manner: "One finds in the bladder prominent areas of different sizes which surfaces are like untanned leather covered with crusts to which grains of sand are attached. The ureter in those cases becomes exceedingly thick especially in its lower portion without being proportionately dilated. Besides those abnormalities, one finds polypoid masses in the ureters and still more frequently in the bladder."

Pruner also notes the frequency of gonorrheal urethritis. He makes no mention of prostatic hypertrophy or inflammation. He gives a detailed account of scrotal elephantiasis he had observed among Negroes. He insists on the frequency of tuberculosis and scarcity of cancer.

Theodore Bilharz came in 1850 to Kasr el Aini Hospital from Germany. This young internist and zoologist was called by Dr. Greisinger, who was made chief of the sanitary service by the new viceroy, Abbas the first. During the first seventeen months of his stay Bilharz performed some 400 autopsies.³² His aim was to study intestinal parasites. From May 1, 1851, to June 1, 1853, Bilharz reported to his teacher, Professor Siebold of Breslau, in a series of nine letters his outstanding discovery of the worm *Distomum haematobium* in the branches of the portal vein.³³ The parasite was later called *Bilharzia haematobium* thus immortalizing the name of this great scientist. Later on he gave detailed description of the worm and its development. He also attributed the extreme frequency of calculi in the bladder and ureters to the presence of the trematode, as he found calcified eggs of bilharzia in the center of the calculi.

The work of Bilharz fell into complete oblivion until 1873 when it was presented to the doctors of the Kasr el Aini school of medicine by the Italian, P. Sonsino, chief of the Khedivial Laboratories.³⁴ Further studies were made in 1885 by Fritsch³⁵ and in 1897 by Looss³⁶ with the help of more advanced microscopic technic.

In 1907 Sambon distinguished the *Schistosoma mansoni*, the eggs of which have a lateral spine from the *S. haematobium*.

In 1910 Ruffer found calcified eggs of the parasite in Egyptian mummies. It was not until 1915 that Dr. Leiper,³⁷ professor of parasitology in Kasr el Aini, discovered the snail stage of the life cycle of the worm. At the same time new methods were developed to combat this disease, the name of which is unfortunately known even in the smallest village of the Nile Valley.

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