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Urolithiasis: from past to present

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Abstract: *Urolithiasis is a polyetiological disease associated with metabolic disorders and characterized by the formation of stones in the urinary tract. Today, it has become a global problem. The incidence and prevalence of urolithiasis have been on the rise, it depends on geographical, climatic, ethnic, dietary and genetic factors. Upper urinary tract stones affect mainly men (approximately 3 times more often than women). The lifetime risk of stone formation is on average 5 to 10%. The prevalence of urinary stones in different regions ranges from 1% to 20%. In countries with a high standard of living, such as Sweden, Canada, or the United States, the prevalence is more than 10%. In some regions, there has been an increase in rates of more than 37% over the past 20 years. In Ukraine, urolithiasis ranks second among all urological diseases, with more than 52 thousand patients registered annually for the first time, and the incidence ranges from 30 to 45% among all urological pathologies. Mostly young people are affected, and the disease is associated with acute and chronic pyelonephritis and frequent recurrence of urinary stones (30-80%). This course of urolithiasis leads to renal failure, disability, and mortality. The stone formation is a complex and polyetiological process that includes endogenous (age, gender, and heredity) and exogenous factors (geographical conditions, climate, and nutrition). It is known that humanity has been suffering from this disease for over 7000 years. Urolithiasis has been well known for centuries. It is clearly confirmed by various archaeological findings, as well as scriptures about painful calculi and therapeutic procedures that were performed to remove them. Given the importance and prevalence of urolithiasis, this article reviews the historical development of the diagnosis and treatment of this disease in different regions of the world. A review of the methods of diagnosis and treatment from early antiquity to the most modern ones that are in use today.*

Keywords: Urolithiasis, Nephrolithiasis, Ureterolithiasis, Urinary Calculi, Lithotripsy

Introduction

Urolithiasis is a polyetiological disease associated with metabolic disorders and characterized by the formation of stones in the urinary tract (Pasiechnikov S.P. et al., 2019).

It is a very common disease that affects all countries around the world (Bultitude M., 2017). Urolithiasis affects 1 in 10 people worldwide at least once in their lifetime, and 2% of people have a recurrence of the disease. For each person, urolithiasis can be painful and even lead to chronic kidney disease, and the costs to the healthcare system and the economy can be very high (Wagner CA., 2021).

Mankind has been suffering from this disease for over 7000 years since 5000 BC (Eknoyan G., 2004). Urolithiasis has been well known for centuries. It is clearly confirmed by various archaeological findings, as well as scriptures about painful calculi

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and therapeutic procedures that were performed to remove them. (López M. & Hoppe B., 2010).

The concept and treatment of urolithiasis has undergone significant changes since that time.

Nowdays technological advances and changes in treatment regimens have influenced current treatment recommendations, which have clearly shifted toward endourologic procedures. minimally invasive methods and include extracorporeal shock wave lithotripsy (ESWL), ureteroscopy (URS), and percutaneous nephrolithotomy (PNL) (Türk C. et al., 2023).

Aim

Analysis of historical sources and evidence of urolithiasis in order to highlight the importance of this pathology, as well as analysis of changes in diagnosis and treatment.

Review and discussion

In 1901, the English archaeologist E. Smith found a bladder stone in a 4500-5000-year-old mummy in El Amri (Egypt), this calculus dates to 4800 BC and has a uric acid base with concentrated layers of calcium oxalate and ammonium magnesium phosphate (Tefekli A. & Cezayirli F., 2013; Shah J. & Whitfield H. N., 2002) . However, he was able to identify only four cases of urolithiasis in the thousands of mummies examined, which led to the conclusion that urolithiasis was less common in ancient Egypt (López M. & Hoppe B., 2010).

The most ancient literary citations about urolithiasis which describe symptoms and treatments to dissolve the stone occur in Asutu medical texts in Mesopotamia between 3200 and 1200 BC (Tefekli A. & Cezayirli F., 2013). Also, treatment plans for urinary tract diseases, including calculi, were found in the Ebers papyrus (1500 BC), the main source of knowledge about old traditional Egyptian medicine (López M. & Hoppe B., 2010).

The history of the study, diagnosis, and treatment of urolithiasis is shown in Figure 1 (Eknoyan G., 2004).

The first descriptions of «stone cutting» are found in Hindu and Greek writings. Ancient India used dietary therapy, a urethral syringe with curative milk, clarified oil or alkalis to treat patients with renal stones. When these methods of treatment were ineffective, surgical procedures were used, which are described in detail in the works of Sushruta (about 600 BC.). Sushruta was a surgeon in ancient India and he is the author of the book Sushruta Samhita, which describes more than 300 surgical procedures, including a perineal lithotomy called «Steinstien», which meant «cutting stone», which he explained in great details, including preoperative preparation, which consisted of cleaning the surgical field, cleansing the body with vomiting and purgative agents, as well as prayers and offerings to the gods (López M. & Hoppe B., 2010; Tefekli A. & Cezayirli F., 2013; Shah J. & Whitfield H. N., 2002).

In ancient Greece, Hippocrates (460-377 BC) described kidney disease and identified the symptoms of bladder stones, and three centuries BC, Ammonius first mentioned that crushing a bladder stone would make it easier to remove. Despite his revolutionary thoughts, surgical procedures to remove stones became popular only a century later (López M. & Hoppe B., 2010; Tefekli A. & Cezayirli F., 2013).

Ancient Greek medicine has been available in the Roman Empire since the first century BC. One of the most famous physicians of that time was Aulus Cornelius Celsus (c. 25 BC – c. 50 AD). He tried to include all medical knowledge in a single encyclopedia «De Medicina», which was a systematic review of medicine and included the works of Hippocrates (López M. & Hoppe B., 2010; Tefekli A. & Cezayirli F., 2013). It mentioned the typical (colicky pain) abdominal pain in patients with renal tract calculi and described the procedure of lithotomy with perineal incision, which was used with few changes until the end of the eighteenth century (López M. & Hoppe B., 2010). He argued that the operation should be performed in a warm room, and like Sushruta, he noted that a strong and intelligent assistant should sit by the patient's head to hold him down, but in cases where «the patient is strong enough» he envisioned the addition of two more assistants (Figure 2) (Tefekli A. & Cezayirli F., 2013).

Galen (131-200 AD), a Greek-born Roman physician, surgeon, and philosopher, was a follower of Hippocrates, whose works he tried to restore. He believed that hematuria, abscesses, and kidney ulcers were caused by the formation of kidney calculi in the form of sand or larger stones. He also performed lithotomy, which was described by Celsus (Shah J. & Whitfield H. N., 2002).

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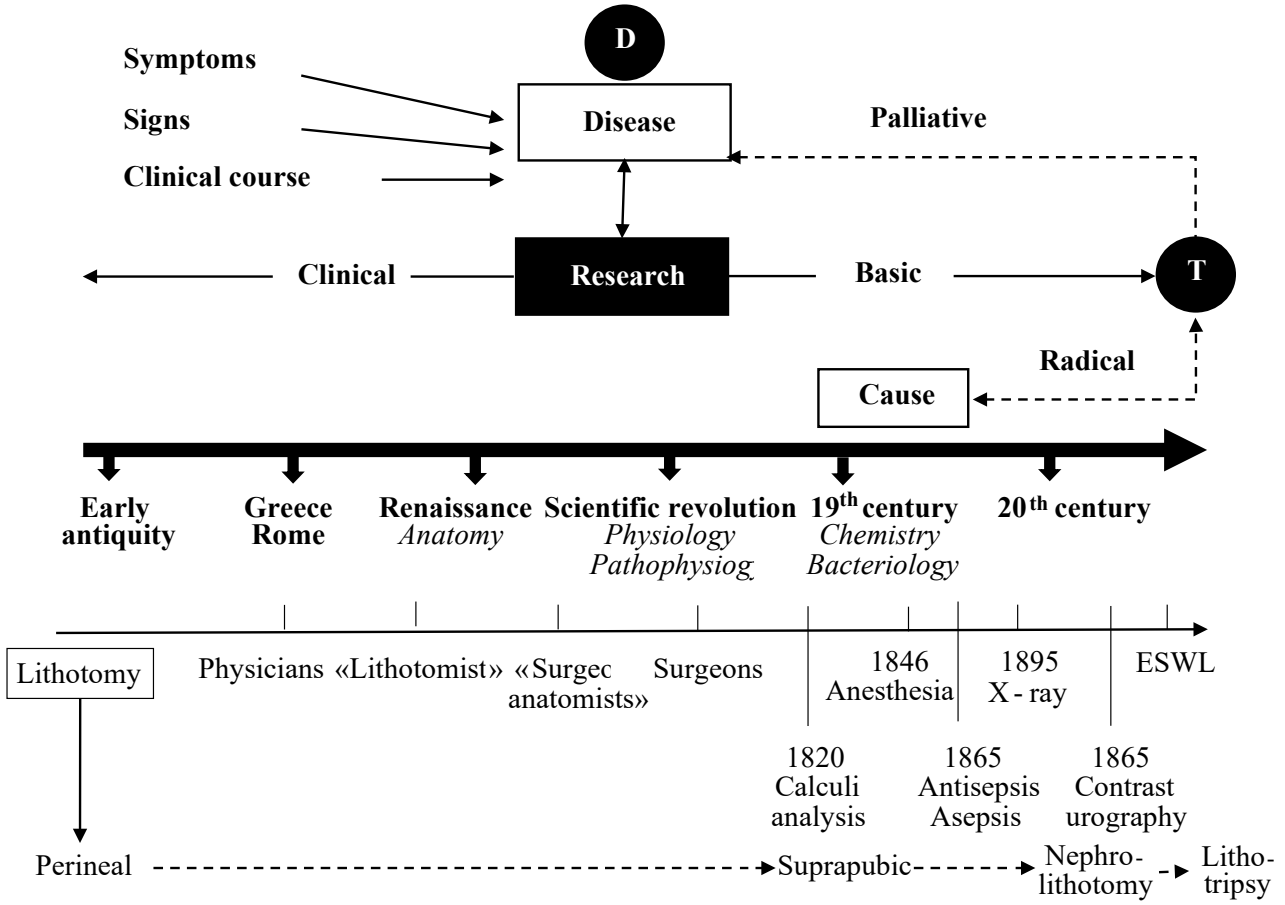

Figure 1. Chronology of the history of urolithiasis. The upper part is a scheme for analyzing any disease based on its diagnosis (D) and treatment (T) in the wide context of the historical past (thick line). The lower part (thin line) shows the history of urolithiasis from its origin in early antiquity to its modern treatment with Extracorporeal Shockwave Lithotripsy (ESWL).

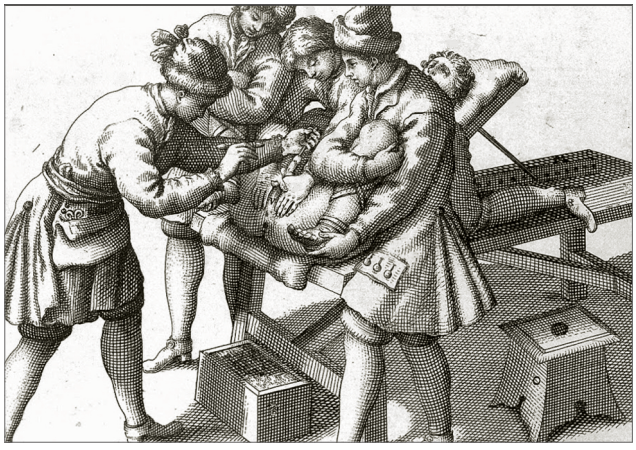

Figure. 2. Lithotomy, as described by Dr. Cornelius Celsus

At the end of the Roman Empire, all knowledge and methods of ancient Greek medicine were lost in Europe. The monks of the fifth to twelfth centuries were the only people who still knew and practiced the «old» medical procedures, and monasteries were the only places where they were performed (López M. & Hoppe B., 2010).

In the Byzantine period (167 to 732 AD), Paul of Aegina (625-690 AD) practiced lithotomy. He also described the following manifestations of urolithiasis: «sand deposits are seen in the urine, and patients suffer from frequent itching in the penis». He described his surgical procedures in his sixth of seven books, which was devoted entirely to surgery. His preoperative orders included instructing patients to jump from a height or shake in order to make the stone descend to the bladder neck. He used a left-sided incision, as described by his predecessors, and dressed the wound with a cloth soaked in oil and wine (Shah J. & Whitfield H. N., 2002).

Ancient Arabic medicine was based mainly on classical Roman and Greek medical literature

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(Shah J. & Whitfield H. N., 2002). Razes (865-925 CE), Ibn Sina (Avicenna, 980-1037), and Abulkasis (936-1013 CE) also used stone removal procedures (López M. & Hoppe B., 2010). Razes wrote a 23-volume summary of his works, which included a description of the lithotomy of Paul of Aegina. In the 10th volume of «Continence», he described a new technique for removing a large bladder stone using strong pliers (Shah J. & Whitfield H. N., 2002).

Albucasis (Ibn Abbas Alzahrawi, 930-1013 AD) from Cordoba demonstrated considerable experience in surgery by modifying the lithotomy technique practiced by the ancient Greeks (Abdel-Halim, R. E., Altwaijiri A. S., Elfaqih S. R. & Mitwalli A. H., 2003). He used a scalpel called a «necil» (Figure 3) to make a transverse incision and suggested that «if the stone is large, it is unwise to make a long incision and the patient may either die or it will lead to urinary incontinence through the wound, so it is better to crush the stone, especially in cases where it is irregularly shaped.» Albucasis once again described the method of crushing the stone, but it was not widely used (Shah J. & Whitfield H. N., 2002). He contributed to Razes's idea by designing special forceps, which he called «primitive lithotrithe», with which he grabbed stones.

During the Middle Ages in Europe (1096-1438), there was a lack of activity in the research

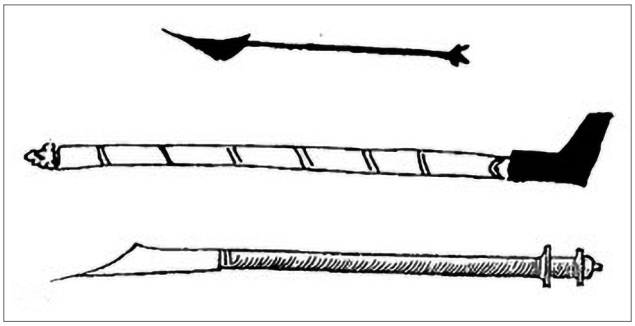

Figure 3. Albucasis' scalpel

and treatment of urolithiasis (Shah J. & Whitfield H. N., 2002). Lithotomists were essentially wanderers who moved from city to city in search of work and were often charlatans who performed lithotomies in public without anesthesia and usually lasted a few minutes (Tefekli A. & Cezayirli F., 2013).

In the 14th century, Chauliac (1300-1367), who is considered the father of French surgery, wrote «Chirurgia magna», in which he combined the medical knowledge of Arabs, Greeks and his own experience (Shah J. & Whitfield H. N., 2002). He wrote a lot about urolithiasis, but never performed a lithotomy, which was a dangerous operation at that time because the Fourth Lateran Council in 1215 prohibited physicians (most of whom were priests) to perform surgical procedures as contact with blood or body fluids was considered contaminating for men (Tefekli A. & Cezayirli F., 2013).

In the Renaissance (1453-1600), new procedures could be tried on criminals (Shah J. & Whitfield H. N., 2002). In 1475, Colo used suprapubic lithotomy on a prisoner. After that, the Colo family in France held a sort of monopoly on lithotomy for 2 centuries (Tefekli A. & Cezayirli F., 2013).

In 1520, Farnisco de Romanis proposed a sound to determine the bladder neck, and the perineum was incised by sound using a wide knife called a «novacula» (Fig. 4) (López M. & Hoppe B., 2010). He also used retractors for examination. His technique was popularized by his student Marianus Sanctus and called the «Marianus operation»: a vertical incision with a length from two to four inches was made with a sharp deep knife «novacula», and the tissues were divided down to the bladder neck, the retractor was passed through the prostate and bladder neck. If the stone was too large, it was crushed with large forceps, and the fragments were removed with a scoop or hook (Tefekli A. & Cezayirli F., 2013). The wound was left open (Riches E., 1968). Due to the fact that many instruments were used during the operation (Novaculo knife (Fig. 4), Sanctus' dilator (Fig. 5), Sanctus' forceps (Figs. 6, 7), Sanctus' cochlear), it was called «apparatus major» (Shah J. & Whitfield H. N., 2002).

In 1550, Cardan of Milan (1501-1576) performed the first kidney surgery where he opened a lumbar abscess and found 18 stones. There was no further mention of this procedure for many years, and so it may be possible that he found the calculi by accident (Tefekli A. & Cezayirli F., 2013).

Pierre Franco (1500-1561) revised suprapubic lithotomy after a failed perineal lithotomy in a

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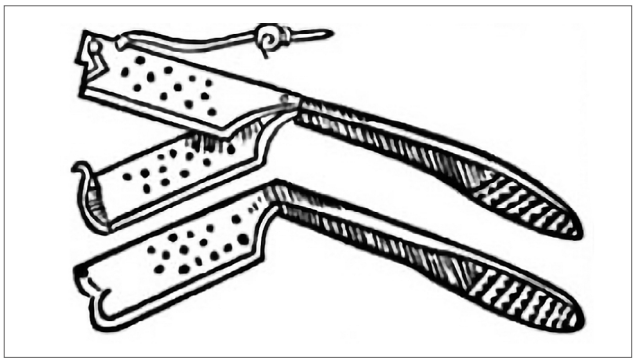

Figure 6. «Sanctus' forceps»

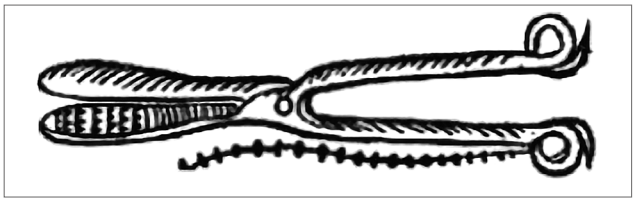

Figure 7. «Sanctus' forceps»

Figure 8. «Sanctus' cochlear»

child in 1561 (Tefekli A. & Cezayirli F., 2013). His patient was a three-year-old child with a bladder stone as large as a chicken egg, the surgeon was unable to remove the stone with the usual perineal method due to the narrow pelvic outlet, so he had his assistant push the stone upward through the rectum with his fingers, after that he made an incision directly above the pubis over the stone and successfully removed it (Riches E., 1968). Although the procedure was successful, due to the extreme danger of this approach, he wrote in his papers: «I advise people not to do this», after which this procedure was not used for many years (Shah J. & Whitfield H. N., 2002; Riches E., 1968).

In the early 17th century, Covillard was one of the first lithotomists who recommended crushing the stone to facilitate its removal (López M. & Hoppe B., 2010).

The next significant event in the history of the treatment of urolithiasis was the introduction of lateral lithotomy by Jacques de Beaulieu (1651-1714). After serving 5 years in the cavalry, he took the monk's order and became known as «Fre`re Jacques», after that he studied lithotomy from the Italian and began to practice as an traveling lithotomist without medical qualification (Shah J. & Whitfield H. N., 2002). One day he accidentally hit the side of the perineum, which «inspired» him to provide a more spacious and safer access to the bladder (Ellis H., 1979). Jacques de Beaulieu improved and popularized lateral lithotomy, and it is believed that he performed more than 5000 operations (Shah J. & Whitfield H. N., 2002). Unfortunately, this method was still accompanied by serious morbidity and mortality.

One of the last traveling lithotomists was Jean Bazeyac (1703-1781), who became known as Fre`re Co`me. Initially, he used the method of «apparatus major» to treat the poor. After that, he started using lateral lithotomy and opened a hospital in Paris in 1753, where he and his nephew performed more than 1000 lithotomies (Shah J. & Whitfield H. N., 2002).

In 1796, Deschamps developed various methods of perineal lithotomy, the most widely used being the 'moyenne' technique. He developed a double lithotome with protected blades. Dupuytren went a step further and developed a double lithotomy with the double lithotome with protected blades (Fig. 9).

Moreover, at the end of the 18th century, it became possible to determine the components

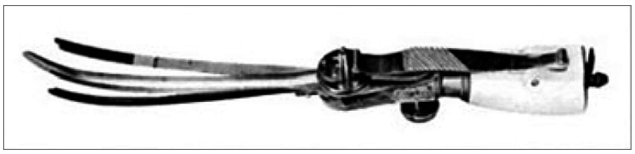

Figure 9. «Dupuytren's double lithotome»

of urine, as well as the composition of stones, which allowed to identify increased excretion of uric acid in the urine and uric acid as a common component of the stone in some patients by Karl Wilhelm Scheele. Later, other determinants of kidney stones were identified, with calcium and oxalate occurring in most cases of urolithiasis, and less commonly, stones composed of xanthine or cystine. However, this progress in «stone research» was quickly forgotten, and most studies conducted afterwards focused on the clinical picture (López M. & Hoppe B., 2010).

The study of urolithiasis became increasingly active as famous historical figures began to suffer

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from urinary tract calculus and hide this disease, including: King Leopold I of Belgium, Peter the Great, Louis XIV, George IV, Oliver Cromwell, Benjamin Franklin, philosopher Bacon, scientist Newton, doctors Harvey and Burgawe, and anatomist Scarpa. An interesting fact is that Napoleon Bonaparte and Emperor Napoleon III suffered from bladder stones and had severe symptoms, which probably affected their outlook, decisions, and judgment. Historians discuss what might have happened during the Russian campaign of 1812 and during the Franco-Prussian War of 1870 if they had not had bladder stones (Tefekli A. & Cezayirli F., 2013).

In the 19th century, lithotrites were modified and adopted, the use of which did not need incisions. This idea was first proposed by Albucasis, who developed the «primitive lithotrite» (Shah J. & Whitfield H. N., 2002).

In 1822, Leroy d'Etoile, who was looking for other ways to break stone, modified Albucasis's idea of a «drill» and proposed a tool called a «lithoprion» – a straight, long tool with a drill in the center (Shah J. & Whitfield H. N., 2002).

On January 13, 1824, Jean Civial first introduced the lithotriptic instrument, modifying the «primitive lithotrite» developed by Albucasis, which allowed him to break up and then remove the bladder stone through the urethra, at the Neckar Hospital in Paris (Figs. 10, 11) (López M. & Hoppe B., 2010). He began development in 1817, when he was a second-year medical student. His first crude device was significantly modified by himself and presented to the world only in 1824 (Riches E., 1968). It is that event that can be called the beginning of the use of lithotrites and the beginning of «endourology» in stone crushing (Tefekli A. & Cezayirli F., 2013).

In 1832, Charles Heurteloup described the principle of modern lithotrite in Paris and presented

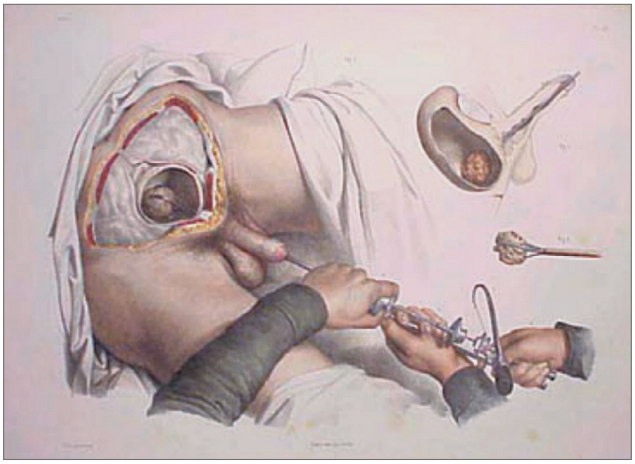

Figure 10. Civial's lithotrity

his «percussion lithotrite» (Fig. 11) (Shah J. & Whitfield H. N., 2002).

Henry J. Bigelow (1818-1890), who was a Boston urologist, was worried about the danger of sharp fragments inside the bladder after using lithotrite, so he developed a new, harder and stronger one that could break larger stones (Fig. 13) (Shah J. & Whitfield H. N., 2002). In 1874, Bigelow first performed litholapaxy by inserting lithotrite into the bladder under anesthesia (Tefekli A. & Cezayirli F., 2013). After that, the mortality rate decreased from <24% to 2.4% (Shah J. & Whitfield H. N., 2002).

Meanwhile, as litholopaxy was gaining popularity, there were attempts at alternative surgical procedures to remove calculi: Gustav Simon (1824-1876), who had already performed a planned nephrectomy for a fistula in 1869, performed the first nephrectomy in a patient with urolithiasis, in 1873 Ingalls in Boston performed the first nephrotomy, in 1879 Heinecke performed the first pyelotomy, in 1881 Le Dentu in France performed the first nephrolithotomy, in 1889 Kummel and Bardenheuer performed the first partial nephrectomy in a patient with urolithiasis

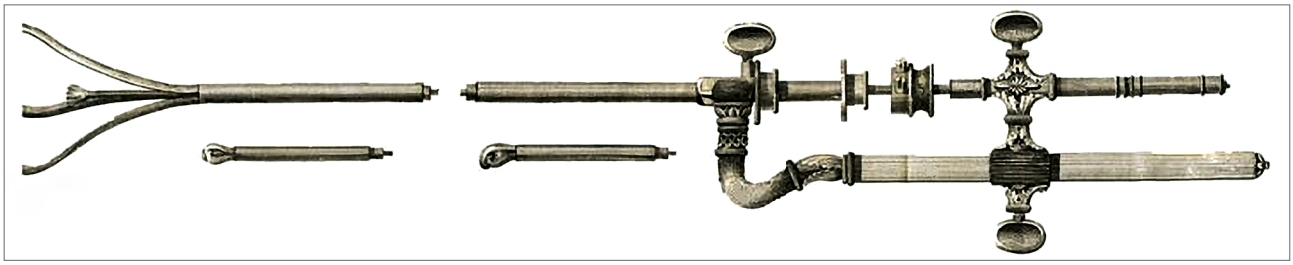

Figure 11. Civial's lithotrit

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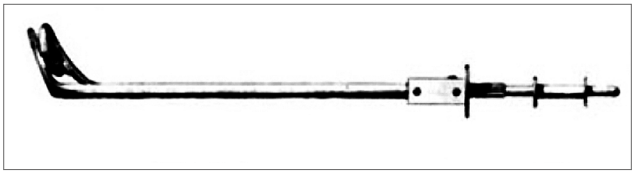

Figure 12. Heurteloup's percussion lithotrite

Figure 13. Bigelow's lithotrite and evacuator

(Shah J. & Whitfield H. N., 2002).

With the increasing use of the Nitze cystoscope and the Hopkins rod-lens system, Young and McKay (1870-1945) were the first to perform urethroscopy in 1912 and report it in 1929, and they developed «rigid» cystoscopic lithotripsy, and in 1964 Marshall performed the first «flexible» ureteroscopy using a 3 mm fibroscope (Tefekli A. & Cezayirli F., 2013).

In the late 1950s, physicist Yutkin first described electrohydraulic lithotripsy, which was the first model of intracorporal lithotripsy available for clinical use (Rainer E. & Sutchin P.).

In 1955, while attempting to perform a renal arteriogram, Willard Goodwin was the first who installed a percutaneous nephrostomy tube through which he injected a radiopaque agent, performing the first antegrade nephrostogram. This approach of Dr. Goodwin gave a start to the realization of a new percutaneous access to the kidney (Sutchin R. Patel & Stephen Y. Nakada, 2015).

In 1976, Fernstorm and Johanson were the first to describe the technique of removing renal calculi through a percutaneous nephrostomy under radiological control and introduced percutaneous nephrolithotripsy (PNL) (Sutchin R. Patel & Stephen Y. Nakada, 2015; Shafi H., Moazzami B., Pourghasem M., & Kasaeian A., 2016).

In 1978, Arthur Smith described the first antegrade stent placement when he placed a Gibbons stent through a percutaneous nephrostomy in a patient with a reimplanted ureter to stop the leakage of urine. He coined the term «endourology» to describe closed, controlled manipulations of the urogenital tract (Sutchin R. Patel & Stephen Y. Nakada, 2015).

However, with the appearance of the first extracorporeal shock wave machine in 1980, there were dramatic changes in the treatment of stones (Riches E., 1968). Extracorporeal shock wave lithotripsy (ESWL) was introduced by Christian Chaussey in the early 1980s. ESWL was based on the use of shock waves, which, passing through water and soft tissues, purposefully transformed the stone into sand-like particles that could be washed out of the body by the natural process (Fig. 14) (Rainer E. & Sutchin P.).

In 1984, the U.S. Food and Drug Administration (FDA) approved the use of ESWL devices, after which it became widespread throughout the world. Despite the fact that recent studies emphasize the limitations of this device, ESWL remains an outpatient procedure that is well tolerated, but it is not the only approach to treating stones (Tefekli A. & Cezayirli F., 2013). Ureteroscopy has made it possible to pass through the ureter to treat both ureteral and renal stones. Since the

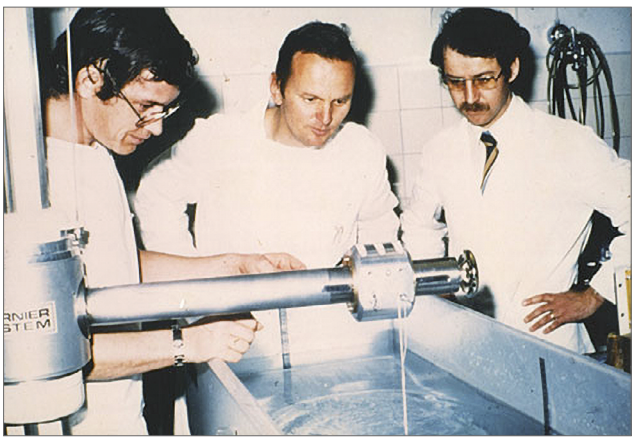

Figure 14. Chaussy, Eisenberger and Forssman at work on the ESWL

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1980s, ultrasound, laser, and electrohydraulic lithotripsy have provided greater flexibility in targeting calculi based on their size and location. In contrast to ESWL, these methods require contact between the transducer and the calculus (Shah J. & Whitfield H. N., 2002).

In 1986, the development of a laser for fragmentation of ureteral calculi was started, and significant advances in laser fibers and power generation systems made laser lithotripsy the method of the choice for destruction of ureteral calculi (Tefekli A. & Cezayirli F., 2013).

The newest method approved for fragmentation of kidney, ureteral, and bladder calculi is pneumatic lithotripsy. The first device developed for this was a pneumatic device «Lithoclast» (Fig. 15). It was developed by a Swiss company in 1992 (Shah J. & Whitfield H. N., 2002). This device has a similar mechanism as a pneumatic jackhammer: fragmentation of stones is made by direct contact with a hard, rigid tube (Zheng W., & Denstedt J. D., 2000).

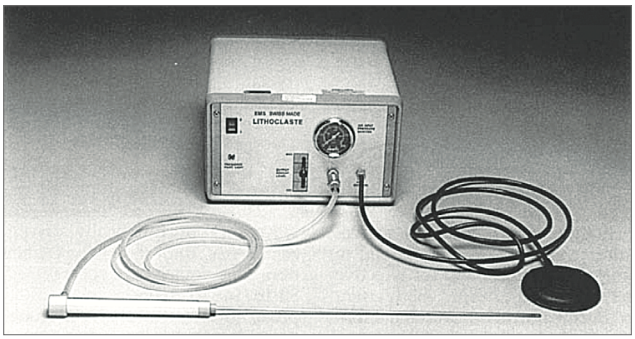

Figure 15. «Lithoclast» (1992)

In 2000, a modern surgical robot introduced by Intuitive Surgical Inc. (Sunnyvale, California) known as the da Vinci® Surgical System was first approved by the U.S. FDA for general laparoscopic surgery.

Robotic surgery has quickly entered the urological practice, because of its benefits, such as HD screen with three-dimensional visualization and zooming capabilities, which corrects the main drawback of laparoscopic surgery (loss of natural hand-eye coordination and intuitive movements felt by the surgeon). Moreover, the system uses motion scaling technology that filters out small, uncontrolled and unintentional movements of the surgeon's hands, providing a more stable and focused approach to surgical processes. This enables the surgeon to reach a level of manipulative dexterity that would otherwise be unattainable (Siddiqui, K. M., & Albala, D. M., 2016).

So far, robotic technology has not been widely used to treat kidney stones due to the cost and limited ability to use this technique. Currently, Robotic-assisted surgery is limited to complex, large-volume stones or existing anatomical abnormalities in patients with urolithiasis (Siddiqui, K. M., & Albala, D. M., 2016).

Conclusions

Nowadays, urolithiasis is a global problem, and the prevalence of this disease increases every year. Despite the fact that different treatment methods have been developed over the years, there are differences in the clinical indications and effectiveness of each treatment option (Shafi H., Moazzami B., Pourghasem M., & Kasaeian A., 2016). Over the past two decades, endourology with minimally invasive procedures has become widespread and almost completely replaced open surgery, which is performed in less than 4% of patients with renal stones (Tefekli A. & Cezayirli F., 2013; Shafi H., Moazzami B., Pourghasem M., & Kasaeian A., 2016).

Percutaneous nephrolithotomy (PNL) has quickly become the «gold standard» treatment for all stones larger than 2 cm (Türk C. et al., 2023). The procedure is performed using the posterior calyx, usually in the upper or lower pole, depending on the location of the calculi and the closeness of the surrounding organs. After access is gained to the collecting system, the pathway to the renal pelvis is expanded using radiology. If complete stone removal is not possible, energy sources are used to break the calculus (Rodríguez, D. & Sacco D. E., 2015).

ESWL is a safe and effective method of treating most upper urinary tract stones (Coptcoat M. J. et al., 1986). Although ESWL is an effective method for many patients, there is a possibility that it may not work and further treatment may be necessary. Other procedures may have a higher success rate, although they are more invasive and, as a result, may cause more severe complications (Raj Persad, 2023).

With the development of endoscopic technologies, the treatment outcomes of US and

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PNL are constantly improving. In recent years, there have been many new developments in this area, including new endoscope designs, more effective ancillary tools, improved treatment protocols, the introduction of robotic technology, the combination of ureteroscopy and percutaneous nephrolithotomy (endoscopic combined intrarenal surgery or percutaneous nephrolithotomy with transurethral lithotripsy), improved laser technology, etc. All of these new advances will further improve the effectiveness and safety of procedures, which will benefit patients (Li, J. K., Teoh, J. Y., & Ng, C. F., 2019).

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Сечокам'яна хвороба: від минулого до сучасного

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Анотація: *сечокам'яна хвороба (СКХ) – це поліетіологічне захворювання, пов'язане з порушенням обміну речовин і супроводжується утворенням каменів у сечових шляхах. На сьогоднішній день СКХ стала світовою проблемою, захворюваність зростає з кожним роком. Поширеність СКХ залежить від географічних, кліматичних, етнічних, дієтичних та генетичних факторів. Розповсюдженість СКХ верхніх сечових шляхів у 2–3 рази більша у чоловіків, ніж у жінок. Ризик утворення каменів протягом життя в середньому складає від 5 до 10%. Показники поширеності СКХ у різних регіонах варіюють від 1% до 20%. В країнах з високим рівнем життя, наприклад у Швеції, Канаді або США поширеність дуже висока і складає більше 10%. У деяких регіонах відзначається підвищення показників більш ніж на 37% за останні 20 років. В Україні СКХ посідає друге місце серед усіх урологічних захворювань, щорічно вперше реєструється понад 52 тис. хворих, а частота виникнення варіює від 30 до 45% від усієї урологічної патології. Здебільшого хворіють люди молодого віку, захворювання перебігає з явищами гострого та хронічного пієлонефриту та частими рецидивами СКХ (30–80 %). Такий перебіг СКХ призводить до виникнення ниркової недостатності, інвалідизації та смертності хворих. Утворення каменів у нирках є складним і поліетіологічним процесом, який включає ендогенні (вік, стать і спадковість) та екзогенні фактори (географічні умови, клімат, харчування). Відомі факти свідчать, що людство страждає від цього захворювання понад 7000 років. СКХ була добре відома протягом століть. Це чітко підтверджено різними археологічними знахідками, а також писаннями про хворобливі конкременти та терапевтичні процедури, які проводились із метою їх видалення. Враховуючи важливість та розповсюдження СКХ, в статті проведено огляд історичного становлення діагностики та лікування даної патології в різних регіонах світу. Проведено огляд методів діагностики та лікування починаючи з ранньої античності і до самих сучасних, які використовуються в наші дні.*

Ключові слова: сечокам'яна хвороба, літотомія, літотрипсія, нирка, сечовий міхур.