

# A brief overview of urology's development

## Milestones in urology show evolutionary growth



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Urinary and genital diseases have been around since time immemorial. We know this from the evidence left behind – urinary stones discovered in Egyptian mummies and alongside numerous skeletal remains – and in vestiges of ancient civilisations such as paintings and writing tablets.

We also know that simple acts of external urological surgery were performed, mainly on the genital organs not only for reasons of religion (circumcision) or justice (castration), but also for therapeutic purposes (catheterisation of the bladder, in which the Hindus were pioneers, needle tapping of the bladder which was done by the Chinese and cystotomy to remove calculi as practiced by the Assyrians and the Greeks).

However, it was Hippocrates (5<sup>th</sup> century BC), and later Galen (2<sup>nd</sup> century AD), who established the principles and practice of medicine and described many ailments, including some urological conditions, based on groups of symptoms and proper observation, particularly of the urine.

In the Middle Ages, medicine, along with many other activities, stagnated. However, it was also during this era that Arabic medicine reached its zenith with Avicenna and Averroes, which had an impact on urinary diseases as well. In the fledgling field of European urology, itinerant barber-surgeons specialising in extracting bladder stones – lithotomists – earned a place in history by treating kings and noblemen. The most well known of these lithotomists were Corbeil, Collot and Frère Jacques (of the well-known French song).

### Medical revival in the Renaissance

The Renaissance saw a revival of the importance of anatomy, with the work of Vesalio (16<sup>th</sup> century), and the practice of surgery, with the work of Ambroise Paré (16<sup>th</sup> century), as well as a renewal of the classic medicine of Hippocrates and Galen, with Paracelsus (16<sup>th</sup> century). The 17<sup>th</sup> and 18<sup>th</sup> centuries brought significant advances in the areas of physiology with the work of Bacon, Harvey – who discovered circulation of the blood, Sydenham, Van Helmont, Sylvius and Bichat, as well as in microscopic anatomy, with the invention of the microscope and the work of Malpighi, Leeuwenhoek and Morgagni.

Urology, though not yet a specialised field, clearly benefited from these important advances in human thought and experience. However, in practical terms, urology at that time was limited to recognition of some (relatively few) ailments by observing certain constellations of symptoms, examination and analysis of the urine (uroscopy), and treatment with fluids and some drugs of plant or animal origin.

Surgery was still limited to external genital surgery, catheterisation of the bladder and lithotomy, with which there was already significant prior experience, and, as knowledge of venereal diseases and their sequelae (e.g., urethral strictures) grew, exploration and dilatation of the urethra were eventually done shown by the work of Amato Lusitano, Diaz and Laguna in the 16<sup>th</sup> century, and which peaked in the 19<sup>th</sup> century with the work of Beniqué and Guyon.

### Pioneering breakthroughs

It was at the beginning of the 19<sup>th</sup> century that, along with Beniqué's instrumental manipulation of the urethra, endoscopy of the urethra and bladder came into use with the work of Lewis, Desormeaux and Fischer. There were, however, serious problems with illumination in these rudimentary devices, and it was only toward the end of the century, after electricity came into use, that Max Nitze (1877) achieved a good quality cystoscopy using a device with an incandescent light bulb. This pioneering access to observation of the organs inside the body was of enormous importance in the diagnosis of diseases of the lower urinary tract (the urethra and bladder).

Right around the end of the 19<sup>th</sup> century another important advance was made in the diagnosis of

upper urinary tract diseases, namely kidney disease, with Albarran's invention of a moveable "lever" for adjusting the cystoscope, making it possible to insert tubes (catheters) up into the ureters and kidneys. This made it possible to analyse the urine produced by each kidney separately, thereby facilitating lateral diagnosis. The most common diseases of the time, of which tuberculosis was the most prevalent, were very different from those we see today.

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Meanwhile, Roentgen's discovery of X-rays (1895) and the subsequent development of radiology led to further advances in medical diagnosis in general and urological diagnosis in particular. Visualisation of the urinary tract with probes and catheters and with radio-opaque products introduced through these tubes (Chevassu, early 20<sup>th</sup> century), examination of the renal arteries by injecting contrast media into the aorta – aortography (Reynaldo dos Santos, 1929), and above all visualisation of the excretory tree by injecting products intravenously – urography or intravenous pyelography (Rowntree, 1923, Von Lichtenberg, 1929), were fundamental milestones in clarifying anatomy and pathological function and diagnosing diseases of the urinary tract.

All these advances in the field of diagnosis were accompanied by progress in therapy, particularly in surgery with the introduction of antiseptics and asepsis (Lister, 1869; Pasteur, 1864) and the development of anesthesia (Morton, 1846 – ether; Simpson, 1848 – chloroform; Riggs – nitrous oxide), which set the stage for performing the first nephrectomy (Simon, 1869), and the first prostatectomy (Freyer, 1900).

Beginning in the second quarter of the 20<sup>th</sup> century, new strides were made in medicine and even more in surgery, in terms of chemical intervention, particularly with antibiotics (penicillin: Flemming, 1929), but also with corticosteroids, hormones and enzymes as well as hemotherapy and transfusional medicine.

The development of new techniques of surgical repair instead of traditional surgical excision or drainage then became feasible. Urology was one of the first fields to break away from general surgery because of the specific nature of its diagnostic and therapeutic techniques, namely endoscopy and radiology, and of some of its surgery, namely that of the prostate and the urinary tract.

Improvements in diathermic currents, nonconductive aseptic solutions and sophisticated optical devices have facilitated the development of endoscopic surgery of the prostate and bladder. Endoscopic surgery was for many years a mainstay procedure in urology.

### Modern advances

Advances continue to be made, not only in fundamental aspects of the basic sciences, but also in new and sophisticated methods of diagnosis and treatment. These include computerised imaging techniques: ultrasound, computed axial tomography (CAT), magnetic resonance imaging (MRI), digital and Doppler angiography, radioactive isotopes; analytical, immunological, genetic and pathology-based methods of diagnosis; sophisticated tools for studying urodynamics; new methods of endoscopic and laser diagnosis and treatment, such as endourology (ureterorenoscopy, percutaneous surgery), internal and external shockwave lithotripsy, laparoscopy and laparoscopic surgery, and robotic surgery and telesurgery; control of infection with vaccines and new generation antibiotics; new techniques for resuscitation in surgery; progress in reparatory surgery and implantation of prostheses.

There were also very important advances in dialysis, artificial kidneys and organ transplant along with immune control; significant developments in cancer therapy with radiation therapy, new applications of physical methods, chemotherapy, immune therapy, gene therapy, etc. Also significant advances in information and communication technologies, particularly in informatics, telematics, and above all the Internet are revolutionising medicine, surgery and urology.

### Subspecialised medicine

After this long road that urology has travelled, from the lithotomists to urethral and bladder manipulators and excisional surgeons, from the first endoscopists to urinary tract repair surgeons and endourologists and laparoscopists, where the specialty has been for the most part a surgical one, we find, paradoxically, that the current trend in urology is increasingly less surgical and less invasive.

Rigorous scientific research and sophisticated techniques work together to meet the most important challenges of the future: health education with the goal of preventing urological disease and early diagnosis, application of the most conservative treatment possible (with medications or mini-invasive techniques) using scientific evidence and the best possible technical methods, rehabilitation and palliatives from a fresh humanistic and ethical perspective.

And in keeping with the many sophisticated technologies that the practice of urology requires, and will continue to require in the future, the field nowadays has many subspecialties (ambulatory urology, stone disease, oncological urology, andrology and sexual medicine, neurourology and voiding dysfunction, female urology, pediatric urology, reconstructive urology, renal transplantation, endourology, laparoscopy and robotics, etc.).

These subspecialties are related to the mother specialty but also have strong links to other specialties, which demands a new approach to medical practice: mono-specialized but multidisciplinary teams armed with the means and experience to confront and respond in the best way possible to the challenges posed by threats to health and quality of life, whatever form they may take.



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