Abul Qasim Al-Zahrawi in Europe

Minaret Research Network

Abul Qasim Khalaf ibn Abbas al-Zahrawi (936-1013 CE) was one of the most outstanding physicians and surgeons in the Islamic world. He made original and wide-ranging contributions to various branches of medicine, including urology, surgery, orthopaedics, gynaecology and obstetrics, pharmacology and dentistry.

Al-Zahrawi’s magnum opus *Al-Tasrif*, a voluminous compendium of medical knowledge that was completed around the end of the 10th century, was the outcome of nearly half a century of clinical practice, research and experiments, teaching and reflections. Al-Tasrif draws on Greek medical sources, particularly the work of Paul of Aegina, who lived in the 7th century CE, on Al-Razi’s *Kitab al-Hawi* and, more importantly, on his own observations and clinical experiences and experiments. Al-Tasrif comprises 30 treatises of varying sizes. The first treatise is concerned with the general principles of medicine, such as elements, humors, temperaments and anatomy. The second treatise deals with the symptoms and treatment of some 325 diseases from head to foot. Other treatises deal with pharmacology, diet, women’s diseases, midwifery and dentistry.
The 30\textsuperscript{th} treatise is devoted to surgery. It is divided into three parts comprising cautery, incisions and bloodletting, bone setting, and illustrations of surgical devices and instruments, most of which were designed by Al-Zahrawi himself. This treatise describes in substantial detail the treatment of wounds, the extracting of arrows, and the setting of bones in simple and compound fractures. A significant aspect of Al-Zahrawi’s multifaceted contributions to medicine and surgery relates to the diagnosis and treatment of women’s problems and diseases. He instructed and trained midwives and wrote a section on midwifery in \textit{Al-Tasrif}. Some of the clinical and surgical devices and instruments designed by him were meant to be used for women.

More than a thousand years ago, Al-Zahrawi diagnosed and treated many diseases, which came to be confirmed in later centuries. He described what later came to be known as “Kocher’s method” for treating a dislocated shoulder, and the “Walcher position” in obstetrics. The “Walcher position” is credited to the German physician Walcher (d. 1935). He described the method of ligaturing blood vessels almost six centuries before the French surgeon Ambroise Pare (1510-1590). He described tuberculosis of the spine, which is now known as Pott’s disease (named after the English physician Percivall Pott, 1714-1788). He prescribed mastectomy for breast cancer. Al-Zahrawi described, for the first time in medical history, a genetic disease transmitted by an unaffected woman to her male children, which is today known as haemophilia. Al-Zahrawi described families whose male members died of bleeding only after minor traumas. The first modern description of haemophilia was made by an American physician, Dr John Conrad Otto, in 1803. Al-Zahrawi advised the use of catgut, a natural substance that is capable of dissolving and is acceptable by the body, which is still used in modern surgical procedures. He was the first
to use sutures from animal intestines, silk and wool to close wounds, a thousand years before Fredrich Trendelenburg (d. 1924), who is generally credited with the invention of the procedure.

*Al-Tasrif* contains more than 200 illustrations and drawings of clinical and surgical devices and instruments. These include scalpels, probe syringes, curettes, hooks, rods, specula, the surgical needle and forceps. These devices and instruments were meant to serve a wide variety of clinical and surgical purposes.

Illustrations of vaginal speculum, two types of forceps and double-edged scalpel (from a 13th century manuscript of Al-Zahrawi’s Al-Tasrif, at Bodleian Library, Oxford)
In the field of urology, Al-Zahrawi devised new types of urethral catheters and bladder irrigation syringes to crush stones in the urethra and the bladder. The procedure for crushing a urethral stone was an original contribution of Al-Zahrawi. It is not mentioned by any Greek physician. This procedure laid the foundation of lithotripsy, an important landmark in the development of urology. Al-Zahrawi’s procedure was widely recognized, appreciated and followed in Europe until the 19th century. It was the forerunner of procedures devised by Fournier de Lempdes (1812), Gruithsien (1813), Civiales trilabe (1818) and the brise coque of Rigal De Galliac (1829).

An illustrated page from Al-Tasrif (Source: http://www.bium.univ-paris5.fr/aspad/expo51.html)
Al-Zahrawi also invented a new scalpel for the procedure of cutting on bladder stones (crystolithotomy) with two sharp cutting edges, a novel instrument that was unknown to Greek physicians. The scalpel used by the Italian surgeon Marianus Sanctus in the 16th century and the other used by the English surgeon Shelsden in the 18th century bear a striking resemblance with the scalpel devised by Al-Zahrawi.

In the technique of cutting on the bladder stone, Al-Zahrawi was the first to use a forceps to extract the stone. The use of the stone forceps devised by Al-Zahrawi spread to Europe during the Middle Ages and the Renaissance. The drawing of the stone forceps given in Marianus Sanctus’s book is exactly identical to the description and drawing of the stone forceps in Al-Zahrawi’s Al-Tasrif. The procedure adopted by Al-Zahrawi was an important landmark in the development of bladder stone surgery in Europe. Spink, Lewis and Kirkup regarded Al-Zahrawi’s innovative procedure as marking the foundation of the modern lithotripsy principle.
Al-Zahrawi was the first surgeon to introduce, in complicated cases, the two-stage bladder stone operation. This procedure influenced European surgeons for several centuries. Covillard, who recommended the two-stage bladder stone operation in the 17th century, was influenced by Al-Zahrawi. Another important surgical contribution of Al-Zahrawi is the technique for extracting bladder stone in women. There is no mention of this technique in Greek surgery.
Forceps designed by Al-Zahrawi to crush vesical stones

Metal nasal dropper devised by Al-Zahrawi
The last treatise of Al-Tasrif, which deals with surgery, was translated into Latin by Gerard of Cremona (d. 1187). Treatise 28, which is devoted to pharmacy, was translated into Latin in 1288, and was later published as *Liber Servitoris*. The first two treatises were translated into Latin and published as *Liber Theoricae* in 1519. At least 33 manuscripts of Latin translations of parts of Al-Tasrif are extant in various libraries in Europe and the United States. Gerard’s Latin translation became extremely popular in Europe and was reprinted at least ten times between 1497 and 1544. Almost all European physicians and surgeons during the Middle Ages, including Roger of Salerno (d. 1180), Guglielmo Salicetfe (d. 1277), Lanfranchi (d. 1315), Mondinus of Bologna (d. 1326), Guy de Chauliac (d. 1368), Nicolas of Florence (d. 1411) and Leonardo da Bertapagatie of Padua (1460), copied from the Latin translations of Al-Tasrif.
An authoritative edition of the Arabic text of treatise 30 of Al-Tasrif, which is devoted to surgery, together with an English translation, was published by the Wellcome Institute of the History of Medicine, UK in 1973.

A page from the Latin translation of Al-Zahrawi’s encyclopaedic work *Al-Tasrif*

For nearly five centuries, from the 11th to the 16th, Al-Zahrawi’s work on surgery had a profound impact on European physicians and surgeons. The celebrated French surgeon
Guy de Chauliac (d. 1368) made repeated references to Al-Zahrawi’s work in his writings and even appended the last volume of the Latin translation of Al-Tasrif to his book *Chirurgia magna*. He made efforts to promote surgical procedures invented by Al-Zahrawi in Europe. Al-Zahrawi was hailed by the eminent Italian surgeon Pietro Argellata (d. 1423) as “the chief of all surgeons”. The renowned French surgeon Jacques Delchamps (d. 1588) made frequent references to Al-Zahrawi’s work in his writings. Almost all European writers of surgery in the Middle Ages made extensive references to Al-Zahrawi’s work and drew upon his clinical insights and surgical innovations. Al-Zahrawi’s surgical treatise remained a standard textbook on the subject in all leading European universities from the 15th to the 18th centuries. The renowned historian of science George Sarton has remarked, in his monumental *An Introduction to the History of Science*, that no single book, other than *Al-Tasrif*, influenced and revolutionised the art of surgery from the 11th to the 14th century.
A Latin translation of the 28th volume of Al-Zahrawi’s encyclopaedic work *Al-Tasrif*

One of the numerous printed editions of al-Zahrawi’s magnum opus *al-Tasrif* was published in Oxford in 1778. Almost all European writers on medicine and surgery from the 12th to the 18th century extensively quoted from *al-Tasrif*, which remained a standard textbook in surgery in all leading European universities until the 18th century. Many of the founding fathers of modern science and medicine, including Gabriel Fallopius (d. 1562), William Harvey (d. 1657) and Andreas Vesalius (d. 1564), drew upon the works of Rhazes, al-Zahrawi and Avicenna. Vesalius’s Latin text of anatomical tables contained a large number of Arabic terms.
An eminent German physicist and historian of science Eilhard Wiedemann devoted more than half a century, between 1875 and 1928, to investigate and highlight the contributions of Muslim scientists and physicians. He got some of the clinical and surgical devices and instruments designed by Al-Zahrawi reconstructed. Five of these replicas were purchased by the Deutches Museum in Munich in 1911.

Fuat Sezgin, the renowned historian of Islamic science, established a unique Museum of Islamic Science and Technology at Frankfurt in 1983. The museum has more than 800 exhibits consisting of replicas of scientific and medical devices, instruments and innovations made by Muslim scientists and physicians between the beginning of the 9th and
the end of the 16\textsuperscript{th} century. The catalogue of the museum *Wissenschaft und Technik in Islam* was published in five volumes in 2003. The catalogue contains pictures of replicas of scientific and medical devices and instruments that are on display at the museum. A similar museum was established by Sezgin in Istanbul in 2008.

Al-Andalus Museum at Cordoba, established by Roger Garoudy, which has on display replicas of surgical instruments devised by al-Zahrawi

Some years ago, a Spanish medical historian made replicas of the surgical devices and instruments designed by Al-Zahrawi and had them exhibited in a museum. They are now on display at the Museo Vivo de Al’Andalus, in Cordoba, Spain. Replicas of these instruments are also on display at Madinat al Hikmat, Hamdard University, Karachi. The mobile exhibition ‘1001 Inventions’ has photographs of some of these replicas.
Museum of Islamic Science and Technology, Frankfurt
REFERENCES

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