

## SHORT COMMUNICATION

### The Surgery of Abulcasis (936-1013) Contributions of the *Kitab Al-Tasrif* Treatise to Modern Surgery

#### Abstract

The Arab occupation of the Iberian peninsula had an important influence on the scientific development of Europe. Medicine at that time had a great influence on the classical authors, although the Muslim doctors Rhazes and Avicenna began to stand out, and had a very prominent influence until the Renaissance (Compier, 2012, pp. 3-25).

The most important century of Spanish Arab Medicine is the 12th, in which the figures of Avenzoar, Averroes, and Maimonides appear, the latter being of Jewish origin (Martín-Araguz, et al, 2002, pp. 877-892). In previous centuries Ibn Habib, Abulcasis, Ibn Yulyul, Arid Ben Said El Kateb, and Abenguefit stood out (Tschanz, 2003, p. 9; Otero Tejero, et al, 2007, pp. 859-868). Without a doubt, and from the surgical point of view, we should center our interest on Abulcasis, as he was the first surgeon born in the Iberian peninsula to integrate the surgery into the doctrinal body of medicine, with the same category and level of knowledge.

Abulcasis made an impact on the history of surgery with his multilevel work. Abulcasis was the first Arab-Hispanic doctor from Al Andalus who wrote a treatise on surgery (Amr, 2007, pp. 220-221). He was based on his predecessors of the Greek and Roman school of medicine as well as the Arabic knowledge in pharmacology (Markatos, 2019, pp. 2199-2203), but also he was a great innovator himself; he succeeded in inventing surgical instruments used in practice until nowadays in their most basic principle. Twelfth-century Latin translations of medical works written in Arabic have had a significant influence on the development of modern medicine (Masic, et al, 2017, pp. 364-372).

**Key words:** Abulcasis, History of medicine, Arabic Medicine, Humanistic medicine, Surgeons

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## Introduction

### Biography of Abulcasis

Abu-l-Qasim Khalaf ibn Abbas Al-Zahrawi was born between 936 and 940 in the city of Azahara. He studied medicine and was a physician and surgeon for the caliphs Abd al-Rahman III and his son Al Hakam II, living most of his life in Cordoba dedicated to the practice and teaching, until he died in 1013 (Al-Ghazal, 2003, p. 37).

He lived in Al-Andalus, current Spain, and died in his hometown in the year 1013 (Asaad, et al, 2019, pp. 611-617). There are few original historic sources about his early life, except his public work. There are inconclusive data that tell us that Abulcasis moved to Baghdad to complete his knowledge of medicine (Otero Tejero, et al, 2007, pp. 859-868; Fernández Raigoso, 2021, pp. 57-70), this is a frequent custom among Muslim students, since this city was located, along with Damascus, one of the most important hospitals in Islam (Van Hee, 2002, pp. 61-75). Later he developed his work in Córdoba and Medina Zahara (Gutiérrez Aroca, 2018, pp. 133-148).

He was a court physician to the Umayyad caliph Abd-Er-Rahman III and his son al-Hakam II al-Mustanir (Moreno Resina, 2005, p. 21). Undoubtedly this caliphate corresponds to the period of maximum splendor of the Muslim occupation of the Iberian peninsula (Brufal, 2017, pp. 37-69). Cordoba stood out not only in the military and political aspect but also in the field of science, having a great reputation for its numerous libraries and schools where all kinds of subjects were taught (Brufal, 2017, pp. 37-69).

The great School of Medicine of Cordoba competed at that time with the School of Salerno, which was later the forerunner of many faculties of Medicine in Europe (De Divitiis, Cappabianca, and De Divitiis, 2004, pp. 722-745). Abulcasis taught his knowledge to various students whom he admitted to his medical practice, as can be deduced in his treatise on surgery when addressing a possible audience as “his children”, and in an engraving of the manuscript found in Liège entitled “*The hygiene of Abulcasis*”, in which he appears under the figure of a teacher (Dognés, 1892, p. 3). Figure 1 represents Abulcasis blistering a patient. Abulcasis reviewed every contemporary surgical knowledge such as Persian, Greek, Roman, and Indian, for raising his surgical knowledge.

There were no differences in social class or religion among his patients. Abulcasis cared for Christians wounded in the battles of the time, citing his interventions in managing arrow wound injuries (Spink, and Lewis, 1973, p. 440).

### Introduction of the Book *Al-Tasrif*

Abulcasis wrote a book entitled *Kitab al-tasrif li-man ayiza ‘an al-ta’lif*, better known as “*Kitab al-tasrif*”, “*Altasrif*” or “*Tasrif*”, in which he brings together all his knowledge. The title means “*Book of medical practice*” (Noras, Hajzadeh, and Arianpoor, 2015, pp. 3-8). The encyclopedia *Al-Tasrif* written around the year 1000, on about 1500 pages, collects his knowledge and experience. It was translated into Latin in 1170 and re-edited many times for almost 800 years until the late 18<sup>th</sup> century (Spink, and Lewis, 1973, p. 225). It is divided into thirty books or “*maqalas*”, its twenty-nine articles are about various diseases and their quality of treatment as well as the knowledge of spices and drugs and the last article of this work is about surgery (Briceño Iragorry, 2008, pp. 1-25).



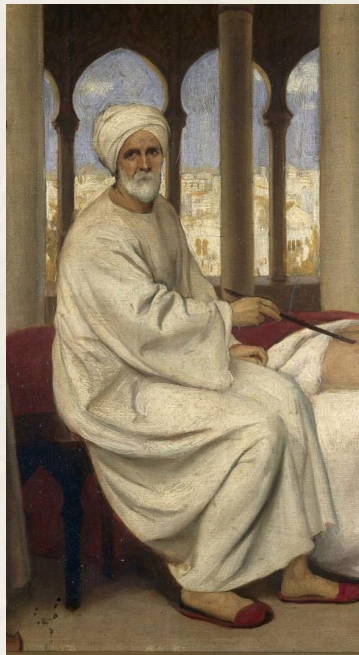


Figure 1. Abulcasis blistering a patient. (Board, © <https://wellcomecollection.org/works/hfvcxxpd>)

The surgical part of this work has been considered, without any doubt, one of the main texts dedicated to Surgery in the Middle Ages and for which the author reaches an important place in the History of Medicine (Peña, and Girón Irueste, 2001, pp. 163-187). The School of Translators of Toledo was in charge of translating it from Arabic to Latin in the 12<sup>th</sup> century, along with such emblematic works as the “*Canon*” by Avicenna and the “*Liber Almansorem*” by Rhazes. The translation team was formed, among others, by Daniel de Morley, Roberto Chester, Alfredo Angélico, and Marcos de Toledo and directed by Gerardo de Cremona. This translation would guarantee, on the other hand, its possibility of diffusion throughout the late medieval Latin world, something that would happen in a spectacular way (Moreno Resina, 2005, p. 113 ).

### Contribution of Abulcasis to Surgery

Abulcasis had a great influence from the Middle Ages to the 19<sup>th</sup> century (Otero Tejero, et al, 2007, pp. 859-868). The importance it had in the development of Medicine in general and Surgery, in particular, can be seen in the citations that surgeons as important as Guy de Chauliac and Pietro Argellata make of their texts, the latter saying that Abulcasis “*is, without doubt, the chief of all surgeons*” (Moreno Otero, 2013, p. 151). The Latin author Paulus Ricius praises our surgeon with these words “*I am not ashamed to say, with the forgiveness of others, that Abulcasis is not inferior to any doctor after the father of Medicine, Hippocrates, and his interpreter, Galen*” (Hamarneh, and Sonnedecker, 1963, pp. 103-117).

The book *Al-Tasrif* is an example of production from the golden age of Arabic science, for its innovativeness and for the imprint it had on the world through its translations into Latin, Greek, and Hebrew (Pera Madrazo, 2003, pp. 97-108). The last and largest



volume of *Al-Tasrif*, was the first surgical treatise ever written and with it, medieval surgery reached its peak. Volume thirty consists of three books: the first concerns the use of cautery, the second deals with incisions, perforations, venous sections, and arrow extractions, and the third refers to fractures and dislocations (Spink, and Lewis, 1973, p. 203). Cauterization was a deeply rooted treatment modality in its time and for some authors the definitive treatment of most conditions. Abulcasis questions the effectiveness of cautery in its classical conception while hinting at its true therapeutic possibilities. It is interesting to note how he points out to his disciples that they resort to this method only when other treatment modalities fail. Perhaps the most interesting thing is the use which gives cautery in the same way that we do today with an electric scalpel such as to stop arterial bleeding (Spink, and Lewis, 1973, pp. 78-95; Pera Madrazo, 2003, pp. 97-108). He designed different types of cautery depending on the different pathologies. For the treatment of hernias, he designed a crescent-shaped cautery and a crescent-shaped cautery for palpebral ptosis (Pera Madrazo, 2003, pp. 97-108). He also proposes the use of cautery for the surgical removal of a wide variety of tumors (Markatos, et al, 2019, pp. 2199-2203). Figure 2 represents some of the Abulcasis illustrations of surgical material.



Figure 2. Original manuscript of the *Kitab al-Tasrif* of Abulcasis. (*Al-Maqalatu Salasun (Thirtieth Treatise)*, n.d.)

His most important personal contributions can be found in the second book, in which it is worth mentioning the scissors for tonsillectomies and their use, the lancet for draining abscesses, the design of a new trocar for paracentesis, the design of a new instrument for removal of stones, as well as the vaginal speculum (Spink, and Lewis, 1973, pp.



208-306). Among its innovations is the use of animal gut (*catgut*) as a suture material that is still used in many countries. It is worth mentioning his contributions to dentistry and oral surgery (Pera Madrazo, 2003, pp. 97-108). Abulcasis designed an instrument to remove dental plaque called mijrad (scraper). The third book is the shortest part of his treatise on surgery. His comments are made under two main headings, cranial injuries, and fractures and dislocations in general. The most interesting is in the section that deals with the different ways of making an immobilization employing a hardened bandage with flour and egg white, being the precursor of the French plaster of Larrey. As a curiosity and anecdote, it is worth mentioning the lesions in the genitals that do not appear in any of the classic treatises, “*When the male organ is fractured, insert the penis in a gooseneck, wrap it and leave it at rest for three days*” (Pera Madrazo, 2003, pp. 97-108; Spink, and Lewis, 1973, pp. 308-377). *Al-Tasrif* is also the first work to include an illustration of surgical instruments, probably the first of their kind contribution to the history of surgery (Markatos, et al, 2019, pp. 2199-2203).

### Conclusion

Abulcasis made an impact on the history of surgery with his multilevel work. Abulcasis was the first Arab-Hispanic doctor from Al Andalus who wrote a treatise on surgery. He was based on his predecessors of the Greek and Roman school of medicine as well as the Arabic knowledge in pharmacology, but also he was a great innovator himself; he succeeded in inventing surgical instruments used in practice until nowadays in their most basic principle. Twelfth-century Latin translations of medical works written in Arabic have had a significant influence on the development of modern medicine.

### Conflict of Interest

None.

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