ELSEVIER

Abu Al-Qasim Al-Zahrawi (936–1013 CE), Icon of Medieval Surgery

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Abu al-Qasim Al-Zahrawi (936–1013 common era [CE]), also known in the West as Albucasis, was a great Arab physician and surgeon of the late 10th and early 11th centuries CE. He is best known for his surgical knowledge and expertise. His greatest contribution to medicine is the Kitab al-Tasrif, which includes thirty treatises on medical sciences. His early and great contributions to the field of surgery were seminal. For his endeavors in this field, a number of surgeons and scholars have dubbed him the "Father of Operative Surgery".

"And I will not cut for the stone but will commit that affair entirely to the surgeons."

A part of Hippocratic Oath on performing surgical operations.

INTRODUCTION

Abu al-Qasim Khalaf ibn al-Abbas Al-Zahrawi (936–1013 common era [CE]), also known in the West as Albucasis, was a great Arab physician and surgeon (Fig. 1). He was born in El-Zahra, Al-Andalus, State of Córdoba. He was an outstanding physician, surgeon, and chemist of the late 10th and early 11th centuries CE. Albucasis is best known for his surgical knowledge and expertise.[1] His greatest contribution to medicine is the *Kitab al-Tasrif*, which includes thirty treatises on medical sciences.[2]

KITAB AL-TASRIF

The 30th treatise of Kitab al-Tasrif is on surgery. It has 3 sections. The first is on wound care. The second is on minor surgical operations, ophthalmology, and oral disease. The third is on fractures, dislocations, and gynecology. In addition to the sections on medicine and surgery, the book contains sections on midwifery, pharmacology, psychotherapy, and medical chemistry.[3] All the chapters are illustrated with many pictures of surgical instruments. Albucasis designed most of these devices himself. For example, he devised an anesthetic sponge for the first time. He also introduced the nonsinking skull trephine for skull access, using a circular metal margin to avoid laceration of the dura and brain tissue.[2,4] Figure 2 illustrates a number of surgical instruments devised by Albucasis for different operative purposes.

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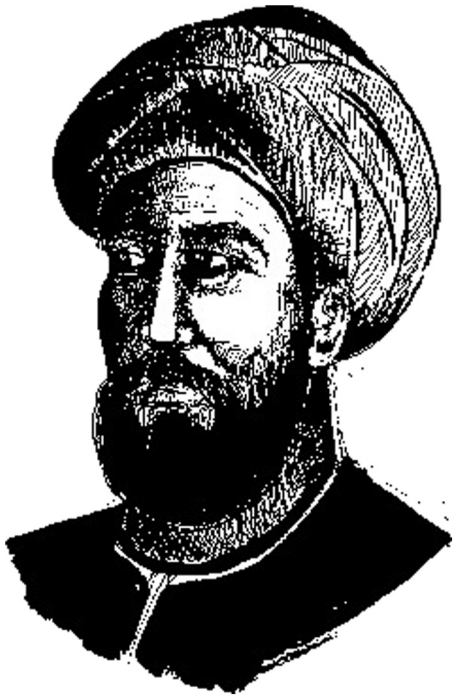

Fig. 1. Portrait of Albucasis (936–1013 CE).

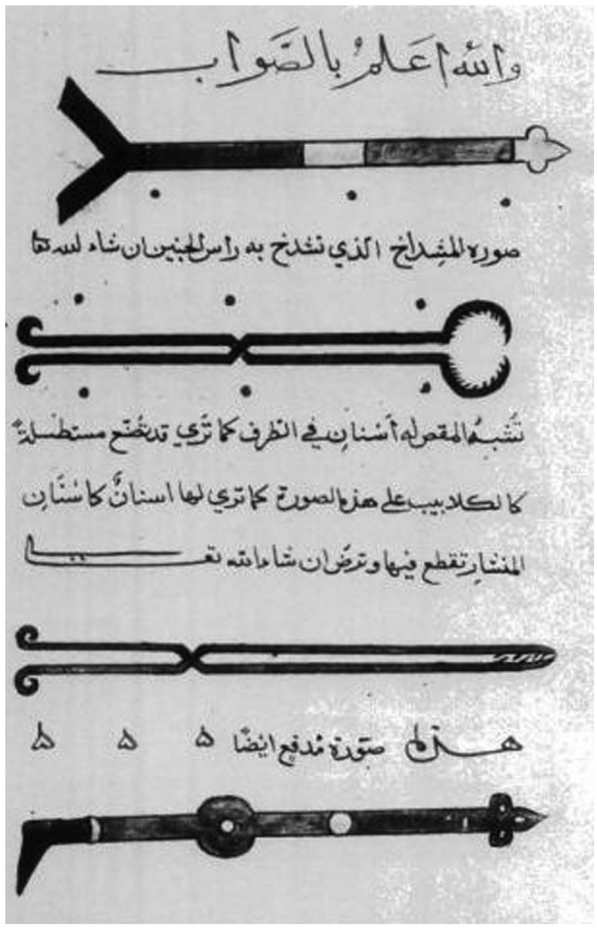

Fig. 2. An original Arabic text from *Kitab al-Tasrif* illustrating a number of surgical instruments devised by Albucasis.

General Surgical Operations by Albucasis

Albucasis gave the first descriptions of abdominal surgery. He described methods of bowel reduction, abdominal wall closure, and intestinal anastomosis.[5] He was the first to sew the intestine with fine sutures of cat gut, and he was also the first to use thermal cauterization to control vessel bleeding.[4,5] He was the first physician to mention ectopic pregnancy. He described this condition as fetal bones being extruded from a suppurating sinus at the umbilicus.[6]

Albucasis made cervical incisions to provide surgical airways as a lifesaving procedure.[7] Furthermore, in 925 CE, he performed the first thyroidectomy.[8] He also conducted surgery on children with cleft lip,[9] and he used cautery instead of the scalpel for this operation.[10] In addition, hydrocephalus, adenoids, gynecomastia, circumcision, hermaphrodites, imperforate anus, and supernumerary and webbed fingers were all described by Albucasis.[11]

NEUROLOGY AND NEUROSURGERY BY ALBUCASIS

In the fields of neurology and neurosurgery, Albucasis recommended a piece of red hot iron to treat intractable migraine. He also used cautery for apoplexy and epilepsy. He noted that fractures of the spine could result in paralysis.[12] In addition, he described surgical treatment of head injuries and skull fractures, spinal injuries and dislocations, and hydrocephalus and subdural effusions.[4] He described pain as a symptom. He also elaborated on surgical anatomy of the skull and brain in relation to the operative procedures of his time.[13]

INNOVATIONS IN VASCULAR SURGERY

Albucasis pioneered in many surgical procedures and contributed to several subspecialists of surgery.[14] In respect to vascular surgery, he applied ligation of bleeding vessels in an attempt to stop bleeding[2,15] and used cauterization to seal blood vessels.[16] It seems that he was the first surgeon to use arterial ligation to stop bleeding almost 6 centuries before Ambroise Paré (CE 1510–1590).[17]

Albucasis also used temporal artery ligation to treat certain types of headaches.[18] Furthermore, he described various methods of varicose vein surgeries accurately. Albucasis says that there are 2 methods of performing varicose operation. The first is incision, and the second is extraction through the ankle or knee.[19] He was the first to use external stripper.[20] He also ligated testicular veins to treat varicocele.[18] These methods are used today with minor modifications.

Albucasis described arterial aneurysms as swelling of arteries. He adopted this idea from Galen. However, he applied compression and used incision and cauterization to stop bleeding in a number of patients.[21] He also described tying the proximal end of the artery for aneurysm treatment.[22] He recognized aneurysms and advised that these should not be mistaken for tumors. He recommended that a cautery should be kept ready when there is suspicion for aneurysms.[23]

Albucasis performed amputations to treat polydactyl and limb gangrene. He performed amputations through incising the normal tissue and cutting the bone. He used styptics and cauterization to stop bleeding.[18,24] However, his practice of amputation was limited to below knee and below elbow levels. He used to not suture the wound after amputation.[25]

CONCLUSION

Albucasis was pioneer in medicine and surgery and was a teacher of surgery who lived more than thousand years ago. His early and great contributions to the field of surgery were seminal. He introduced surgery as a distinct field in medicine and used his knowledge and expertise to train young physicians of his time. For his great endeavors in the field of surgery, a number of surgeons and scholars have dubbed him the ''Father of Operative Surgery.''[2,26–28] We should express our gratitude to this great physician and surgeon for his creative innovations. Our current knowledge and expertise in surgery is based on the works of pioneers such as Albucasis. Pietro Argallata (d. 1453), a 15th century European surgeon, described Albucasis as "without doubt the chief of all surgeons."[4,26]

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