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## HISTORY OF MEDICINE

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# THE ARABO-ISLAMIC CONTRIBUTION TO THE DEVELOPMENT OF SURGICAL INSTRUMENTS

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### SUMMARY

Arab physicians demonstrated exceptional skill in surgery using the instruments introduced by ancient Greeks and Greco-Roman surgeons. In many cases they have manufactured their own innovative instruments succeeding the performance of difficult operations. Arab surgical instruments and their boxes were also decorated with fine designs, sign of art of the Arabo-Islamic civilization.

**Key words:** Arabo-islamic medicine, surgical instruments, medical boxes, middle Ages

### RÉSUMÉ

*La contribution arabo-islamique au développement des instruments chirurgicaux*

Les Médecins arabes ont démontré des compétences exceptionnelles en chirurgie en utilisant les instruments introduits par les chirurgiens Grecs et gréco-romaines. Dans de nombreux cas, ils ont développé leurs propres instruments pour la performance des opérations difficiles. Les instruments chirurgicaux arabes et leurs boîtes ont été également décorés avec des motifs raffinés, signe de l'art de la civilisation arabo-islamique.

**Mots-clés:** médecine arabo-islamique, instruments chirurgicaux, boîtes de chirurgie, moyen âge

### INTRODUCTION

During the middle Ages, the medical work of Arabo-Islamic physicians such as Rhazes (834-932), Albucasis (936-1013) and Avicenna (c. 980-1037) (Fig. 1), was significant in preserving the knowledge that had been accumulated throughout centuries, particularly the contributions of ancient Greek and Roman scholars. The Arabic versions of all of the works written by Hippocrates (460-370 BC) and his pupils and by Galen (c. 130-201), have been translated and ameliorated promoting the medical thought in the West (1).

The Arabo-Islamic physicians were fascinated for the work of Galen, Hippocrates, Rufus of Ephesus (late 1<sup>st</sup> century AD), Oribasius (320-400 AD), Dioscorides (c. 40-90 AD) and Paul

of Aegina (625-690 AD). Surgery was the field that excelled towards a new era of more complicated procedures (2). A rich collection of surgical tools was available thanks to ancient Greek and Greco-Roman physicians. Thus dioptras, hedrodiastoleus, mochlikos, ostagra, kauterion, motos moloubus, catheters, metrechytes, agkistra, tricholabis, embryoukos, staphylagra, osteotomes, scalpels, psalis, spathomele, cyathiscomele (3), "all placed harmonically inside the surgeon's medical bag, arranged in the most appropriate way, following a methodical layout, as physician cannot keep everything in mind", were available for the operating theatre of the era (3-4). Arabo-Islamic physicians, studied thoroughly their use, registered them in detailed catalogues, and wrote (or translated) extensive treatises on the subject (5).



Figure 1 - The distinguished physician Avicenna



Figure 2 - Abulcasis' surgical instruments

### **Arabo-Islamic physicians and their surgical instruments**

Rhazes, was an esteemed Persian physician, alchemist, chemist, philosopher, and scholar, who wrote over 200 works. He was credited of being the first physician who used general inhalation anaesthesia in the form of the anaesthetic sponge. A sponge immersed in a solution of opium, hyocyamus, mandragora and loisleuria was inhaled before any operation. Moreover, Rhazes used catgut in surgical practice and "sterilised" his instruments in a fresh liquid of bile (!). He had also devised new surgical instruments. In his work "The Book of Surgical Instruments", the most admirable surgical treatise of his time, he described the knotted rope for the removal of nasal and nasopharyngeal polypi. It was a thin rope with multiple knots, passed through the nose to the mouth and moved in out, having the same action as the present Gigli saw (6-7).

Abulcasis, is considered the most famous surgeon in Arabo-Islamic medicine. Inside his masterpiece "Al-Tasrif", he stressed the importance of the study of Anatomy as a fundamental prerequisite to surgery, advocated the re-implantation of a fallen tooth and the use of dental prosthesis carved from cow's bone, re-introduced the removal of kidney stones by cutting into the urinary bladder and described the tracheotomy operation. The book contains the description and magnificent illustration of about 200 surgical instruments, many of which were devised by Abulcasis himself (5, 8) (Fig. 2).

Another leading figure of the Arabo-Islamic medicine was Avicenna, who wrote numerous works among which the celebrated "Canon of Medicine". Avicenna provided a systematic knowledge on head traumas, such as the removal of fractured bones of a damaged skull. He also described a number of instruments for this operation.

Some were used to perforate the bone, some for pulling out the bones, and some for elevating the depressed bones. All the tools should have had different shapes, size and dimensions due to the diversity of human heads and injuries. Avicenna explained an instrument, a drill calling it trepanum (most probably a sophisticated one) or a perforator, which did not go deeply into the interior of the surface of the skull bone (9).

In 13th century, a Syrian physician and surgeon, Ibn al-Quff (1233-1286), was the author of the earliest medieval treatise intended solely for surgeons. Inside his works entitled: "Basics in the Art of Surgery and "A commentary on Avicenna's work", he described various procedures and surgical instruments (10).

Khalifa ibn Abi Al Mahasin Al-Halabi (13th century AD), was an Arab surgeon specialized in ocular surgery and particularly in the operation of cataract. Inside his book "The Book of Sufficient Knowledge in Ophthalmology" (c. 1275), he provided two illustrations depicting 28 different surgical instruments, while in red colour he cited their names and in black their kind of use (5).

### **Instruments and boxes**

Archaeological findings, demonstrated the existence of several surgical instruments in the Arab world since the 9th century. Over the course of time, those instruments were decorated and carved to depict the image of the Arab world and to stand out by the ancient Greek ones (5). The skill of the Arab metalworkers enabled the production of fine and beautifully elegant tools which made delicate surgical operations, such as lifting and suturing the blood vessels with ease. Many of the Arab designs, are still in use today, having changed little in over 10 centuries (11). Fol-

lowing the Hippocratic theorem of “everything in order and with easy access”, Arab physicians had their own medical boxes to arrange the surgical instruments, mostly wooden with metallic decorations (5).

### CONCLUSION

Arabo-Islamic physicians throughout the world preserved the medical knowledge acquired in the past by the ancient Greeks and Greco-Roman physicians, embraced the designs of their instruments, while in some cases manufactured new innovative ones, and promoted surgery to higher levels. Their success contributed to the recognition of the surgeons as a really important medical cast.

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