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A Comparative Study of Bone Fractures Treatments by Both Albucasis (324-404 AH/936-1013AD) and Sabuncuoğlu (787-874AH/1385-1470AD)

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Keywords

Albucasis al- Zahrawi
Sabuncuoğlu Şerefeddin
The orthopaedics
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Abstract

Albucasis “*Abul-Qasim al-Zahrawi*” was the first Arab surgeon acknowledged by his contemporaries and by great surgeons who followed him, he was born in 324 AH/936 AD and died in 404 AH/1013 AD in Madina al-Zhara west of Córdoba. *Sabuncuoğlu Şerefeddin* also was a distinguished Ottoman physician interested in surgery, he was educated at Dar Al Shifa in Amasya then worked as a surgeon for many years. He was Born in 787 AH/1385 AD and died in 874 AH/1470 AD in Amasya. Both of the physicians made a great progress in surgery during their periods. Albucasis had a great book in medical book called “*Al- Tasrif li-man ajaz an al- taalif*” which considered as a medical encyclopedia. *Sabuncuoğlu* also had a medical book called “*Cerrahiyetü'l Haniye*” which considered a special scientific medical work. Although there was a long time between Albucasis and *Sabuncuoğlu's* periods, mistakenly, *Sabuncuoğlu's* book was considered as a translation of *Al- Zahrawi's* book. Both books dealt with *Orthopaedisc* and bone fractures' treatment. So, this study focuses on analyzing the differences and similarities between the two works of both physicians. The main purpose of this work is to highlight the knowledge, concerning the orthopaedics and bone treatments as explained by *Sabuncuoğlu* and *Albucasis*. This study also relied on the analytical method to find out these differences and similarities. According to the analysis findings, the research found some differences and a lot of similarities in bone

treatments between both books. Also, the research analyzed that the differences were only in the instruments they used.

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Introduction

Bones are the main components of the skeletal system, consider the mechanical support of the body. Doctors classifies the fractures according shape or pattern¹.

Although there was a long time between Albucasis and *Sabuncuoğlu's* periods, mistakenly, *Sabuncuoğlu's* book "*Cerrahiyetü'l Haniye*" or (*Imperial Surgery*) was considered as a translation of Albucasis' book "*Al- Tasrif li-man ajaz an al-taalif*". He affected a lot by Albucasis' book and the main skeleton of his book came from *al-Zahrawi's* book².

Albucasis, the pioneer of surgery affected in all Arabic and European physicians³. *Sabuncuoğlu*, the Turkish physician also influenced by *al- Zahrawi* and that appeared in his medical work, the manuscript of *Cerrahiyetü'l Haniye* and his treatment of fractures and orthopaedics⁴.

This topic is important and serves several scientific disciplines such as: history, because it discusses the history of certain periods and makes a comparison in the history of medicine in both periods. It is also important to the science of medicine, as it discusses the history of two famous physicians and sheds light on their medical contributions. As wellas, its importance in manuscript science, because it discusses two important medical manuscripts.

Accordingly, the main focus of this work is to highlight the knowledge concerning the bone fractures and their treatments as explained by *Sabuncuoğlu Şerefeddin* and Albucasis *al- Zahrawi*. The main purpose of the research is to answer the questions, "What are the similarities between the two books in orthopaedics and bone fracture treatments, that made scholars thought the two works are the same?. If there were differences between the books of both physicians in the treatment of fractures and orthopaedical diagnosis?. What are the similarities and differences in surgical instruments they used?" that was discussed for the first time. This study also relied on the analytical method to find out these differences and similarities.

¹ Ahmed Oryan, Somayah Monazzah Harsini, and Amin Bigham Sadegh, *Bone Injury and Fracture Healing Biology*, Biomed Environ Sci, (2015), Vol. 28, No.1, pp. 57-58.

² H Volkan Acar, *Acupuncture points in the book of Şerefeddin Sabuncuo_glu, a 15th century Turkish physician*, Acupunct Med, (2014), Vol. 33, Issue. 1, p. 73

³ HafizIqtidar Ahmad Ahmer, S.M., Sartaj Ahmad Ferasat Ali, *Contribution of AL-Zahrawi in The Field of Orthopaedics*, International Journal of Information Research and Review, (2014), Vol. 1, Issue. 1, p.30

⁴ Amira Ali Wasfy Madah, *Atib w asydala fi aldawla aleuthmania mn a'sr al-Fatih hata wafat alsultan Suleiman Qanuni 855-974AH/ 1455-1566AD*, Resalat Al-mashraq, (2006), Vol.18, No. 1,2. P.549

1. **Albucasis al- Zahrawi (324-404 AH/ 936-1013 AD)**

His name was *Abul Qasim Khalaf Ibn al- Abbas al- Zahrawi*, was born in 324AH/936 AD and died in 404AH/1013 AD⁵ in Madina al-Zhara⁶ west of Córdoba, his period was flourished and advanced in scientific fields, especially in medicine⁷. He is famous in Latin by several names, the most famous is Abulcasis⁸. He was the personal physician of the Caliph Abdel Rahman III⁹⁻¹⁰. He wrote two books; *Al -Tasrif li-man ajaz an al- taalif* and *Kitab fi-l-tibb li- ‘amal aljarrahin*¹¹.

2. **The Book of *Al- Tasrif li-man ajaz an al- taalif***

He had a great medical treatise on surgery, which is *al- Tasrif li-man ajaz an al- taalif*. This manuscript is considered as a medical Encyclopedia¹² consisting of thirty volumes talking about surgery, medicine, pharmacology, therapeutics and chemistry¹³. He invented many surgical instruments were used for many centuries¹⁴. For the first time the surgical instruments were illustrated and described¹⁵ and that influenced in all later Arab physicians¹⁶.

As well as, many surgeries were mentioned in his book for examples; ophthalmic surgery, surgery for thyroid cystectomy and arrow extracting. Emergency medicine also was mentioned in this book and how to use the suture materials made of silk and wool¹⁷. In Europe, he was considered as the famous pioneer surgeon¹⁸ and no one of his contemporary could be compared with them. At the same period, surgeries in Europe were performed by butchers and barbers¹⁹.

He interested also with bone fractures and their treatments, like skull fractures and discussed how to treat this kind of fractures with different instruments such as

⁵ Michel T. Yancey, Abul Qasim Khalaf Ibn Al-Abbas Al-Zahrawi, (Encyclopedia), 25 Oct 2021, <https://www.encyclopedia.com/science/encyclopedias-almanacs-transcripts-and-maps/abul-qasim-khalaf-ibn-al-abbas-al-zahrawi>, Last access. 21\11\2021, 12:00 AM

⁶ Madina al- Zahra: Located west of Cordoba, constructed by caliph Abd al- Rahman III in 936 AD. Was burned by Berber in the 11th century. See, Antonio Vallejo Triano , Irene Montilla-Torres, *Caliphs, Elites, and Servants in the Qasr of Madinat Al-Zahr ‘a’ in the Light of Its Residential Architecture*, Arts, (2019), Vol. 8, No. 65, p.1

⁷ Masoud Nouri-Vaskeh, Soroush Mostafavi, Hadi Alizadeh, Abdolhassan Kazemi, *Albucasis: pioneer of the modern anorectal surgery*, Journal of Coloproctology, (2020), Vol. 40, Issue. 4, p. 435

⁸ Luisa Maria Arvide Cambra, *Abulcasis Al-Zahrawi, The Surgeon of Al- Andalus*, European Scientific Journal, (2016), Vol. 12, No. 10, p. 240

⁹ Abdel Rahman III: He was the Umayyad Caliphate who ruled from 912 to 961 AD. His reign was considered as the golden age for Islam in Spain. He was the constructor of Madia al- Zahra. See, Michael Goodyear, Abd al- Rahman III, (World History Encyclopedia), 11 February 2019, https://www.worldhistory.org/Abd_al-Rahman_III/, Last access. 25\11\2021, 1:00 AM.

¹⁰ Rabie E. Abdel-Halim, Salah R. Elfaqih, *Extraction of urinary bladder stone as described by Abul-Qasim Khalaf Ibn Abbas Alzahrawi (Albucasis) (325-404 H, 930-1013 AD)*, Saudi Medical Journal, (2003), Vol. 24, No. 12, p. 1284

¹¹ Cambra, *Abulcasis*, p. 241

¹² Sammy Al- Benna, Albucasis, *a tenth-century scholar, physician and surgeon: His role in the history of plastic and reconstructive surgery*, Eur J Plast Surg, (2012), Vol.35., p. 380

¹³ Vaskeh, Mostafavi, Alizadeh, Kazemi, *Albucasis*, p. 435

¹⁴ Mahmoud K. Booz, *Albucasis Bone Surgery in Antiquity*, Pan Arab J Orth Traum, (1997), Vol.1, p. 73

¹⁵ Mohamerd Amin Elgohary, *Al Zahrawi: The Father of Modern Surdery*, Annals of Pediatric Surgery, (2006), Vol. 2, No. 2, p. 84

¹⁶ Cambra, *Abulcasis*, p. 244

¹⁷ Vaskeh, Mostafavi, Alizadeh, Kazemi, *Albucasis*, p. 435

¹⁸ Abdel-Halim, Elfaqih, *Extraction*, p. 1284

¹⁹ Elgohary, *Al Zahrawi*, p. 82

Misqab and *Mikta*²⁰⁻²¹. Furthermore, clavicle fracture²², humeral fracture²³, orthopaedic surgeon and spinal dislocations were discussed in his book²⁴.

3. *Sabuncuoğlu Şerefeddin (787-874 AH /1385-1470 AD)*

He was a distinguished Ottoman physician interested in surgery²⁵, he was educated at *Dar Al Shifa* in Amasya²⁶ then worked as a surgeon for many years²⁷. Born in 787AH/1385 AD and died in 874AH/1470 AD, lived in Amasya, wrote many medical books influenced in Ottoman medical and covered about 40 illness. *Sabuncuoğlu Şerefeddin* worked as a chief of physicians for 14 years²⁸. At first, his scientific work was considered as a translation of the book “*al- Tasrif li-man ajaz an al- taalif*” of Albucasis²⁹.

4. *The Book of Cerrahiyetü'l Haniye “Imperial Surgery”*

In 869AH/1465AD, *Sabuncuoğlu* introduced his famous book *Cerrahiyetü'l Haniye* to sultan *Muhammed al-Fatih*³⁰ as a gift, who appreciated this scientific work³¹. Although the importance of this book in medical treatments, especially surgery³², it was ignored until 1930AD, because it wasn't written in Arabic or Persian like the other books during this era³³. This book includes 163 surgical instruments' images and explained 163 surgical procedures. *Sabuncuoğlu* explained these surgical procedures with miniatures³⁴. Considers the oldest

²⁰Mehmet Turgut, History Pediatric Neurosurgical Techniques in the 15th century, Journal of Clinical Neuroscience, (2008), Vol.15, Issue. 10, p. 1086

²¹ Mikta: is a medical instrument with a one face of the knife and the other like the back of the knife, see

Turgut, *History Pediatric*, p. 1086

²² The Clavicle Fracture: The clavicle is the bone that connect the arm and shoulder with the trunk. The fracture of clavicle is one of the most common bones fractures. See, Filippo Familiari, MD,1 Gazi Huri, MD2, Olimpio Galasso, MD1, Giorgio Gasparini, MD1, Mahmut Nedim Doral, MD2, *The Shoulder*, Springer, 2017, p. 91

²³ The Humeral Fracture: That done near the shoulder in the arm bone. See, Frank Norberg, MD, *Proximal Humerus Fracture Book*, Twin Cites Orthopedics, without date, p. 2

²⁴ Sezgin Sarban, S, ahin Aksoy, I` lter Uzel, DDS, PhD, Ug`ur E. Is, ıkan, MD, S, ahap Atik, MD, *Orthopaedic Techniques of Sabuncuoğ`lu in the 15th Century Ottoman Period, CLINICAL ORTHOPAEDICS AND RELATED RESEARCH*, (2005), Vol. 439, pp. 257

²⁵ Neset Koksall, *History of Surgery in Turkey*, UEMS Surgery Section Meeting, 5-6 April, Istanbul, without date, p. 13

²⁶ Amasya: located in Northern Turkey, this province encompasses 55,199ha. Amasya is famous as agricultural province and there are approximately 35,000 farms middle. It is a small province. See, Vedat Ceyhan and Kerem Hazneci, *Economic Efficiency of Cattle-Fattening Farms in Amasya Province, Turkey*, Journal of Animal and Veterinary Advances, (2010), Vol. 9, Issue. 1, p. 60

²⁷ Madah, Atib, p. 549

²⁸ Ayhan Verti, Sahin Aksoy, Hasan Kafali and F.Ferda Verit, *Urologic Techniques of Serefeddin Sabuncuoğlu in the 15th Century Ottoman Period*, Elsevier Inc, (20003), Vol.62, No. 4, p. 776

²⁹ Madah, Altib, p. 549

³⁰ Muhammed al -Fatih: He was the son of sultan Murad II, born in 1432 and died in 1481. He was the seventh Ottoman sultans. He was the great sultan who conquered Constantinople in 1453. See, Gábor Ágoston, Bruce Masters, *Encyclopedia of the Ottoman Empire*, Facts On File, 2009, pp. 364:366

³¹ Gulsat Aygen, PhD, Aykut Karasu, MD, FACS, Ali Ender Ofluoglu, MD, Glenn Pait, MD, Halil Toplamaoglu, MD, *The first Anatolian contribution to treatment of sciatica by Serefeddin Sabuncuoğlu in the 15th century*, (Surgical Neurology), 2009, NO. 71, p. 131

³² Nğm`aldyn`ly bn`mr bn`ly`alkātby`ālqzwyny, ġām``āllđh, dār`ālbyān`āl`rby, 2002, p. 532

³³ Verti, Aksoy, Kafali and Ferda Verit, *Urologic Techniques*, p. 778

³⁴ Koksall, *History*, p. 13

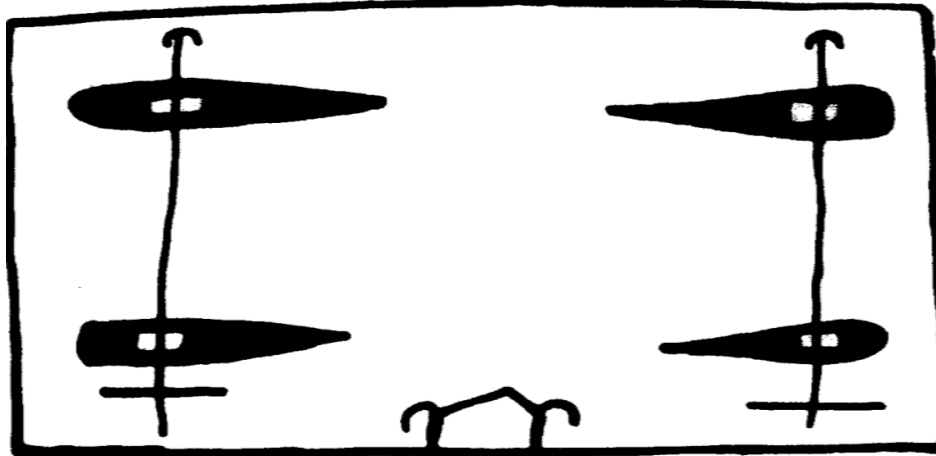
illustrated surgical Ottoman textbook³⁵ that wrote in Turkish language³⁶. The book is divided into three chapters (fractures and dislocations, treatment with cauterization, and surgical procedures)³⁷ including various specialties like: general surgery, pediatric, obstetrics, and gynecology, thoracic surgery, urology and neurosurgery³⁸. The book is considered cauterization as a main treatment for a lot of diseases³⁹

5.The Orthopaedics and Treatment of Bone Fractures:

Al-Zahrawi, in the volume 30 of his book *al-Tasrif* mentioned how to treat the fractures and breaks of bones and joints⁴⁰. He was a famous orthopaedic surgeon; he was the first physician treated the pelvis fracture⁴¹. In addition, he described orthopaedic in bones dislocation and fracture, as well as describing of different types of fractures. Albucasis defined the fractures as kinds of separation in bones⁴². In chapter 3 of his book, Sabuncuoğlu also discussed in 22 sections the fractures treatments, and rest of the 36-section related to dislocations. In section 5, he discussed the treatment of clavicle fracture, in section 11, he discussed the treatment of humeral fracture, in section 23, he talked about treatment of dislocations, and in section 30 he talked about the treatment of spinal dislocations⁴³.

Sabuncuoğlu, in a part of his book recommended some advice to the physicians. First, in the case of total vertebral dislocation of spinal that can't be treated and causes death. Another case is sliding of the vertebral dislocation towards any side. If it happens to the kids, there is no treatment, but with adults it can be treated, especially when the vertebra rises to the back causing hunchback⁴⁴.

Moreover, *al-Zahrawi* used a special table for dealing with vertebral dislocation, this table helped in extending limbs and that affected in reducing the displaced fractures (fig. 1)⁴⁵.



³⁵ Aygen, Karasu, Ofluoglu, Pait, Toplamaoglu, *The first Anatolian*, p. 130

³⁶ Sarban, Aksoy, Uzel, DDS, Is,ikan, Atik, *Orthopaedic Techniques*, p. 257

³⁷ Verti, Aksoy, Kafali and Ferda Verit, *Urologic Techniques*, p. 776

³⁸ Aygen, Karasu, Ofluoglu, Pait, Toplamaoglu, *The first Anatolian*, p. 130

³⁹ Uygur, Pamir, Ottoman, p. 166

⁴⁰ Cambra, *Abulcasis*, p. 245

⁴¹ Saba Anjum, *Al- Zahrawi: A prominent Muslim Medical Scientist and His Impact on West, Revelation and Science*, (2013), Vol. 3, No. 3, p.53

⁴² Abdo O. Shuriye, Raihan Othman, *Contributions of Muslim Scientists to Medicine and Related Sciences*, IIUM Press, First Edition, 2011, p. 137

⁴³ Sarban, Aksoy, Uzel, DDS, Is,ikan, Atik, *Orthopaedic Techniques*, p. 254:255

⁴⁴ Turgut, *History Pediatric*, p. 1087

⁴⁵ Booz, *Bone Surgery*, p. 75

Figure 1: Reducing table used by al- Zahrawi as a treatment for bone dislocations.

After: Mahmoud K. Booz, *Albucasis Bone Surgery in Antiquity*, Pan Arab J Orth Traum, (1997), Vol.1, p. 75

Similarly, *Sabuncuoğlu* described in detail the technique of the axial traction of dislocation and fracture spinal. As the patient is placed on a soft bed near to the wall facing upside down, the healers wrapped the knees and the ankles of the patient carefully with a smooth rope. Then they should collect both ends of the rope and tie them to the wheel of the stake found at the patient feet. Likewise, they put the rope under the patient armpits and tie it to the wheel of the stake at the patient head (fig. 2). If the treatment didn't work, the healers stood by their feet upon piece of wood onto the dislocation vertebra of the patient until the joint returns back to its place⁴⁶. *Al-Zahrawi* also dealt with the different types of fractures like head fracture, recurrent dislocation and even for wiring teeth with gold and silver wires by cauterization⁴⁷.



Plate 2: The technique of an axial traction for therapy of dislocation vertebra, done by *Sabuncuoğlu*.

After: Imperial Surgery, in 2 Volumes [in Turkish]. Ankara: Turkish Historical Institute Publishing; 1992; Chapter 3, Section 30 [32]. Used with permission from Turkish Historical Society by 04 Sep 2012.

Sometimes, physician couldn't know if there is fracture or not, so al-zahrawi recommended advice in his book *al-Tasrif* to enable physicians knowing that. He described the signs of fracture as crack sound, protrusion and distortion, the physician could realize that by pressing the hurt bone with his hand⁴⁸.

6. Bone Surgical Instruments:

⁴⁶ Turgut, *History Pediatric*, p. 1087

⁴⁷ Booz, *Bone Surgery*, p. 74

⁴⁸ Shuriye, Othman, *Contributions*, p. 137

Albucasis, the pioneer of surgery, invented many instruments for using them in his treatment of bones fracture and in his orthopaedic such as; scalpel “*mibdla*” that used for cutting or removing tumours, saw “*minshar*” for cutting bones (fig. 3), osteotome “*mikta*” for cutting dead bones, drill “*miskab*” for making holes in bones, bone lever which is used to reduce fracture (fig. 4)⁴⁹. and splint “*Jabira*” for fractures (fig. 5) which he cut bandages and cut them to different layers and then wrapped the fractures with those layers⁵⁰.

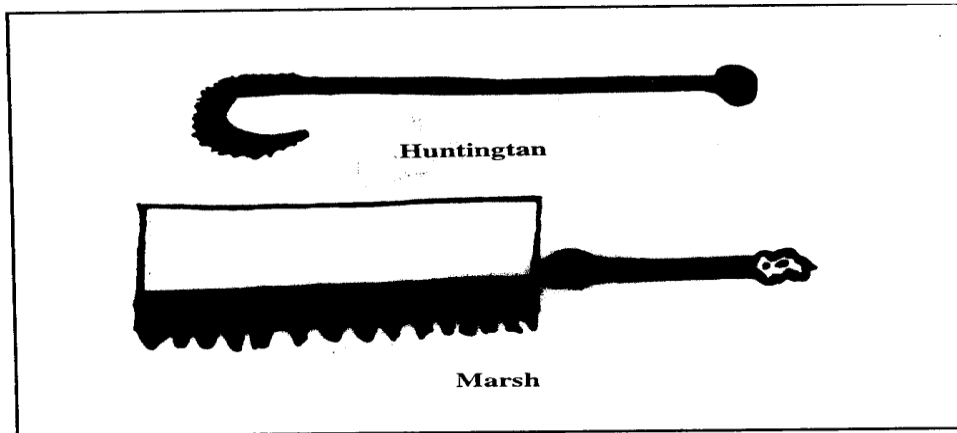


Figure 3: Saw used in cutting bones by *al-Zahrawi*

After: Booz, *Albucasis Bone Surgery*, p. 76

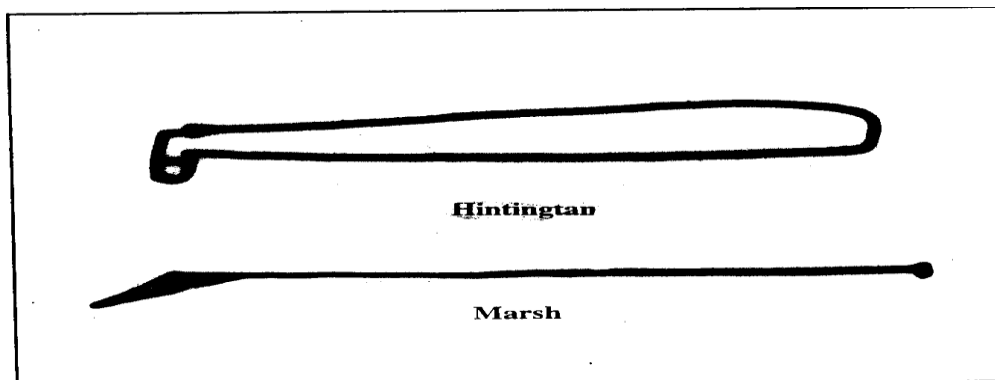


Figure 4: Bone lever used by *al-Zahrawi* in orthopaedic

After: Booz, *Albucasis Bone Surgery*, p. 76

⁴⁹ Booz, *Bone Surgery*, p. 76

⁵⁰ Ahmer, S.M., Ali, *Contribution*, p.31

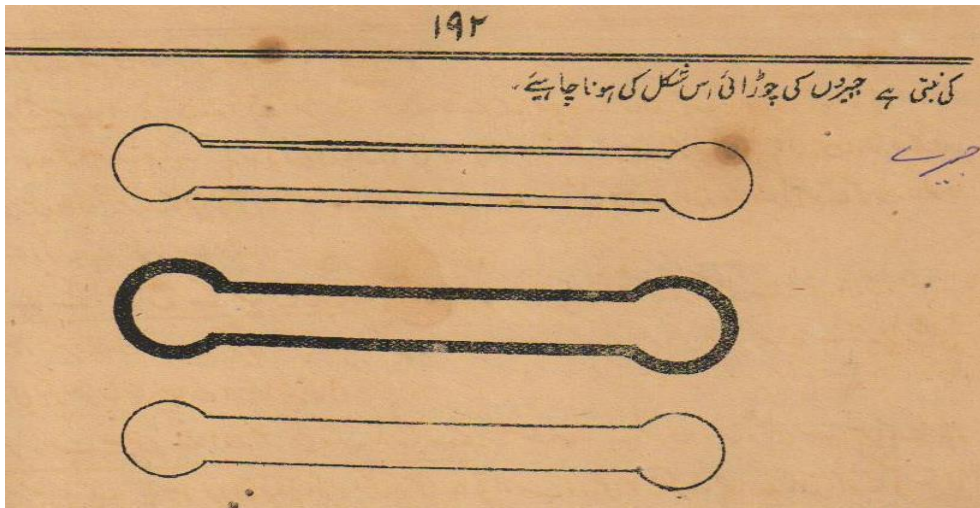


Figure 5: Jabiraa used by *al-Zahrawi*.

After: Hafiz Iqtidar Ahmad Ahmer, S.M., Sartaj Ahmad Ferasat Ali, *Contribution of AL-Zahrawi in The Field of Orthopaedics*, International Journal of Information Research and Review, (2014), Vol. 1, Issue. 1, p.31

According to *Sabuncuoğlu*, there are different methods used for removing the broken bones: one of them is cutting bones by using a cutting instrument which called *Mikta* ending with a thin edge, and if the area of the fracture is wide, he recommended making a hole using a drill with a button on its neck prevents overpenetration of the drill inside the brain tissues. There are 3 kinds of drills he used⁵¹.

He introduced some advice to the physicians during fracture procedures. First, they should turn the *Miskab* 'the drill instrument' (fig. 6) after they put it in the center of the broken bone until making a hole and the edge of the drill comes out from the other side of the skull. Then they should open another hole in another section of the wound and cut the bones between the two holes by *Mikta*. They should be careful of the tissues of the brain⁵².



⁵¹ Turgut, *History Pediatric*, p. 1086

⁵² Turgut, *History Pediatric*, p. 1086

Figure 6: surgical devices used by *Sabuncuoğlu* for cutting and drilling bones of the kids 'skull, Miskab in the right and Mikta in the left, reprinted with permission of the Atatürk Institute of Culture, Language and History, Institute of Turkish History.
After: Mehmet Turgut, *History Pediatric Neurosurgical Techniques in the 15th century*, Journal of Clinical Neuroscience, (2008), No.15, p. 1085



Figure 7: Photo of some tools used by Sabuncuoğlu, from the Museum

After: Basagaoglu, Z sallhoglu, R BaBaZade, P BoZkuRt-sutas, *The Anaesthetic Drug "Murkid"*

Used by Serafeddin Sabuncuoğlu in 15th Century and its nfluence on The Advance of Surgery, in book History of Anaesthesia VIII, The Australian Social of Anaesthetists, 2016, p. 563

Conclusion:

- According to analysis findings, *Sabuncuoğlu* the Turkish physicians from the fifteenth century followed the same medical methods of Albucasis in orthopaedic and the different treatments of bone fractures. As, both of them described the different types of dislocations and their treatments, but he added his own details.
- Because of the large number of similarities in both physicians' treatments of bone fractures, mistakenly, *Sabuncuoğlu*'s book "*Cerrahiyetü'l Haniye*" was considered as a translation of Albucasis' book "*Al- Tasrif li-man ajaz an al- taalif*". Although there are many similarities between the two books, there are some differences.
- The differences were in the drawing of surgical instruments in two books of *al-Zahrawi* and *Sabuncuoğlu*. According to Albucasis, he drew the instruments only, such as drawing reducing table without presence of patients, while *Sabuncuoğlu* in his book, drew the patients operated on, in addition to the reducing table, and that was appeared for the first time in the Islamic world.
- Both of the physicians reflect how was the progress in orthopaedical surgeries and bone fractures during those periods.

References

Books and Articles

• Foreign References

- Abdo O. Shuriye, Raihan Othman, Contributions of Muslim Scientists to Medicine and Related Sciences, , First Edition, IIUM Press, 2011.
- Ahmed Oryan, Somayah Monazzah Harsini, and Amin Bigham Sadegh, Bone Injury and Fracture Healing Biology, Biomed Environ Sci, (2015), Vol. 28, No.1, pp. 57-71.
- Antonio Vallejo Triano Irene Montilla-Torres, Caliphs, Elites, and Servants in the Qasr of Madinat Al-Zahrā' in the Light of Its Residential Architecture, Arts, (2019), Vol. 8, No. 65, pp. 2-26.
- Ayhan Verti, Sahin Aksoy, Hasan Kafali and F.Ferda Verit, Urologic Techniques of Serefeddin Sabuncuoğlu in the 15th Century Ottoman Period, Elsevier Inc, (20003), Vol.62, No. 4, pp. 776-778
- Basagaoglu, Z sallhoglu, R BaBaZade, P BoZkuRt-sutas, The Anaesthetic Drug “Murkid” Used by Serafeddin Sabuncuoğlu in 15th Century and its nfluence on The Advance of Surgery, in book History of Anaesthesia VIII, The Australian Social of Anaesthetists, 2016.
- Er,Uygur,M. Necmettin Pamir, Ottoman Surgical Treatises and Their Influences on Modern Neurosurgery in Turkey, WORLD NEUROSURGERY, (2013),Vol.80, Issue..6, pp. 165-169.
- Filippo Familiari, MD,1 Gazi Huri, MD2, Olimpio Galasso, MD1, Giorgio Gasparini, MD1, Mahmut Nedim Doral, MD2, The Shoulder, Springer, 2017.
- Gábor Ágoston, Bruce Masters, Encyclopedia of the Ottoman Empire, Facts On File, 2009.
- Gulsat Aygen, PhD, Aykut Karasu, MD, FACS, Ali Ender Ofluoglu, MD, Glenn Pait, MD, Halil Toplamaoglu, MD, The first Anatolian contribution to treatment of sciatica by Serefeddin Sabuncuoğlu in the 15th century, Surgical Neurology, (2009), Vol. 71. Issue. 1, pp. 130-133.
- HafizIqtidar Ahmad Ahmer, S.M., Sartaj Ahmad Ferasat Ali, Contribution of AL-Zahrawi in The Field of Orthopaedics, International Journal of Information Research and Review, (2014), Vol. 1, Issue. 1, pp. 121-123.
- H Volkan Acar, Acupuncture points in the book of Şerefeddin Sabuncuo_glu, a 15th century Turkish physician, Acupunct Med, (2014), Vol. 33, Issue. 1, pp. 72-76.
- Luisa Maria Arvide Cambra, Abulcasis Al-Zahrawi, The Surgeon of Al-Andalus, European Scientific Journal, (2016), Vol. 12, No. 10, pp. 240-247.
- Mahmoud K. Booz, Albucasis Bone Surgery in Antiquity, Pan Arab J Orth Traum, (1997), Vol.1, pp. 73-77
- Masoud Nouri-Vaskeh, Soroush Mostafavi, Hadi Alizadeh, Abdolhassan Kazemi, Albucasis: pioneer of the modern anorectal surgery, Journal of Coloproctology, (2020), Vol. 40, Issue. 4, pp. 435-439.

- Mehmet Turgut, History Pediatric Neurosurgical Techniques in the 15th century, Journal of Clinical Neuroscience, (2008), Vol.15, Issue. 10, pp. 1085-1090.
- Mohamerd Amin Elgohary, Al Zahrawi: The Father of Modern Surgery, Annals of Pediatric Surgery, (2006), Vol. 2, No. 2, pp. 82-87.
- Neset Koksall, History of Surgery in Turkey, UEMS Surgery Section Meeting, 5-6 April, Istanbul, without date.
- Rabie E. Abdel-Halim, Salah R. Elfaqih, Extraction of urinary bladder stone as described by Abul-Qasim Khalaf Ibn Abbas Alzahrawi (Albucasis) (325-404 H, 930-1013 AD), Saudi Medical Journal, (2003), Vol. 24, No. 12, pp. 1283-1291.
- Saba Anjum, Al- Zahrawi: A prominent Muslim Medical Scientist and His Impact on West, Revelation and Science, (2013), Vol. 3, No. 2, pp. 51-56.
- Sammy Al- Benna, Albucasis, a tenth-century scholar, physician and surgeon: His role in the history of plastic and reconstructive surgery, Eur J Plast Surg, (2012), Vol.35., pp. 379-387.
- Sezgin Sarban, Sahin Aksoy, Işter Uzel, DDS, PhD, Ugur E. Isikan, MD, Sahap Atik, MD, Orthopaedic Techniques of Sabuncuoglu in the 15th Century Ottoman Period, CLINICAL ORTHOPAEDICS AND RELATED RESEARCH, (2005), Vol. 439, pp. 253-259.
- Vedat Ceyhan and Kerem Hazneci, Economic Efficiency of Cattle-Fattening Farms in Amasya Province, Turkey, Journal of Animal and Veterinary Advances, (2010), Vol. 9, Issue. 1, pp. 60-69
- **Arabic References**
 - Amira Ali Wasfy Madah, Atib w asydala fi aldawla aleuthmania mn a'sr al-Fatih hata wafat alsultan Suleiman Qanuni 855-974AH/ 1455-1566AD, Resalat Al-mashraq, (2006), Vol.18, No. 1, 2. pp. 531-586.
 - Ngm āldyn 'ly bn 'mr bn 'ly ālkāby ālqzwyny, ḡām' ālldh, dār ālbyān āl'rby, 2002.

Website Links

- Michel T. Yancey, Abul Qasim Khalaf Ibn Al-Abbas Al-Zahrawi, (Encyclopedia), 25 Oct 2021, <https://www.encyclopedia.com/science/encyclopedias-almanacs-transcripts-and-maps/abul-qasim-khalaf-ibn-al-abbas-al-zahrawi>, Last access. 21\11\2021, 12:00 AM.
- Michael Goodyear, Abd al- Rahman III, (World History Encyclopedia), 11 February 2019, https://www.worldhistory.org/Abd_al-Rahman_III/, Last access. 25\11\2021, 1:00 AM.