

## ORIGINAL ARTICLE

### Albucasis Insights in Trauma Management

#### Abstract

Surgical intervention was seen since mankind existed. The management of trauma was begun when first men suffered from wound complications in routine daily activity. The first Greek physicians combined magical and primitive medical methods to treat a wound. The study of surgery which was neglected after the Roman era was survived by Islamic scientists. They collected remaining ancient treatise and innovated new methods and instruments to manage a vast variety of diseases surgically. Surgical management of trauma is the main field of interest in papers written by scientists such as Rhazes, Al-Majusi, Albucasis and Avicenna. The aim of this study is to describe methods explained by Albucasis, as the greatest surgeon in golden Islamic era, to manage trauma patients with bleeding, airway obstruction, penetrating abdominal and arrow wound injuries.

**Key words:** Albucasis, Trauma, golden Islamic era

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Ali Taheri Akerdi<sup>1,2</sup>  
Mohammad Reza Rouhezamin<sup>1,2</sup>  
Mohamad Hosein Bahmani  
Kazerooni<sup>3</sup>  
Shahram Paydar<sup>1,2</sup>

1- Department of Surgery, Shiraz Medical School, Shiraz University of Medical Sciences, Shiraz, Iran  
2- Trauma Research Center, Shiraz University of Medical Science, Shiraz, Iran  
3- Student research committee, Shiraz University of Medical Sciences, Shiraz, Iran

#### Correspondence:

Mohamad Hosein Bahmani  
Kazerooni  
Student research committee, Shiraz University of Medical Sciences, Shiraz, Iran  
masoubk1@gmail.com



### **Albucasis, Trauma, golden Islamic era**

Surgical intervention has been with men since the Stone Age. Cave petroglyphs have revealed skull surgery to remove evil spirit.<sup>1</sup> Suturing with bone needles has been invented and introduced as a standard method since 20000 B.C.<sup>2</sup> Trepanation, a surgical intervention to remove a part of skull for medical purposes, was also a method of surgery in burnt city, Iran about 4000 years B.C.<sup>3</sup> Ligation, cauterization and suturing which were common methods to control bleeding before Greek era have been applied by north American Indians, east African tribes and south Americans.<sup>4</sup> Moreover, Egyptian surgical knowledge influenced ancient medical physicians dramatically.<sup>5, 6</sup>

The study of trauma was begun when first men suffered from wound in routine daily activities such as hunting. The Greek doctors first combined magical and primitive medical methods to treat a wound.<sup>7</sup> They classified penetrating trauma into four categories: arrow, slingshot, spear and sword wound. The mortality rate has been cited in their poetry for each type of injury, too.<sup>8</sup> Trepanation was also a routine method in ancient Greek since 900 B.C.<sup>9</sup> Later, Hippocrates recorded his surgical expertise in six treatise on subjects such as head wounds, fractures and joints.<sup>10</sup> During the second century AD, several methods were introduced to tie bandages for Bleeding management and fixation of fractures as cited in Soranus' handbook On Bandages. Later, Arelius Celsus and Galen extended the Greek surgical knowledge in Roman era.<sup>11, 12</sup>

The study of surgery, which was neglected after the Roman era, was survived by Islamic scientists as indicated in Altasrif by Albucasis.<sup>13-15</sup> They collected the remaining ancient treatise and innovated new methods and instruments to manage a vast variety of diseases surgically. Some stunning surgeries such as hernia repair, cataract extraction, neurosurgical, surgical and orthopedic operations were explained in Islamic tradition, as well.<sup>16</sup> Surgical management of trauma was one of the main fields of interest in papers written by scientists

- 1- Ghannae Arani et al, 2012:301-4.
- 2- Mackenzie et al, 1973: 158-68.
- 3- Rezaian et al, 2012: 157-67.
- 4- Mackenzie et al, 1973: 158-68.
- 5- Saber, 2010: 327-34.
- 6- Mayall, 2014: 51-3.
- 7- Pikoulis et al, 2004: 549-53.
- 8- Pikoulis et al, 2004: 549-53.
- 9- Konsolaki et al, 2010: 549-53.
- 10- Pikoulis et al, 2004: 549-53
- 11- Allison et al, 2009: 31-45.
- 12- Mackenzie et al, 1973: 158-68.
- 13- Shariatpanahi, 2017: 133-68.
- 14- Zahrawi, 2006: 29-30.
- 15- Allison et al, 2009: 31-45
- 16- Zahrawi, 2006: 29-30.

such as Rhazes, Al-Majusi, Albucasis and Avicenna.

Albucasis (936-1013), known as father of modern surgery, was born in Cordoba, Spain in Golden era of Islamic scientific tradition. He collected ancient remaining surgical knowledge in the 30th chapter of his outstanding book, *Altasrif*. Besides, he explained brilliant new methods and instruments for surgical interventions in the same chapter.<sup>17, 18</sup>

His field of interest, in fact, was trauma management. Although management of trauma was not as structuralized as practiced currently, he had a deep insight about main causes of life loss, secondary to trauma in his era. His brilliant methods to maintain airway and control bleeding are telltale signs of his knowledge.

Nowadays, management of trauma patient is a structuralized multidisciplinary process to overcome any condition compromising airway, breathing, circulation and neurological system.<sup>19</sup> The aim of the present study is to describe methods explained by Albucasis to manage trauma patients.

Bleeding control is a main part of every kind of trauma. Albucasis recommended finger pressure as the first step to reduce and stop arterial bleeding. The same method is suggested nowadays.<sup>20</sup> The next step applied by him was cauterization. A hot iron bar was applied in site of injury repeatedly to stop bleeding. He stressed to avoid injury to adjacent nerve bundles during intervention by cautery.<sup>21</sup>

Other methods were also explained by Albucasis to manage bleeding in more serious conditions. The other method, quite similar to what is illustrated in current references of surgery, is transection of partially teared artery as found in *Al-Tasrif*.<sup>22</sup> This shows his extensive comprehensive knowledge of hemostasis a millennium ago. Like modern surgery, at that time, too, invasive methods, such as tying bleeding points and non-invasive management of bleeding by applying herbal medical powder and subsequent packing of wound were other common methods practiced then.<sup>23</sup>

Tracheostomy is an invasive method for management

17- Amr, 2007: 220-1.

18- Annajjar et al, 2010: 857-9.

19- Planas et al, 2018.

20- Brunicardi, 2015: 85-96.

21- Zahrawi, 2006: 49-50.

22- Brunicardi, 2015: 85-96.

23- Zahrawi, 2006: 49-50.



of airway in specific patients nowadays. Albucasis explained it in a stepwise pattern similar to the modern methods. He recommended extending the neck and applying a transverse incision below the level of larynx. After traction of surrounding tissues up and downwardly, trachea was exposed and opened to maintain airways patent.<sup>24</sup>

He described rib fracture in details. The most common site of fracture was assumed to be the poster-lateral aspect of rib. He indicated that the cartilaginous part was suffered from contusion rather than fracture. Close reduction was suggested by Albucasis as the first step for the management of non-complicated rib fracture. Cupping therapy was the method of choice for close reduction. In case of pain aggravation, the patient would undergo open surgery and extraction of fractured bone without perforating adjacent pleura. At last the wound was sutured and bondage was applied. Moreover, concurrent contusions of lung and its conservative treatment have been explained in *Al-Tasrif*.<sup>25</sup>

Penetrating abdominal trauma with sword, arrow and spear was common in the era of Albucasis. Furthermore, he explained management of penetrating trauma in detail. He classified the penetrating wounds into small, medium and large size. He emphasized that small wounds were prone to incarceration and bowel edema. To overcome this problem, he recommended expanding the incision with a cutting device (Figure 1). Besides, a wet sponge was applied on incarcerated bowel loop to reduce edema. Subsequently, the loops reduced and a suture was applied. To repair small laceration of bowel loops, he applied a brilliant method. The edge of wound was approximated by surgeon and an ant was stimulated to bite them. Afterward, the ant was sacrificed. The same step has been repeated to close the wound completely. The preferred position of injured patients was explained by Albucasis for each wound of abdominal wall during a surgery. Upward tilt was recommended for laceration of upper abdomen and downward tilt, for laceration of lower abdomen. Finally, the saturation of peritoneum

24- Zahrawi, 2006: 18-19.

25- Zahrawi, 2006: 242-3.

and different layers of abdominal wall was explained by him.<sup>26</sup>

26- Zahrawi, 2006: 171-6.  
27- Zahrawi, 2006: 196-202.

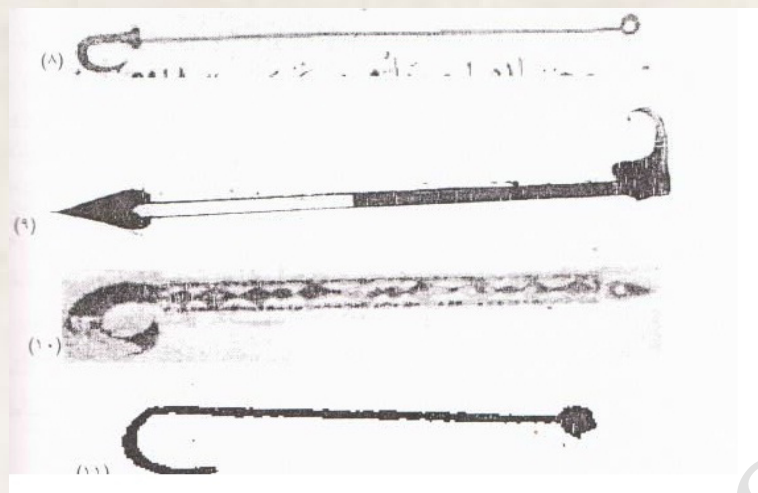


Figure 1. Instrument for widening of abdominal fascia incision.

Management of arrow wound was explained in Al-Tasrif. He extracted arrows in most situations but recommended to leave it when heart was aimed or the patient had poor condition. Innovative instruments were also illustrated in the last chapter of Al-Tasrif for the treatment of arrow wound. Several case reports were included in his treatise to explain his expertise in management of arrow penetrating wounds<sup>27</sup> (Figures 2-4).

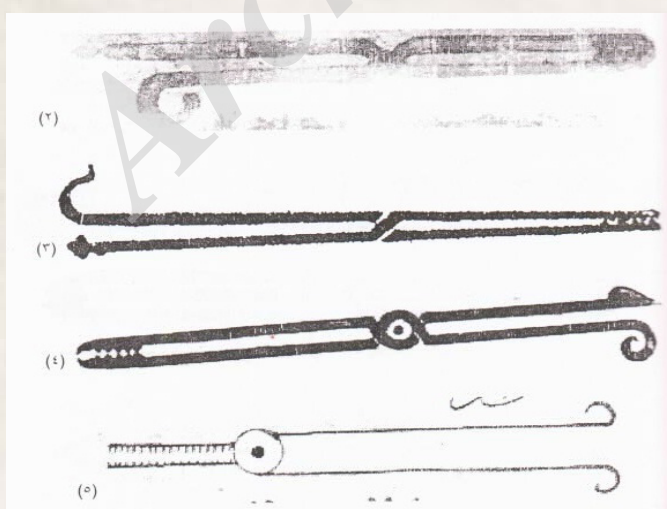


Figure 2. Kalbatayn; an instrument to expel arrow like pincers (tool).



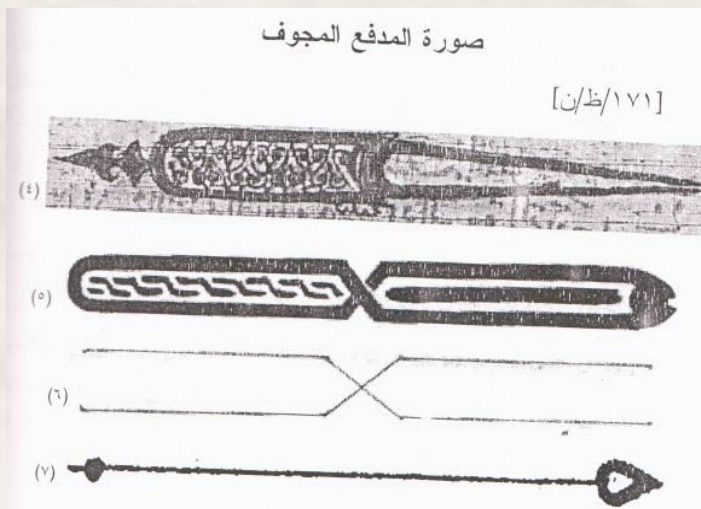


Figure 3. hollow al-Madfai; an instrument to expel arrow.

The last division of the 30th chapter of Al-Tasrif is exclusively about fractures. Close reduction of pelvic fractures by simple primitive tools such as packed tampon in different body orifices and movement of injured patients, management of open fracture of long bones and open reduction when noninvasive management was not successful are some interesting methods of trauma surgery.

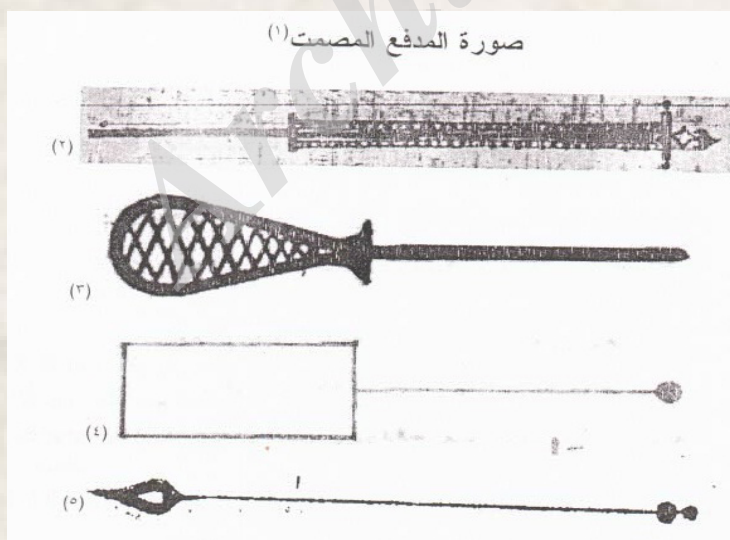


Figure 4. Solid al-Madfai; an instrument to expel arrow.



Born 1000 years' age, Albucasis had innovative modern theories and methods to manage trauma patients. Apparently, some of his methods were not practical and efficient considering the consensus of modern trauma surgeons. Consequently, it seems extremely fascinating to study his experiences which may guide us to new clues for the management of our trauma patients.

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