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Remanufacturing and Evaluation of Al Zahrawi's Surgical Instruments, Al Mokhdea as Scalpel Handle

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Abstract

Background: Current development of surgery is due to medical practitioners and surgeons practices and experiments throughout the history. Albucasis, the Muslim Spanish physician in 10 century AD was one of the pioneers in surgery that had major influence by his innovations in surgical techniques, treatment approaches and invention of instruments. He introduced a type of surgical knife named Mokhdea in his treaties, Al Tasreef that had mobile lancet. **Methods and Materials:** In this paper, we represent this historical instrument according to Albucasis points of view. Also, this knife was reproduced and finally a modified version of it was suggested for current using according to ancient knowledge.**Results:** Albucasis presented a retractable surgical knife with figure in the 30th volume of his book, Al Tasreef. According to his description, this instrument was made including blade, clamp and handle. Also, a standardized new scale up surgical knife was suggested. This instrument includes a blade united with a lever that moves throughout a rail in the handle.**Conclusion:** The idea of making retractable surgical knife dates back to about 1000 years ago; presented by Muslim physician, Albucasis. Also, new presented surgical knife is better compared with current knives because of its comfortable using, safety and scale up.**[GMJ. 2013;2(1):22-25]**

Keywords: Surgical Knife, Albucasis, History of Medicine, Al Zahrawi, Scalpel

Introduction

Current development of surgery is the result of medical practitioners and surgeons practices and experiments throughout the history.[1] One of the most common instruments used in most of operations is surgical knife and blade. It has a long history; it seems that from Neolithic period (circa 10000 years ago), surgery was done by stone instruments in different era such as south America and latter (5000 years ago) in Persia, etc.[2] In ancient Persia (1000 BC), surgeons were one of the three main physician groups who called as kareto baešaza in the Avestan language (one of the ancient Persian languages).

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It means the physicians who worked with knife.[3] Also, founded surgical knives from antiquity (8000 BC) to current era in various civilizations [4] show the depth of the history of this surgical instruments whole around the world.

On the other hand, current usual surgical knives have some complications in use. For example, depth of cutting is depended on surgeons' skill and cannot be regulated by the instrument; also the safety of those is less and probability of pollution for surgeons by cutting their hands is too much. In this regard, many US patents are proven to fix this problems and many new designed instruments were made. But, these instruments are not common among the surgeons because of some reasons such as difficulty in use.[5,6]

By looking to the history, we can find some pioneers in surgery tried to design the surgical knives with better quality and comfortable applying throughout the history. Albucasis (936-1013 AD), the Spanish physician[7] was one of these great surgeons. He presented a novel knife in his time for surgery which was called Mokhdea in Arabic language.[8]

Abu al Qasim Khalaf ibn al-Abbas al-Zahrawi who was known in the west as Albucasis was a Muslim physician in Andulus (currently Spain). He was born in Al Zahra, a suburb of Spain capital, Cordova in 936 AD. He was one of the pioneers in surgery that called as the father of operative surgery.[9] He had many innovations in the surgery. He was the founder of lithotripsy,[10, 11] performance the first thyroidectomy and novel techniques for cystolithotomy by invention of operative instruments.[12] Also, he was credited for his contributions in neurosurgery and gynecology by introducing his novel treatments and instruments.[13, 14] Surgery was not important like the other parts of medical sciences before Albucasis. He categorized the ancient knowledge of surgery; flourished it by his novel findings in techniques and instruments and introduced it as an important part of medical sciences.[15] Finally he died in 1013;[16] when the Islamic golden age in science became to rise. He was contemporary with great Persian scholars such as Avicenna, Haly Abbas and Rhazes that flourished medicine during early medieval period in Islamic territories.[17]

In this study, we tried to represent his surgical instrument together with remanufacturing it and also modified this instrument to design a novel surgical knife which can be used in current medicine. It is a historical perspective to find new approaches to cure in present time.

Methods and Materials

In this research, we first study the book of al Tasreef and presented Albucasis work on surgery. Mokhdea was described according to this book. In the next step, it is tried to remanufacture this instrument exactly based on Albucasis descriptions. Mokhdea was built by jointing three parts: A lancet, a metal clamp and a handle. Finally, a new surgical knife handle was suggested by modification of the Mokhdea to solve current problems of surgical knives. Suggested knife handle is sketched and presented in this paper.

Results

The book of al Tasreef and Mokhdea

The most important manuscript of Albucasis was Al Tasreef Liman 'Ajaz 'aan al-Taleef (the clearance of medical science for those who cannot compile it).[12] It was a comprehensive medical encyclopedia including 30 volumes. The last volume of this book entitled "On Surgery" or "Hand Work" discussed about surgery.[18] This volume includes three chapters on 1) Cauterization; 2) Incision, perforation, venesection and wounds; and 3) bone setting [19].

In the second chapter, Albucasis described an special instrument as surgical knife in three sizes (small, medium and big) accompanied with figure (Figure 1).

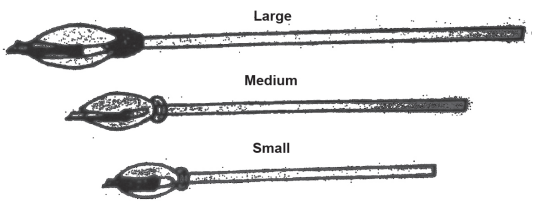

Figure 1. A schematic figure of Mokhdea, from the book of Al Tasreef [8]

Albucasis described this instrument in his book as bellow:

"This figure is Mokhdea that has three types; small, medium and big. Like kohl stick, it is made from cupper. It has one broad head like two spoon on together that a lancet put among them. This lancet, like a bird tongue can be moved up and down according to the surgeon's wills.[8]"

New designed surgical knife based on Mokhdea

Firstly, we tried to make a knife like whose Albucasis described in his treaties (Figure 2). This instrument has three parts; a lancet, a metal clamp together with a handle which joint to the clamp. In this historical instrument, lancet can be moved up and down in the clamp by hand.

On the other hand, innovation of Albucais to make this instrument with some modification can be good idea to design a new surgical knife based on his description. In this regard, we suggest a retractable, scaled up and safe surgical knife with mobile lancet (Figure 3).

This suggested knife and handle includes three parts; a lancet, a handle and a lever.

Lever has a role as lock for fixing the lancet. This lever had two parts, one is fixed and the second is mobile. The lancet can be fixed when the mobile part was moved to right and put in close position. Also, when the mobile part is moved to left (open position); surgeon can move the lancet inside and outside the handle. The lever is joined to the lancet. The lancet is put inside the handle and can be move outside the handle when the lever lock is open. On the other hand, this instrument is scaled up and the length of lancet can be measured and controlled by scaling put on the handle. Therefore it is a retractable surgical knife that surgeons can work easily with more safety.

Figure 2. The remade surgical instrument (Mokhdea) according to the Albucasis description

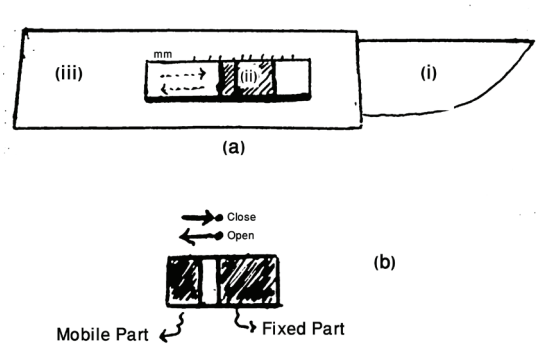

Figure 3. a) A schematic sketch of modified version of Mokhdea. Lancet (i) mobiles via moving lever (ii) inside and outside of the handle (iii). b) The lever has 2 parts: mobile and fix; the lancet can be fixed when the lever is in close position; and also can be moved when it is in open position.

Conclusion

Surgery has a long history. Surgeons and physicians' inventions, innovations and experiments growth this field of medicine to the current stage. Albucasis was one of the great pioneers that raise the surgery by his findings in techniques, treatment approaches and invention of surgical instruments. Mokhdea was one of his interesting innovations to help surgeons in safe and comfort operations. Introducing this instrument can shed light a part of history of surgery. Although some new retractable surgical knives are built and became patent from 1990 until now, but this idea back to about 1000 years ago and presented by Albucasis. Remanufacturing this instrument in this project can induct the feel of surgery in around 1000 years ago to current medical practitioners. This instrument transferred to the Shiraz University of medical sciences museum to show a part of history of medicine.

On the other hand, a new instrument is suggested in this paper by using the ancient knowledge. This surgical knife can help to surgeons for more safe simpler operations. The risk of cutting hands and transmitting some diseases such as HIV can be reduced. Also, It can be worked too comfort only by one hand. In addition, scaled up instrument can help surgeons to cut more carefully. It seems that the ancient forgotten knowledge can help to current medicine yet, of course by modification and standardization.

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References

1. Sciappa J, Van Hee R. From ants to staples: History and ideas concerning suturing techniques. Acta Chir Belg. 2012;112:395-402.
2. Rezaian J, Forouzanfar F. Consideration on Trephinated skull in the Ŝahre-e Sukte (Burnt City) in Sistan. Res Hist Med. 2012;1(4):157-68.
3. Zargaran A, Mehdizadeh A, Yarmohammadi H, Mohagheghzadeh A. Zoroastrian priests: ancient Persian psychiatrists. Am J Psychiatry. 2012;169(3):255.
4. Ochsner J. Surgical knife. Tex Heart Inst J. 2009;36(5):441-3.
5. Volinsky FG. Safety scalpel. United State Patent. Apple.1994: 69526.
6. Lipton JM. Safety surgical blade, handle and shield. United State Patent. 1991: 360089.
7. Zargaran A, Mehdizadeh A, Mohagheghzadeh A. Cataract Surgery in Albucasis Manuscript. Iran J Ophthalmol. 2012;24(1):75-6.
8. Albucasis. On surgery and instruments. Translated into Persian by Aram A, Mohaghegh M. Tehran: Tehran University, 1996. p.p.110.
9. Nabri IA. El Zahrawi (936-1013 AD), the father of operative surgery. Ann R Coll Surg Engl. 1983;65(2):132-4.
10. Abdel-Halim RE, Altwaijiri AS, Elfaqih SR, Mitwalli AH. Extraction of urinary bladder stone as described by Abul-Qasim Khalaf Ibn Abbas Alzahrawi (Albucasis) (325-404 H, 930-1013 AD). A translation of original text and a commentary. Saudi Med J. 2003;24(12):1283-91.
11. Elcioglu O, Ozden H, Guven G, Kabay S. Urinary bladder stone extraction and instruments compared in textbooks of Abul-Qasim Khalaf Ibn Abbas Alzahrawi (Albucasis) (930-1013) and Serefeddin Sabuncuoglu (1385-1470). J Endourol. 2010;24(9):1463-8.
12. Amr SS, Tbakhi A. Abu Al Qasim Al Zahrawi (Albucasis): pioneer of modern surgery. Ann Saudi Med. 2007;27(3):220-1.
13. Al-Rodhan NR, Fox JL. Al-Zahrawi and Arabian neurosurgery, 936-1013 AD. Surg Neurol. 1986;26(1):92-5.
14. Spink MS. Arabian Gynaecological, Obstetrical, and Genito-Urinary Practice illustrated from Albucasis: (Section of the History of Medicine). Proc R Soc Med. 1937;30(6):653-70.
15. Elgohary MA. Al Zahrawi: The father of modern surgery. Ann Ped Surg. 2006;2(2):82-7.
16. Donaldson IM. The Cyrurgia of Albucasis and other works, 1500. J R Coll Physicians Edinb. 2011;41(1):85-8.
17. Zargaran A, Zarshenas MM, Ahmadi SA, Vessal K. Haly Abbas (949-982 AD). J Neurol. 2013.
18. Annajjar J. Abu Alkasem Al Zehrawi (Albucasis 936-1013). Childs Nerv Syst. 2010;26(7):857-9.
19. Chavoushi SH, Ghabili K, Kazemi A, Aslanabadi A, Babapour S, Ahmedli R, et al. Surgery for Gynecomastia in the Islamic Golden Age: Al-Tasrif of Al-Zahrawi (936-1013 AD). ISRN Surg. 2012;2012:934965.