

Editorial

Surgical principles of Ibn Sina (Avicenna)

Beg H

Abstract:

Ibn Sina is one of the famous physicians of Muslim era. He is accepted as Physician par excellence. In his magnum opus, Al-Qanoon, he has collected all the knowledge of medicine from Hindu, Greek and Islamic sources known in tenth-century to eleventh centuries. It includes principles of surgery as well. Though we are not sure how much surgery he did himself as part of his memoirs are lost but he gives the idea of practice of Surgery of the period. In addition to anatomy, physiology and pathology he goes in the management of most surgical problems from head to toe. He is the first to describe the antiseptic properties of wine. We can also attribute to him the first description of Bennet's fracture and his description of late splintage of fractures, now we now know as described by George Perkins. He had a great influence on the practice of medicine in the later centuries.

Keywords: Ibn Sina; Al-Qanoon; Avicenna; surgical principles; cupping; venesection

Bangladesh Journal of Medical Science Vol.14(3) 2015 p.217-220

DOI: <http://dx.doi.org/10.3329/bjms.v14i3.22776>

Background

Abu Ali Al-Husain Ibn Abdullah Ibn Hasan Ibn Ali Ibn Sina was born in a village, Afshana near Bukhara in 980 AD. His father was Abdullah and his mother's name was Satoora. He was a precocious child, at the age of 10 he was a *Hafiz* {reciter} of Quran and by 16 years of age he completed education and started to practice medicine. He had privileged up bringing as the son of politically influential parent who was part of Samanid rulers of the period.¹ He says his teacher Abu Abdullah Al-Natili use to pose problems for him to solve, 'whatever problem he posed for me, I conceptualized better than he, so he advised my father against my taking up any profession other than learning'.²

Education of young men was used to be in schools {*madrasas*} attached to mosques. Theology, Philosophy, mathematics and medicine were taught. All higher schools of learning taught medicine whether the boy is going to be a *Tabeeb* {physician} or a politician or a merchant. At 16 the boy who wants to be a *Tabeeb* would attach himself to a practicing *Tabeeb*. A budding surgeon would attend hospital where well known surgeons {*Jarrahs*} operated and keep up with books. In those days poor students will support themselves by copying manuscripts or working for their teachers. Ibn Sina did not have to do any of these.

Lucky for him he was able to cure the ruler of Bukhara; Nooh Bin Mansoor, who opened his library

for Ibn Sina. In his life he wrote 456 Arabic books and 23 Persian books. Now we can only count 160 in various libraries around the world.³ He died when he was fifty- seven year old in 1037 AD. We know about his life through his book 'My struggle', which was partly written by him and the last part completed by his devoted apprentice Abu Obaida Josjani.⁴ His most famous book Al-Qanoon has been used for centuries as a leading book of medicine and even now is being followed by *Tabeebs* (Unani Physicians) in India and Pakistan. He is buried in a newly built mausoleum in Hamadan (Iran). This has been built in 1950s. It includes a library; the main mausoleum has twelve pillars which indicate the twelve fields of knowledge in which he has written his books. Medicine was only one of the fields of his activity.

Surgical practices of the era

Surgery was not taught in medical schools in pre-Islamic era. Ignorant barbers wielded the knife. According to Hippocrates 'War is the only proper school of Surgeons'⁵ the later Greek philosophers began to build imposing edifices of theory which are triumphs of logic but have little or no basis in established facts. This was partly because of belief of Hippocrates on the healing power of nature rather than unnecessary interference with surgery. He himself advised surgery in extreme cases as an act of desperation.⁶

Was surgery being practiced in early Islamic era? This is evident in a story of *Alif Laila wa Laila*, the

Corresponds to: Dr. Hasan Beg, Otolaryngologist, Spire Murrayfield Hospital, 122 Corstorphine Road, Edinburgh EH12 6UD, hasanbeg@blueyonder.co.uk

famous eastern book of fiction; (The operator) "O King that there is life in your hunchback (patient) yet. I will show you". So saying he took from his belt an unguent in a phial with which he anointed the hunchback's neck, covering it afterwards with linen until the flesh sweated. Then he introduced a pair of iron forceps into his patient's throat and drew out the lump of fish with its bone. Immediately the hunchback sneezed violently, opened his eyes, felt his face with his hand, and jumped to his feet.⁷⁷

Al-Qanoon, his medical text

Al-Qanoon is one of the most famous medical texts ever written. It stands for the epitome of all precedent development, the final codification of all Hindu-Greek-Arabic medicine. It dominated medical schools of Europe and Asia for five centuries.⁸

Al Qanoon is an encyclopaedic work consisting of five volumes. The first volume deals with General principles of medicine including anatomy and physiology, volume two deals with the character of drugs and list of 760 simple drugs, volume three has description of diseases of individual organs from head to toe like eyes, ear, nose and throat, volume four deals with description of general diseases not connected with any organ like fevers, boils, swellings and poisoning. In this section he also discusses beauty culture, and in the last volume he has a formulary.

Surgical principles in *Al-Qanoon*

The general principles of surgery included in fourth volume of *Al-Qanoon* are; incisions should be made along the fold and creases of the skin. He advised to keep away from nerves, arteries and veins. He recommends washing of wound with wine, as he was the first physician to have known of the antiseptic properties of wine. Broken bones should be brought together to improve healing. Methodically describes the suturing of nerves by their capsule. He discussed midwifery and gynaecology. He compared cancer to a crab with its feet growing in the surroundings.⁹

Anatomy forms a basic knowledge for a surgeon. Anatomy was studied in those days on the injured during the innumerable number of wars. The bodies of dead were also available due to famines which were common. Bones were plenty in graveyards. The comparative anatomy could be studied on animals slaughtered. Ibn Sina encouraged use of animals for experiments.

In the first volume he starts anatomy with describing simple organs like bones, cartilage, tendons, arteries, veins, membranes and flesh. He then describes organs as either principle organs like brain or auxiliary organs

like nerves carrying the order of brain. He starts bony anatomy with skull and then travels down.¹⁰ He even describes the muscles of ribs.

His description is detailed and here we will only mention his contributions which still stand good.

Description of eye muscles is detailed and goes into all the muscles and their function. The eyelid muscles have a separate description. On the eye diseases he introduced probing of lachrymal fistula and syringing of lachrymal sac. Ophthalmology was a developed speciality in Muslim period and many other physicians have contributed to it.¹¹

The anatomy and physiology of nose described indicates that he must have seen or done some cadaveric dissection otherwise he would not have been able to describe internal bones, cartilages and soft tissue. The muscles of nostril have a separate section describing how they expand and contracts.

Ibn Sina describes Tracheostomy. He likened nasal Polypi to haemorrhoids and advised their ligature. He gives a good description of disturbances of olfaction, recognising two varieties i.e. first, obstructive due to blockage and second of central origin due to brain lesion.¹² Muscles of larynx, pharynx and hyoid bone is comprehensive and their physiology is described well. He describes seven cranial nerves, though we now know they are twelve. His fifth is Facial and auditory combined together, though, he rightly indicating their physiology separately, first portion for movement of the face and second portion for hearing.

He was well aware of allergy of the ear canal and has described it as itching. Deafness has been described either of central origin or due to blockage of the auditory canal. Noises of the ear have been classified as sonitus, tinnitus and sibilis.

He gives a detailed description of teeth, recognising that they are in bony sockets and have fibrous attachments. He says wisdom teeth come out between puberty and manhood (30 years). He confirms that at times wisdom teeth are absent. The front teeth are used for cutting, canines are used in biting and molars are for grinding. He recognised gingivitis and was aware of trismus due to inflammation of ligaments around teeth. He was also aware that children's diarrhoea is due to teeth eruption.¹⁴

Venesection has a separate section in *Al-Qanoon*. He has indicated the vessels which should be chosen for venesection; also goes into details of contraindications, the amount of blood to be drawn and what equipment to use for the procedure, are detailed.

For amputations he advises that the area should be probed to locate bone and healthy tissue by eliciting pain in the tissue. According to him the decomposed and gangrenous part shows flabbiness and lack of firm attachment. He advises that healthy muscles should be detached before sawing the bone. Important structures should be separated from saw by packing. If there is a morbid process near a large artery or vein the amputation should be avoided.

Cautery was used by Ibn Sina to prevent destructive lesions, to remove putrefaction and to arrest haemorrhage. He advised the use of gold instrument for the procedure. He advised care and to use it on the tissue which is visible to the eyes and not to use it blindly. If cautery has to be used for organs inside, like mouth or nose then the normal tissue should be protected by use of speculum.

He describes causes, types and forms of all fractures, along with methods of treatment. He advocates aligning the bones to bring the broken end together for quick and anatomical healing. He practiced what we now know as the theory of delayed splintage doing it on fifth day. This theory is supposed to be pioneered by George Perkins (1892-1979 AD) but has been described by him earlier.¹⁵ He described fracture of first metacarpal bone in thumb in Al-Qanoon. This fracture is now known as Bennett's fracture (since 1882 AD) though it was described nine centuries ago.¹⁶ He was also aware of the fact that hard tissue like bone can also swell up and develop oedema. This can result in increase in volume of bone and discharge of fluid from it.¹⁷ He also invented a heavy based instrument to correct the displaced vertebrae of thoracic and lumbar region.

He advocated achieving dryness in treating ulcers. If the ulcer is clean, astringents should be applied to promote healing. If the ulcer is dirty (infected), caustics should be used to clean it. Cautery of the ulcer can be performed next.

Anaesthesia

Ibn Sina wrote two formulae of soporific drinks containing Cannabis Indica, Ergot, Atropa and opium to be used with wine.¹⁸ He used to arouse patients with vinegar. The soporific sponge has been mentioned in other books, and inhalation anaesthesia is well known in *Alif Laila wa Laila* 'Ahmad Qamaqam drugs the guard with hemp fumes'.¹⁹

For relieving pain he has advocated ice and cold water, lettuce seeds, Night shade, Hemlock, Hyocyanus, Mandrake and the Opium. He has advocated Opium as the strongest among the group.²⁰

Infections

Inflammations can happen before or after surgery. Ibn Sina was well aware of this complication and laid stress for prevention of infection. He has warned that if infection is not controlled then it will result in an abscess. In the presence of abscess no routine surgery is possible. There are obvious chances of this infection spreading to blood resulting in dangerous consequences. He classifies abscesses as hot, cold, hard and soft. His advice for abscess is it to be left alone to rupture itself, but says at times when it has matured it should be incised. The incision and drainage is what is now practised. His general instructions for soft tissue injuries are to arrest haemorrhage, prevent sepsis by keeping clean and promote healing by suitable diet.

Ibn Sina's influence

Ibn Sina's influence had a great effect upon European Medicine.²¹ In the middle ages Al-Qanoon was greatly followed by Hebrew Physicians and translated into Hebrew a number of times.²² In the twelfth century it was translated into Latin language. After invention of press became the most published book after Bible.²³ Brussels University included Al-Qanoon in its syllabus until 1909 AD.²⁴ Constantine the Africanus stayed in Muslim lands for 39 years and learned from Avicenna and wrote plagiarised work from Avicenna.²⁵

In 1023 AD Ibn Sina left Hamadan for Isfahan, where he would spend fifteen years of his working life under the patronage of Sultan Allaud-Dowla.²⁶ I had a chance of visiting this Hospital, which is attached to *Juma-Masjid* Isfahan. It has been built and rebuilt a number of times, since. At present it does not work as a hospital and is lying empty.

Question is whether Ibn Sina has performed any surgery himself. Basically he was a physician par excellence. We do not find any evidence of his practice of surgery in Al-Qanoon. Having a look at his Hospital in Isfahan (see photograph) it is evident that it was a large *Shafakhana* {hospital}, there must be others working under him and some of them will be *Jarrahs* {surgeons}. There is evidence that later he wanted to incorporate the experiences he gained in practice, but the papers on which he noted then got lost.²⁷ If we would have had those papers we may be able to judge better about his own surgical practice. Not far away in time and period was AbulQasim Zohravi (936-1013AD) the master surgeon of the Muslim period who was leading the surgical practice of the era.

References:

1. Jim Al-Khalili, *Pathfinders*, (London, Allen Lane:2010),176
2. Aisha Khan, *Avicenna*, (New York, The Rosen Publishing group 2006),39
3. M.S.Aasimov, Ibn Seena, Nabgha Afaq (Karachi, *Unesco Payami*) v5, Jan 1981,4
4. *Ibid.*,9
5. George Bankoff, *The Story of Plastic Surgery*, (London, Faber and Faber,1952),68
6. Jurgen Thornwald, *The Century of the Surgeon*, (London Thames and Hudson, 1957),178
7. J.C. Mardrus (English translation), *Alif Laila wa Laila (The Arabian Nights)*, London, Folio Society,2003), V 1, 292.
8. Leslie T. Morton, *A medical bibliography, 4th Edition*, (London, Gower Publishing, London; 1983), 7.
9. M. H. A. Beg, Muslim contribution to Surgery, *Journal of Pakistan Medical Association*; July 1984, 219
10. M. H. Shah, *The General Principles of Avicenna's Cannon of Medicine*, (Karachi, Naveed Clinic 1966),56
11. Hakim Said, *Pharmacy and Medicine thru' the ages*,(Karachi,Hamdard,1980),107
12. Jonathan Wright,*The Nose and Throat in Medical History*,(published by the author? late nineteenth century),93
13. Adam Politzer, *History of Otology*, (Phoenix, Columella Press,1981), 23
14. EhsanulHaq, *Oriental Dentistry and contribution of Muslim Scientists towards Dental Science Through the ages*,(Karachi Hamdard,1987), 25
15. S. T. S. Al-Husaini, *1001 Inventions*,(Washington, National Geographic , third edition; 2012),169
16. Al-Khalili,*op.cit.*(note 1),179
17. Zillur-Rahman, *Tarikh Ilm Tashreeh*,(Delhi, Tibbi Academy,1967), 264
18. U. Khan, *Glimpses of Arabian Surgery* (Karachi, *Hamdard Medical Digest*, 1960), 4, 6.
19. Abul Hasan Mansoor Ahmad (Urdu translation) *Alif Laila wa Laila*, (Lahore, Takhleeqat, 2000), v3;100; also mentioned in, F. H. Garrison, *An introduction to history of medicine*, (Philadelphia, Saunders, 1929,A),137
20. Mones Abu-Asab, *Avicenna's Medicine*,(Rochester, Healing Art Press, 2013), 404
21. Neil Weir, *Otolaryngology- An Illustrated History*, (London, Butterworths,1990), 26
22. Charles Burnett, and Danielle Jacquart, *Constantine the African and Ali Ibn Al-abbas Al-Magusi*,(Leiden, E.J.Brill,1994),63
23. M.S. Asimov, *op. cit*(note 3), 5
24. Salvador Gomez Nogalais, *How Ibn Sina converted to Avicenna*, *Unesco Payami*, (Karachi, Hamdard, 1981),v5:38
25. Wright, *op. cit.* (note 11), 98
26. Al-Khalili, *op. cit* (note 1), 178
27. Manfred Ullman, *Islamic Medicine*, (Edinburgh, Edinburgh University Press, 1978), 45.