

Anthology of Surgery

An introduction to the magisterial surgical history of Edinburgh

The Three Problems of Surgery

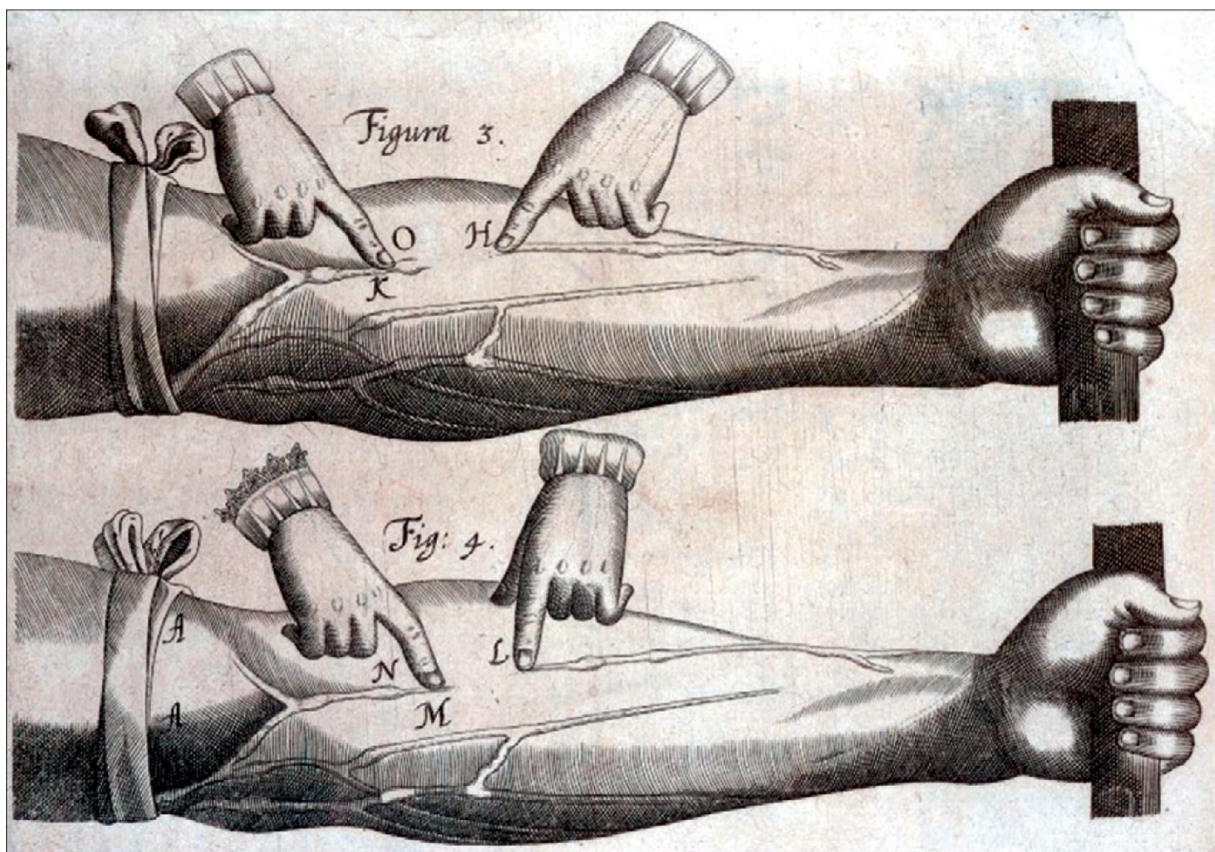
The central issues of Surgery throughout the human civilization can be divided into three

- § Blood loss
- § Infection
- § Pain

Each required completely different solutions by completely different people at (alas) completely different ages. And for completely different reasons of origin.

The Problem with Theories

The blade of theory isn't as sharp as the axe of practical usage in medicine. This is still true to this day.



Consider the discovery, and ultimately the integration by William Harvey of the circulatory properties of blood and charting the entire circulatory system, linking it with cardiac physiology. Despite the massive proliferation of his work, *De Motu Cordis* (by cleverly dedicating his work to King Charles I), it didn't have a huge effect of surgery and medicine at the time. Aside from elevating him to celestial status among scientific peers. We still needed to wait a few hundred years to discover drugs to really anticipate the theory's benefits.

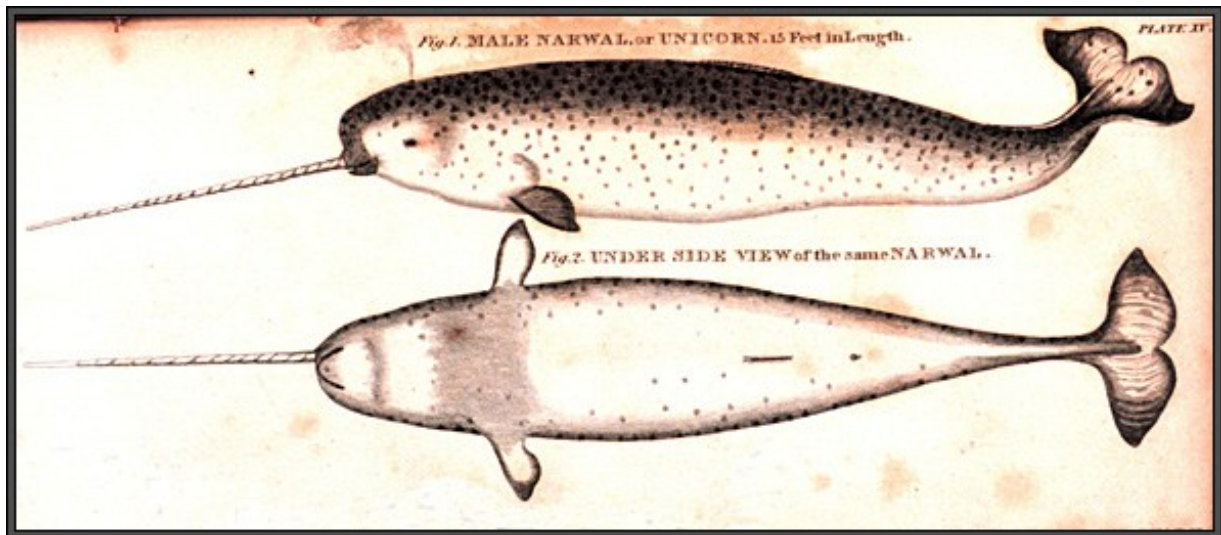
In a similar vein, the discoveries by Robert Hooke and Antonie Van Leeuwenhoek showed the presence of microorganisms, for the first time. That things we cannot fathom can coexist with us was heresy in the 1600s, but it required a certain Pasteur to make the link between microbes and disease for us humans. Pasteur was a grandmaster experimenter, but also a no nonsense theoretician. Interestingly Robert Hooke held the position of "Curator of Experiments" in the royal society where he would show the best experiments in science weekly to Royal Society (London), a post that he held till death. It was a position the man dreamed since he was an assistant to one particular Robert Boyle (of the Boyle's law in gases).



Hooke

If the two Roberts seem like a coincidence, then the name Bell must not feel so, surely now. The most famous surname in Surgery started with Sir Charles Bell, a gifted anatomist,

physiologist, neurologist, surgeon and artist. Bell was the first one to propose sensory nerves and motor nerves had to be kept separate - sensorimotor partition - in the spinal cord. It's something even a schoolboy knows now, but was anything but obvious back then. Charles Bell and John Barclay were famous, in addition to being surgeons, were also collectors of anatomical working models of exotic animals. These included the Tusks of Narwhal (the unicorn of the Sea) and were given to the museums and colleges for students to learn. Between them they had two museums worth of specimens.



We still do not know what these creatures use their horns for.

The surgeon John Bell and advocate George Bell were Sir Charles' brothers, and all three were at one point in Edinburgh alongside Barclay.

Death's Disguise

Edinburgh was the finest place in Europe for Medical sciences in 1700-1800s. This was indisputably its golden age (not so golden to patients and corpses as we shall see).

A common practice back then was to illegally 'gain' corpses to meet the demand of doctors wanting to perform experiments on them. Anatomy was just taking off and people would pay anything to get their hands on pretty much what money can buy.

First of these came from Malefactor Dissection. Malefactors are, for a lack of a simpler name, criminals. Doctors paid a handsome sum (illegally of course) to get the bodies of executed criminals. This has advanced a huge amount of medical and surgical knowledge, least of which were due to the fact that criminals then (compared to now) had high incidence of tumors or diseases, and such could be studied in more depth.

Second and more controversial was from the guild of Graverobbers and Bodysnatchers - collectively known as the Resurrectionists.

These were people (lowlifes, sailors, highwaymen, hooligans and dock hands) who were hired by the anatomists, surgeons and doctors in general to dig up recently deceased people's corpses.



These 'resurrection men' worked in groups and were paid handsomely by their employers. They often left money or jewels in place of the corpse to make the victims' family feel somewhat less angry. Empathy? Fear perhaps, of retaliation. At one point the demand for corpses far outstripped the supply that corpses would go for hefty sums. Why were the supplies low?

Because the price of being caught is death, which paradoxically increased supply too. Curiosity cannot save one from the long arm of law.

The most universal famous of these, was the case of Burke and Hare



These two took it upon themselves to not wait till the grim reaper took someone. Over a period of 10 months they killed about 16 people (normal, disabled, and in many ways the weak) and sold them to Dr Robert Knox. They were so clean that they left no evidence, but the police miraculously caught on. Burke snitched on Hare eventually and sold himself to the police. Hare was sentenced to death and his cadaver was shown in the medical anatomy hall and some 50,000 people from the city of Edinburgh showed up making it impossible for even medical students to see. This was a turning point in the history of graverobbing and the Anatomy Act was passed which made it legal to donate bodies to medical science, a law to this day helps in first year medical students all around the globe.

Often people justified graverobbing as the way for science to defeat its government chains. But more so than not, some of these truants often sliced, mutilated and recombined bodies to form unholy beings that exist in children stories and fantasy lore.

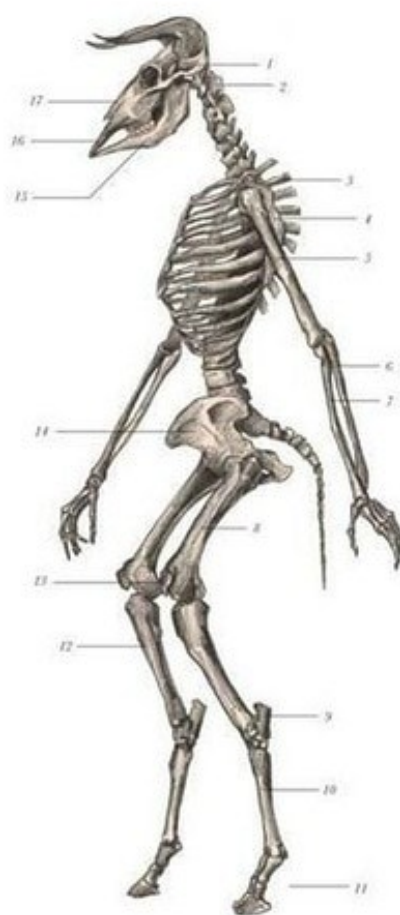


PLATE 5

- 1. Temporal bone
- 2. 1st cervical vertebra
- 3. 1st thoracic vertebra
- 4. Scapula
- 5. Humerus
- 6. Ulna
- 7. Radius
- 8. Femur
- 9. Calcaneus talus
- 10. 3rd & 4th metatarsal bone
- 11. Phalanges
- 12. Tibia
- 13. Pisula
- 14. Pileo
- 15. Incisor (lower jawbone)
- 16. Incisor bone
- 17. Nasal bone

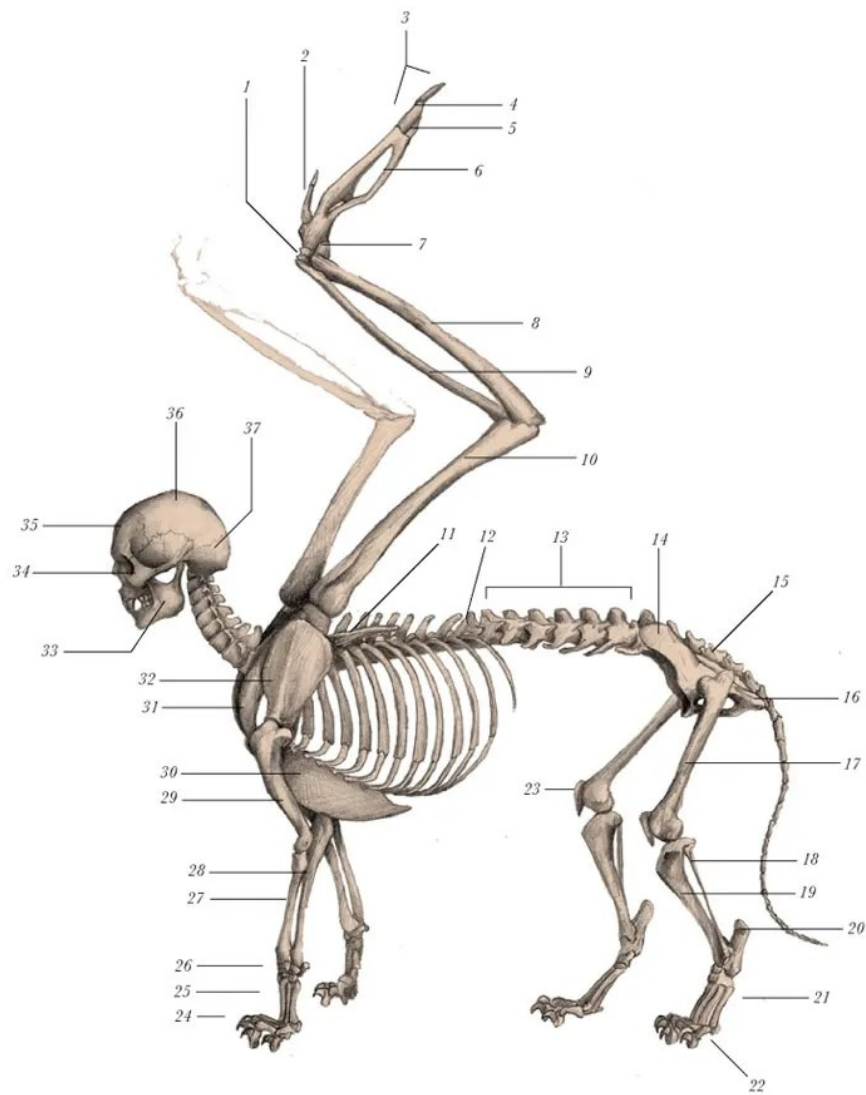


PLATE 1

- 1- Radial carpal
- 2- 1st finger
- 3- Phalanges
- 4- 2nd finger
- 5- 3rd finger
- 6- Carpometacarpus
- 7- Ulnar carpal
- 8- Ulna

- 9- Radius
- 10- Humerus
- 11- Scapula
- 12- 12th thoracic vertebra
- 13- Lumbar vertebra
- 14- Pelvis
- 15- Sacrum
- 16- Ischial tuber
- 17- Femur
- 18- Fibula

- 19- Tibia
- 20- Calcanean bone
- 21- Metatarsal bones
- 22- Phalanges
- 23- Patella
- 24- Phalanges
- 25- Metacarpal bones
- 26- Carpal bones
- 27- Radius
- 28- Ulna

- 29- Humerus
- 30- Keel of sternum
- 31- Furculum
- 32- Scapula
- 33- Mandible
- 34- Zygomatic arch
- 35- Frontal bone
- 36- Parietal bone
- 37- Occipital bone

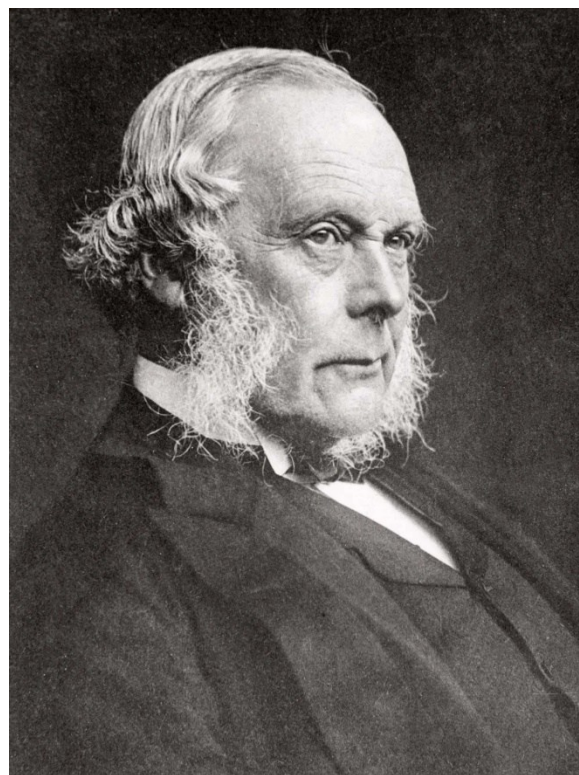


In a world of superstition, it was easy to scare an entire town by parading this and claiming that such a demon is in the wilderness loose and only 'they' can save the town (for a price of course).

Scammers have always existed; now they just use crypto instead of crypts.

The Chains of Society

However, there was one man whose discovery shone over the darkness of this grim age.



Dr Joseph Lister

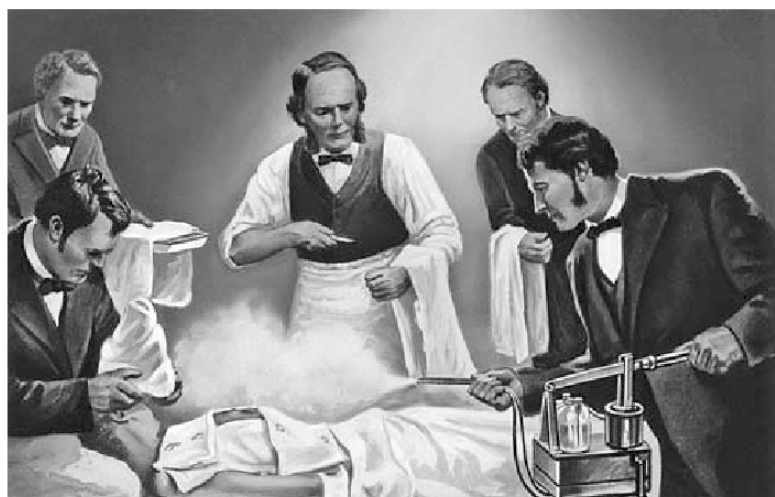
Dr Joseph Lister was not known as an exceptional surgeon nor a popular soul to his peers. What made him and his contributions the most revolutionary was his application of antiseptics. Recall the triple problem of surgery - blood loss, infection and pain. Infection was the real killer here.

Lister's great insight occurred when he was reading Pasteur's germ theory of disease and had his own aha! moment when he hypothesized that the same germs could be the reason for the mass fatalities during post surgery. This seemingly intractable puzzle was largely accepted as God's punishment for opening the human body without permission.

Lister's life was spent convincing his cruel peers that this will actually save lives. It was a social tradition among surgeons then (1800s) to appear as bloody as one can. A bloody tradition perhaps. "A true surgeon goes in clean and comes out bloody like from hell". What this means is a typical surgeon would use the same gown (often white) for all his surgeries so it becomes more and more red. It was seen as a badge of honor among his peers, not knowing that the high mortality of his patients (~80%) stemmed from this. Lister fought long and hard to convince his fellow doctors that these microbes may be causing deaths (infection was a word not yet invented). The problem? Evidence.

Humans form beliefs first, then seek evidence supporting it. None of his peers would believe his arguments that these microbes exist since it could not be verified as they cannot be seen with naked eye. He was often ridiculed on conferences that "close the door lest Lister's microbes come in". The prevailing theory was Miasma theory (miasma = bad/foul air) where air itself caused the deaths and diseases. This was made harder since lay people often argued not seeing any evidence for microbes present in the air, a reasoning error that still persisted in COVID times, two centuries later. UK and US resisted Lister's approaches of handwashing and antiseptics using carbolic acid but thankfully Germany did pick it up and saw massive gains in lives saved. This of course progressed the field than anything else at the time, and Lister despite having an almost tragic ending like Semmelweis (another figure who fought against mainstream surgery) finally found his long last vindication.

Wine, old honey and vinegar were known to some degree, curb 'infections' by traditional wisdom. But without the penetrating insight of a theory to place them in a framework, it was useless as millions died in vain due to a combination of ignorance, resistance to change the established norm and the spectre of social judgement.



The Cure for Pain

Although the infection problem was solved in the 1800s, the experiential problem of the pain still persisted. One can only imagine how hellish was the experience of a common man needing surgery was in the pre-1900s

People often used force (multiple strong males holding the patients' limbs down) to perform surgery sidestepping the pain. More sophisticated ones had their own Mesmers. These were named after Franz Mesmer the famous physician who theorized (and duped) a lot of people saying animals had magnetic energy. Incredibly he proposed that we can harness this natural energy for immortality (and the usual stuff). He would make grand spectacles to behold people, stealing large sums of gold and moving to the next town. The word Mesmerizing came from this gentleman's last name.

Mesmers were asked to hypnotize the patient while the surgeon performed, and it worked rarely as you can imagine (if ever). But they did have a mainstay in surgery and can be seen as precursors of modern anaesthesiologists/anaesthetists. Because they said the spells worked for short periods, surgeons were tasked to finish the operation in under five to ten minutes usually. This was helpful because shorter the surgery less the blood loss, so a mortality gain was observed (for entirely different reasons that these Mesmers theorized).

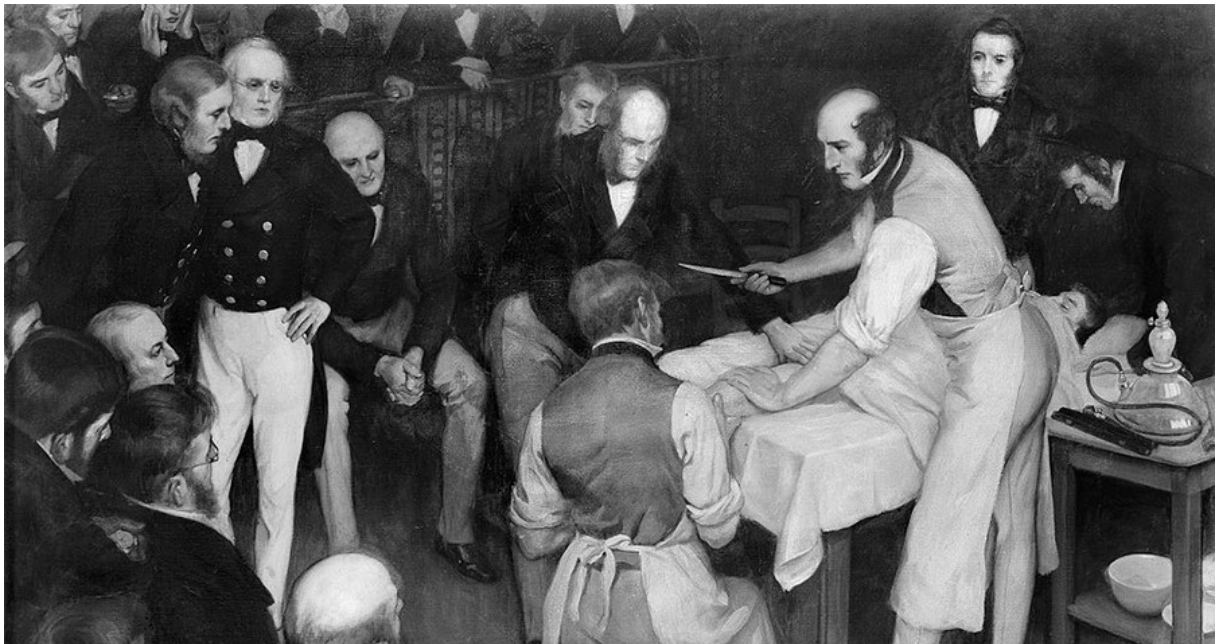


This all came down crashing spectacularly when Robert Liston (yes, another Robert) first performed a surgery under anaesthesia, and gave birth to a whole new medical field.

Robert Liston was trained under John Barclay (yes, the same Barclay a few pages above). He was prodigiously gifted with his technique and speed, and was known throughout UK as 'the fastest knife in West End'. Such was his surgical speed and precision he would always start the surgery by saying "time me, gentlemen". This habit ended when, during a leg amputation

surgery, he cut off his assistant's fingers accidentally, along with the patient's lower limb and reeling back cut the throat of a spectator. All three eventually died and Robert became the first (and hopefully only) surgeon with a 300% mortality rate in one surgery.

He was the first one to perform surgery publicly (his courage was well known) and used ether for anaesthesia. He was successful and wanted (and eventually got) a house facing the Edinburgh Castle, a long time desire of his.



A brief and tragic history of ether:

- § Raymond Lullus invented ether in 1275 and called it Sweet Vitriol
- § Paracelsus used it in 1600s
- § 18th century physicians named it Ether
- § 19th century physicians finally used it as an anaesthetic

A total of 700 years and 700 million screams had to pass before invention and innovation in the humanity's first moment of defeating the second and most personal problem of surgery.

What is more chilling than this?

All throughout this, people routinely used ether for laugh parties or 'ether frolics'. Wedding parties, birthday parties and similar social events had this as a recreational drug to keep laughing. Nobody had the insight to try it with surgery or increase its dosage to reveal its anaesthetic properties. Nobody was laughing during the surgeries. Our social tunnel vision often hampers innovation, even when evidence is staring back at us, urging us to act.

To add more ridicule by Fate consider the story of Horace Wells, a dentist who used a combination of ether and nitric oxide to alleviate pain during dental procedure. One cannot imagine dental procedures even now with anaesthetics, so imagine then. In a grand public, event he performed the surgery on a patient administered with ether and nitric oxide, but the dosage was low and the patient ran out in agony. The dentist was ridiculed and had to relocate this office six times and close 9 times (due to other reasons). He was honored to bringing this practice to dentistry later on, twelve days before his death.

Anaesthetics were extremely critical in surgeries with extensive pain, intractable locations and one-off cases. One famous example is the case of Robert Penman.



Penman

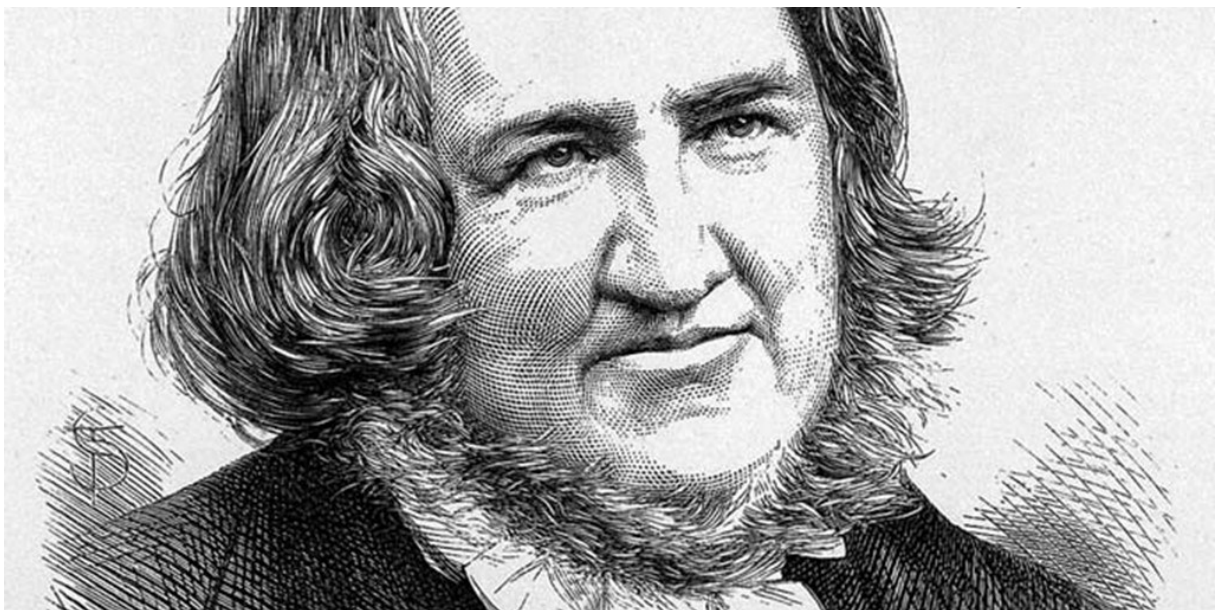


Penman's tumour

This gentleman had an unfortunate tumor on his lower jaw which was successfully removed. Strangely enough, he approached Robert Liston first who refused to recommend treatment, and was operated instead by the famous (and skillful) James Syme.

The Birth of Life

During this time, another jewel of a doctor, this time in obstetrics, was testing the use of another eponymous chemical, Chloroform. Sir James Young Simpson's life and character, though much less exciting compared to Robert Liston, was every bit if not more important.



The 'Simpson's Forceps', widely used in Obstetrics/Gynecology is invented by this man. In addition, he also promoted the usage of midwives in surgery.

Midwives?

Midwives were a group of women who was tasked to perform childbirth among other female oriented surgeries. They banished any and all males from environment and was extremely superstitious. They performed childbirth like a ritual, with the woman's family members (all females) usually convened ahead of time. This group of close circle females talking and encouraging the mother was termed 'gossip', (thus the origin of the ubiquitous social habit of backbiting one's colleagues in private). Midwives, accordingly held extreme power in the society and often affected large scale decisions as every man and woman at some point had to rely on their help.

Despite this, women in general, however were not allowed to practice medicine or surgery.

This was such a situation that only in 1869 did the rule break. And it was broken beautifully by seven women - Sophia, Isabel, Edith, Matilda, Helen, Mary and Emily. They were named the 'Edinburgh Seven' or Septem contra Edinam (Seven against Edinburgh). They were the first in UK and perhaps whole Europe to study medicine as females, and received nationwide support, most prominently from Charles Darwin.



Elementary, my dear Watson

We close my reader, by visiting the life of another colorful surgeon from Edinburgh - Sir Arthur Conan Doyle, the creator of Sherlock Holmes.

Doyle while studying medicine at Edinburgh was mesmerized (as with all students) by Dr Joseph Bell. According to people, he was the only surgeon to treat surgery as a sort of exact

science. How he would state hypothesis and prune them one by one (like an optimal Bayesian perhaps) in light of evidence made surgery feel like a crime novel. Indeed, Doyle's favorite past times were reading detective novels throughout his life. But the thing that struck him, after his medical training under Bell was this - most crime novels had the hero find the answers through luck, divine intervention or help from others. This irritated Doyle who wanted everything to be treated like a science. Like a probabilistic evidence accumulation process. So, he merged his model of Dr Bell and his love of detectives and created Mr Holmes, and rest was history.

Most surgeons named here were gifted artists, painters, sculptors on the side. In Sir Doyle finally we have a writer.



Thank you for reading this.