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**An historical look
at the origins
and early years
of general anesthesia**

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There have been many momentous occasions throughout the course of history that have led to vast improvements in the well-being of humanity. Arguably, the appearance of general anesthesia with its attendant reduction in suffering is near the top of those events. This article examines the plight and suffering of people during the years just before and the years following the introduction of anesthesia. It will also discuss the direct and indirect changes that occurred, and the discovery of the agents of anesthesia, their discoverers, their development and the process of their acceptance.

The road from drug to general anesthesia and its acceptance was, in most cases, slow and erratic. It is interesting that the discovery of such a powerful tool for reducing human suffering should be so slow in coming to fruition.

A painful past

“Surgery was forced to remain a social concern not a scientific one, because what mattered pre-anesthesia was first deferring the agonies of the mind and secondly tending to the ills of the body. Surgery was tied to the inescapable fact of pain.”⁹

A review of the years prior to the advent of modern anesthesia will provide a better appreciation of this pivotal development and a complete understanding of the elation of the medical community.

The chief reason that people were subjected to surgery was tumors. Amputation was the second most frequently performed operation during the preanesthesia period (Figure 1). A recording of an amputation noted that most of the medical students in the theater watching the procedure were unable to continue witnessing the event. The pain, agony, and the suffering were more than they could handle. The cutting of the skin, the sawing of the bones and the blood that pooled around him was a horrific sight and shock usually followed.⁹ Charles Darwin abandoned his medical career on seeing an operation during this period.

Some patients could actually prepare for surgery mentally and endure the procedure without as much as a flinch. Surgeons called these patients (usually men) stoics, after the Greek philosophers noted for controlling their emotions. Family and physicians alike congratulated them. Most people, however, had to be held down, kicking and screaming, and hope their surgeon would be quick and precise.

Before general anesthesia was introduced on October 16, 1846, operations were infrequent. Massachusetts General Hospital, the third most active center in the United States, performed possibly two per week from 1820 through the mid-1840s. Surgery was considered a very special event at that time.⁹ The number of procedures grew rapidly over the next few years. St Bartholomew's Hospital in London recorded approximately 1,000 operations using inhalation anesthesia, 340 in 1860.¹¹

Surgical theaters were constructed so that other patients in the hospital could not hear the

noise. They were often located on the top floor in a cupola where the light was best, or in the basement, where the sounds of agony could be muffled. Some patients preferred to suffer the pain their malady produced, and some, who refused surgery, died by suicide.

From wine and herbs to ether

The need to relieve pain has been a constant pursuit throughout human history, and early efforts were as diverse as their results. In antiquity, remedies were mostly limited to wine and herbs. Rituals of relaxation and prayer provided too little relief. Opium became the most important single agent of pain relief until the debut of ether (Figure 2). Alcohol was also widely used.

Cocaine was first utilized by the Peruvian Indians. By chewing the coca leaves and spitting into the affected area, they numbed the site of the operation, often for trephination. When it was introduced in Germany, the alchemists crystallized the coca leaves into a white powder and called it cocaine. Cocaine later became the leading local anesthetic in surgery. In 1880, Carl Koeller and Sigmund Freud used it as an eye anesthetic, and in 1885, J.L. Corning used cocaine as a spinal anesthetic in humans and became the first to operate on a patient using spinal anesthesia.^{1,8}

Mechanical methods also attempted to relieve pain during surgery. One used compression bands of rubber, rope, and other materials as a tourniquet. This would cause some degree of numbness and the surgeon could proceed to amputate the diseased limb. Another method attempted to cause excess bleeding, causing the patient to faint and allowing the surgeon to proceed. During the winter months of the Crimean War (1854-1856), a surgeon noticed that amputees complained less of pain during near freezing conditions. Ice became another method of numbing the area before surgery.

Hypnosis had also been used widely around the world. Most doctors rejected this method because it often took several hours to initiate an adequate trance (Figure 3). Others thought it to be a form of quackery and would have nothing



to do with it. Less effective methods also accompanied the crude operative procedures of the time. Some patients chose to die rather than endure the pain of an operation.^{5,6,9}

It is paradoxical to note that, it is likely that ether parties were being held near hospitals using the very gases that could have provided humane relief from the suffering. Little did anyone know, the cure was literally just around the corner.

The discovery of ether

The earliest attempts to use inhalation anesthesia by the medical community provided a number of roadblocks and criticisms slowing its

implementation. There were many false starts and troublesome research studies. As early as 1804, an American chemist, Sluth AM Mitchell, administered nitrous oxide to animals with dire results. He concluded that the gas was poisonous and could be the cause of epidemics. His opinions were accepted with few reservations, and no doctor seemed brave enough to investigate otherwise.

In 1820, Dr Henry Hill Hickman of England tried to publish his findings on suspended animation by delivering carbon dioxide gases to animals, but because of the prejudices of the era, he was encouraged not to tell physicians of his

FIGURE 1
Gangrene
amputation
without anes-
thesia (1618).

findings that pain could be alleviated during surgery.¹

Although ether was not new to the scientific world, it had yet to be introduced to the medical world. “Ether Frolics” and “laughing gas parties” were part of both social circles and the scientific community that was studying the work of gases in laboratories. Itinerant lecturers would lecture on the properties and effects of the ether and nitrous oxide gases. Afterward, the chemist would give the audience a chance to experience the effects of the laughing gases.

The public was soon using ether and nitrous oxide without the lectures. An 1877 article written by Dr J Marion Sims in the *Virginia Medical*

Raymond Lully called it “white fluid.” Later Paracelsus called it “sweet vitriol” (circa 1530), and tested it on his chickens. He observed that they became unconscious, only to awaken unharmed a short time later. He wrote, “I think it especially noteworthy, that its use may be recommended for painful illnesses.” Still later, in 1792, a German apothecary, Frobenius, changed the name to ether. It was by this name that other scientists continued to study its benefits.⁴

Dr Humphry Davy of England recognized in 1800 that ether, with nitrous oxide, could be helpful in alleviating physical pain. Additionally, he was credited for changing the name of nitrous oxide to “laughing gas”, which is what it was called when students who had studied in Europe brought it to America.⁵

When Joseph Priestley, the pioneer who discovered oxygen and nitrous oxide, came to America in 1790 to escape the ravages of the French Revolution, he introduced the idea that oxygen and nitrous oxide might be useful for diseases of the lungs. Charles U Jackson, who studied at the Sorbonne in Paris, returned to America and began his career as an itinerant lecturer on these and other gases. Doctors, such as Crawford W Long, Horace Wells, and William TG Morton, came to realize that these gases might render a patient insensible during a surgical procedure.¹ Of course, each first tried the gases on themselves numerous times, as well as on their colleagues, before trying to prove the merits of ether to the medical community.

Crawford W Long was the first recorded medical doctor to use ether on his patients. He began in 1842, but did not report his findings and experiments until 1849. His early efforts primarily received scorn.

The first successful application

Horace Wells, a dentist, used ether in his practice and proposed its use for surgery at Massachusetts General Hospital in 1845. His first experience, however, was clumsy because his volunteer was a very large man, and Wells did not have enough of the anesthetic agent to put him under. As a result, Wells was driven from the operating

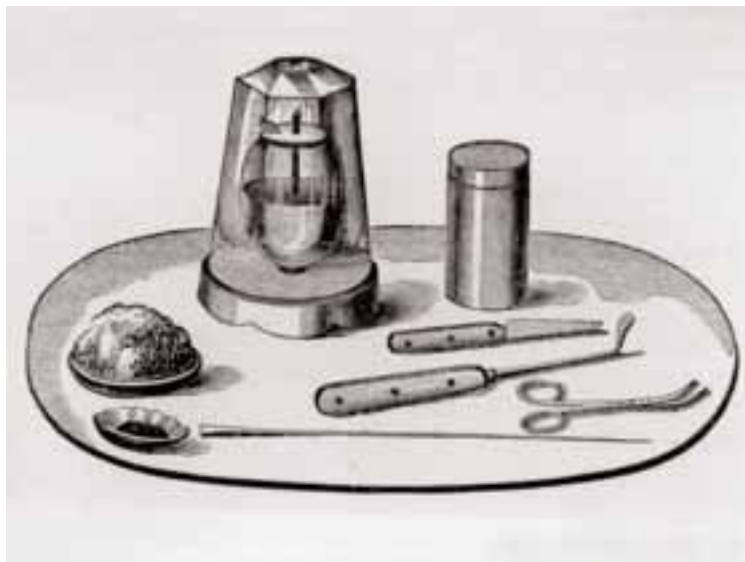


FIGURE 2

Monthly stated that children in rural Georgia were demonstrating with ether at a social function as early as 1832. In his recording of this event, he explained how a party got out of hand when a few of the boys held down another, who was big but shy, and forced ether on him. He then lost consciousness and did not awaken for 30 minutes, during which time the boys were terrified. They quickly fetched a country doctor who revived him, and perhaps delivered the first lecture on the risk of playing with ether.²

While the discovery of anesthesia was mainly an American phenomenon, the actual discovery of ether had its roots in Europe under different names. As early as the 13th century, the alchemist

Articles for
smoking
opium.
1882 *Gallards*
Medical
Journal.

theater with jeers, hisses and “humbugs” from students in the audience. He left a dejected man.⁶

In spite of the ridicule, Wells continued to practice dentistry and administered ether to the many patients who flocked to his office for painless procedures. William TG Morton, his partner, pushed onward and perfected the techniques.

Twenty-two months after Wells’ effort, Morton asked the famous surgeon, Dr John C Warren, if he could give another demonstration, noting that it had nothing to do with Wells or his method. On October 16, 1846, he successfully demonstrated that ether inhalation could render a patient insensible during an operation (Figure 4).²

Warren was known to be stern and, after practicing for over 20 years, avoided showing emotion. However, following this demonstration, he had tears in his eyes at the realization that he would no longer have to watch helplessly as his procedures provoked such pain.³

With great admiration, Dr Henry J Bigelow, assistant to Warren, addressed the students in the operating theater by saying “Gentleman, this is no humbug!”⁷ “Today we have witnessed something of the utmost importance to the art of surgery, our craft has once and for all been robbed of its terrors.”⁴

In a letter to Morton following the demonstration, Dr Oliver Wendell Holmes first coined the term, anesthesia.

“The state should, I think, be called anesthesia. This signifies insensibility, more particularly to objects of touch. The adjective will be anesthetic.”¹

The positive results

One month after the discovery of ether inhalation, the US Patent Office gave Morton patent number 4,848 for his version of ether, called “Letheon”.¹⁰ It took longer to get a patent than it did for the news to travel to Europe. Dr Robert Liston was the first to operate in London while his patient was under ether inhalation, which was administered by Dr John Snow. Snow had already been interested in gases; however, like the



rest of the medical community, he was awaiting approval to administer ether to humans. Although the techniques needed to be refined, the European medical profession quickly accepted this scientific breakthrough. Snow devoted his entire life to improving the administration of ether and nitrous gases.

Another English doctor from Edinburgh, Sir James Young Simpson, began using ether in January of 1847 for the relief of labor pain during childbirth. A major drawback was the smell; it often made people vomit and cough. He decided to seek a less pungent gas and turned to articles on chloroform by Eugene Soubeiran of France and Justus von Liebig of Germany writ-

FIGURE 3

This engraving, titled *The Mesmerist and Mathias*, shows a hypnotic trance.

ten in October 1831. (The actual credit for its formula and name went to Jean Baptiste Dumas in 1835.)

Simpson found that chloroform was much more pleasant to use, and patients did not mind the smell.¹ Another advantage over ether was the decreased quantity—it did not take as much chloroform to achieve the same results. Chloroform was easier to transport, which was an additional benefit for physicians who made many house calls. He used chloroform in more than 50 cases with splendid results.³ Although Simpson did not discover chloroform, he perfected its qualities and believed himself to be “victor of pain” (conqueror of pain).

Chloroform also became the favored choice of Snow at St George’s Hospital in London, where he administered it to outpatients and major surgical patients. He gave up his regular practice so that he could administer anesthesia full time.⁹

American reactions were not so positive. The *Philadelphia Medical Examiner* attacked Warren and Bigelow in Boston for giving succor to quackery and stated that if such actions continued, it would constitute a fraternity of both physicians and quacks together as one. Bigelow retorted that the paper had rebutted mesmerism, and that had been approved in 1831.¹³

Still, there was much evidence of success. Morton delivered anesthesia to over 200 people without complications or fatalities.¹¹ In its first year, not one single fatality caused by anesthesia was recorded.

The discovery of these gases gave surgery the one thing it needed to flourish and develop, a method of alleviating pain. Women especially were early benefactors of general anesthesia. Both ether and chloroform were given to women while in labor, dramatically reducing the trauma of childbirth (Figure 5). Doctors found that ether and chloroform did not prolong labor and reduced the amount of pain the mother would experience.

In London, Snow recorded that he administered chloroform and other gases in about 450 cases in 1852. In 1853, he was asked to give chloroform anesthesia to Queen Victoria during the

birth of her fourth child, Prince Leopold. Snow was subsequently knighted for his service.⁶ Upon hearing the news, women flocked to his office to find out how the queen reacted under anesthesia. With the success of the queen’s anesthetized delivery, they clamored for the same.⁶

Soldiers in battle carried chloroform in bottles so, if wounded, they had instant relief. As technology improved, the inhalation machines began to appear in operating rooms and dentist offices.¹²

Drawbacks and criticisms

While the advances promised by the new gases were becoming more evident, dangers relating to their usage were also being noted. Deaths occurred because of faulty equipment or the lack of training of the person administering the gases.

For the most part, the Americans utilized ether, while the Europeans favored chloroform. Both agents were found to be dangerous as usage increased. Dr Flourens from France noted that chloroform would cause toxicity if given in high quantities and could cause death. Dr James Syme of Edinburgh began to use ether because he felt the deaths of his patients could be attributed to chloroform use, which, in high dosages, caused the patients to stop breathing altogether.

In general, ether was thought to have been safer than chloroform, probably due to its reduced potency.¹ The first death recorded was a 15-year-old girl in Newcastle, England, January 28, 1848, who was undergoing removal of a toenail, while breathing chloroform.

But, there were also problems associated with the use of ether. It was highly flammable, which became a major problem because a fireplace often provided the light for a room. As Wells discovered during his failed 1845 demonstration, obesity was also a problem, as obese patients did not go under nor did they recover as quickly.³ In some cases, doctors speculated that convulsions, prolonged stupor, intense cerebral excitement, depression of the vital powers and asphyxia were caused by etherization. Less frequently, cases of bronchitis, pneumonia and

inflammation of the brain were attributed as effects of anesthesia.

The first meeting of the American Medical Association in 1848 considered various anesthesia agents and their reactions within the medical field. Some surgeons were afraid to use the new anesthesia, even though it supplied great pain relief. They tried to consider both the risks and the advantages of an anesthetic. Some rejected it totally, believing it was too dangerous and not yet established. No one wanted to be the first to have complications.¹

Over the next 10 years, Snow reported 50 cases of anesthesia related deaths, and for reasons unknown at the time, they occurred in young patients.¹ Chloroform deaths had reached such a formidable total by 1863 that the Royal Medical and Chirurgical Society appointed a special committee to investigate the causes.¹²

As the deaths began to mount, there was a surge of new techniques of administration of the gases. The medical community speculated that established failures were not due to the ineffectiveness of the ether, but to the improper techniques used to administer it or the apparatus itself.⁶ In Zurich, Switzerland, by the end of 1847, the government prohibited the use of ether anesthetics by those who practiced dentistry, bleeding, those who performed minor surgical operations, or any other inexperienced persons. In Darmstadt, Germany, officials prohibited the administration of ether by untrained medical practitioners, dentists or midwives.

Not all the criticisms of anesthesia were founded in medicine. During this period, Simpson was highly criticized by the Scottish Calvinist Church for eliminating the pain during childbirth. The church found it immoral to reduce women to a state of unconsciousness at such a critical time in their lives, because pain was punishment for their sins.

Simpson's clever rebuttal quoted straight from the *Bible* (Genesis 11:21) which states that God caused Adam to fall into a deep sleep while he took out his rib to make Eve. He concluded

Administration of anesthesia

Methods of administration used varied with each location and, from 1844 to 1900, some 69 different discoveries had been made.⁶ In London, Snow developed a machine that regulated the dose of the gases and the percent concentration of the anesthetic and oxygen.¹¹ In the United States, Morton used an inhalation apparatus made from a sponge soaked with ether placed in the bottom of a globe with a mouthpiece attached to it. It enabled him to pinch the nose while the patient placed his or her lips



An apparatus used for purifying nitrous oxide (1896).

over the attachment. This method was abandoned quickly because there was no control on how much the patient would inhale. Most just used a moistened sponge and applied it directly to the face.

“The simpler, the better” was often the rule. They applied ether and chloroform on a handkerchief or linen towel and placed it on the face, covering both nose and mouth. The amount of the anesthetic agent that was being received remained a difficult determination, and they just kept adding it until reaching the desired state of anesthesia.



FIGURE 4
Morton successfully demonstrates the administration of ether at Massachusetts General Hospital, October 16, 1846.

that God himself was the first true anesthesiologist and surgeon. The church had to agree with this literal interpretation. Then, after the queen had chloroform administered for the birth of two children, the church modified its stance regarding anesthesia for women.⁴

Other criticisms came from the abuses of ether and chloroform. Wells became addicted to ether and eventually committed suicide. Other doctors from several different fields, such as chemistry and dentistry, as well as those who experimented with these gases, became addicted and often died. Ether frolics and laughing gas parties were instrumental in this addiction. In Ireland, ether drinking became a fad with disas-

trous results. Drinking too much resulted in death, in some cases by combustion when a drinker would light a pipe.⁹

The development of the profession

With the increasing use and knowledge of the inhalation agents, progressive changes were seen in the profession of administering them. In the early days, administering ether or other gases was primarily the surgeon's job, although as a practical matter, he left this task to either his assistant or an operating room clerk under his supervision. Morton was the first to administer anesthesia, and might be considered the first anesthesiologist. He wrote *On Chloroform and*

Other Anesthetics about the proper ways to deliver anesthesia.⁶

In the United States, nurses and assistants provided most of the anesthesia, while in England in 1850, only physicians were used to deliver anesthesia in the hospitals. Various medical personnel administered anesthesia in other countries and no standards were set. It was not until 1892, when Dr JFW Silk of London pleaded for tuition for the study of anesthesia, that organized study programs were first conceived for the field of anesthesia.

In 1901, the Society of Anesthesia was founded, and compulsory education during medical school and instruction of instrumentation of anesthesia followed.¹¹ By 1905, a group of doctors on Long Island, New York, formed the Long Island Society of Anesthesia to promote the science and art of anesthesia. It became the New York Society, then, in 1915, the American Association of Anesthetists. By 1936, the society petitioned for its own certifying board, and, by 1940, the Board of the American Medical Association had completely accepted the field of anesthesiology. Certification soon followed.¹³

Nurse anesthetists were women (very often nuns) with special training in anesthesia. Training first occurred at the Mayo Brothers Clinic in Rochester, Minnesota. Sister Mary Bernard was the first nurse anesthetist in 1877, and she later founded a school in Wichita, Kansas, for nurse anesthetists. Nurses were used in the United States, in part because doctors were often in short supply, particularly during times of war. They continue to practice today in many states.¹² Interestingly, Massachusetts General Hospital, where Morton performed the first demonstration, uses nurse anesthetists, with anesthesiologists overseeing their work.

Other pioneers in the field included Dr Mary Botsford who, in 1897, was the first woman doctor to practice solely in anesthesia at Children's Hospital in San Francisco. In 1900, Dr Sydney O Golden of New York was the first to charge as a professional for anesthesia. Golden called for equality between surgeon and the anesthesiologist.¹⁴ By 1914, the University of Wisconsin Med-

ical School awarded the first American academic position to Dr Ralph Waters. He was also named the first president of the American Society of Anesthetists.¹⁵

Conclusion

Today, patients take for granted that pain will not be a major accompaniment to childbirth or surgery. Prior to the advent of general anesthesia, this was not the case. Indeed, the horrors provoked by the unbridled pain associated with these events are hard to envision. Modern medical practitioners owe a great deal to men, such as Lully, Paracelsus and Frobenius, who first identified ether and to others, like Davy, Priestley and

FIGURE 5

The discovery of anesthesia reduced the pain of childbirth without prolonging delivery.



Jackson, who postulated that ether and chloroform could be used for medical advantage. Perhaps to an even greater extent our gratitude should encompass those who first used those agents and persisted in the face of strong resistance from the church, the medical community and the general public at large. These men of vision included Long, Wells and Morton.

There were certainly stumbling blocks that made the development of this marvelous tool slower than one might imagine. Complications from primitive delivery systems, inadequate training of the providers, and fire hazards took time to overcome. Surgery was in its infancy, barely past the history of bloodletting barbers. The introduction of general anesthesia launched hundreds of possibilities for surgery, and the profession exploded. Hospitals that were performing one or two cases weekly are now performing 100-200 per day.

The story of anesthesia, from its discovery and primitive usage to the modern product experienced today, is one of the most fascinating in history. Anesthesia was indeed “no Humbug!”

About the author

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