

The history of bloodletting

With a history spanning at least 3000 years, bloodletting has only recently—in the late 19th century—been discredited as a treatment for most ailments.

Gerry Greenstone, MD

The practice of bloodletting began around 3000 years ago with the Egyptians, then continued with the Greeks and Romans, the Arabs and Asians, then spread through Europe during the Middle Ages and the Renaissance. It reached its peak in Europe in the 19th century but subsequently declined and today in Western medicine is used only for a few select conditions.

Humors, Hippocrates, and Galen

To appreciate the rationale for bloodletting one must first understand the paradigm of disease 2300 years ago in the time of Hippocrates (~460–370 BC). He believed that existence was represented by the four basic elements—earth, air, fire, and water—which in humans were related to the four basic humors: blood, phlegm, black bile, yellow bile. Each humor was centred in a particular organ—brain, lung, spleen, and gall bladder—and related to a particular personality type—sanguine, phlegmatic, melancholic, and choleric.¹

Being ill meant having an imbalance of the four humors. Therefore treatment consisted of removing an amount of the excessive humor by various means such as bloodletting, purging, catharsis, diuresis, and so on. By the 1st century bloodletting was

Dr Greenstone is a family physician in Surrey, BC.



A surgeon letting blood from a woman's arm as a physician looks on. Oil painting by unknown Flemish painter, 18th (?) century. Courtesy, Wellcome Library, London.

already a common treatment, but when Galen of Pergamum (129–200 AD) declared blood as the most dominant humor, the practice of venesection gained even greater importance.²

Galen was able to propagate his ideas through the force of personality and the power of the pen; his total written output exceeds two million words. He had an extraordinary effect on medical practice and his teaching persisted for many centuries. His ideas and writings were disseminated by several physicians in the Middle Ages when bloodletting became accepted as the standard treatment for many conditions.

Methods of bloodletting

Bloodletting was divided into a

generalized method done by venesection and arteriotomy, and a localized method done by scarification with cupping and leeches. Venesection was the most common procedure and usually involved the median cubital vein at the elbow, but many different veins could be used. The main instruments for this technique were called lancets and fleams.³

Thumb lancets were small sharp-pointed, two-edged instruments often with an ivory or tortoise shell case that the physician could carry in his pocket. Fleams were usually devices with multiple, variably sized blades that folded into a case like a pocketknife.

Localized bloodletting often involved scarification, which meant scraping the skin with a cube-shaped

brass box containing multiple small knives, followed by cupping, which involved placing a dome-shaped glass over the skin and extracting the air by suction or prior heating.⁴

Leeches used for bloodletting usually involved the medicinal leech, *Hirudo medicinalis*. At each feeding a leech can ingest about 5 to 10 ml of blood, almost 10 times its own weight. The use of leeches was greatly influenced by Dr François Broussais (1772–1838), a Parisian physician who claimed that all fevers were due to specific organ inflammation. He was a great proponent of leech therapy along with aggressive bloodletting. He believed in placing leeches over the organ of the body that was deemed to be inflamed.⁵

This therapy was very popular in Europe in the 1830s, especially France, where 5 to 6 million leeches per year were used in Paris alone and about 35 million in the country as a whole. By the late 1800s, however, enthusiasm for leech therapy had waned, but leeches are still used today in select situations.

Famous bleedings

When Charles II (1630–1685) suffered a seizure he was immediately treated with 16 ounces of bloodletting from the left arm followed by another 8 ounces from cupping.⁶ Then he endured a vigorous regimen of emetics, enemas, purgatives, and mustard plasters followed by more bleeding from the jugular veins. He had more seizures and received further treatment with herbs and quinine. In total he had about 24 ounces of blood taken before he died.

After riding in snowy weather, George Washington (1732–1799) developed a fever and respiratory distress. Under the care of his three physicians he had copious amounts of blood drawn, blisterings, emetics, and laxatives. He died the next night of what has been diagnosed retrospectively as epiglottitis and shock.⁶ His medical

treatment aroused significant controversy, particularly the bloodletting.

Warring physicians

The practice of bloodletting aroused deep emotions in both practitioners and detractors, with intense argument about the benefit and harm of venesection. Drs Benjamin Rush, William Alison, and Hughes Bennett exemplify this conflict.

Dr Benjamin Rush (1745–1813) was one of the most controversial physicians in his time. He was arrogant and paternalistic but dedicated to eradicating illness wherever he saw it. He worked tirelessly during the yellow fever epidemics in Philadelphia in 1793 and 1797 and devoted much time to the problem of mental illness.⁷

Unfortunately he had a very simplistic view of disease and thought that all febrile illnesses were due to an “irregular convulsive action of the blood vessels.” Therefore in his mind all therapy was directed at dampening down this vascular overexcitement. He was a great proponent of “depletion therapy,” which meant aggressive bloodletting and vigorous purging. He was known to remove extraordinary amounts of blood and often bled patients several times. “It frequently strangles a fever... imparts strength to the body... renders the pulse more frequent when it is preternaturally slow... renders the bowels, when costive, more easily moved by purging physic... removes or lessens pain in every part of the body, and more especially the head... removes or lessens the burning heat of the skin, and the burning heat of the stomach...”⁸

In addition he held a firm belief in his calomel purgatives, which were loaded with mercury and which he called “the Samson of medicine.” In numerous articles he boldly proclaimed the benefits of his therapy.

He aroused both extremely positive and negative reactions in those around him, including many physicians. Some doctors referred to his

practices as “murderous” and his prescribed doses as “fit for a horse.” He had a long-running feud with his college of physicians, which forced him to resign, and his application to the faculty of Columbia Medical School in New York was denied. However, Rush Medical College in Chicago was named in his honor and gained its charter in 1837.

At the Edinburgh School of Medicine Dr William Alison (1790–1859) and Dr Hughes Bennett (1812–1875) were a study in contrasts. The former was a dignified old-timer and strong believer in bloodletting, while the latter was an arrogant newcomer and resolute debunker of bloodletting. Whereas Dr Alison followed the old tradition of clinical experience and empirical observation, Dr Bennett believed in the new methods of pathology and physiology supported by the microscope and the stethoscope.⁹

Central to their debate was the observation that the improved outcome of patients with pneumonia paralleled the decreased usage of bloodletting. While Dr Alison ascribed this to a “change in type” of illness which had gone from *sthenic* (strong) to *asthenic* (weak), Dr Bennett believed it due to diminished use of a dangerous therapy.

Both were implacable in their point of view, thereby underlining the significant gap between their beliefs in empirical observation versus scientific verification. Dr Bennett had the advantage of the latest techniques and “grounded his rejection of bloodletting on pathologic concepts of inflammation and pneumonia derived from microscopic studies of inflamed tissues.”⁹

The tide turns

In Paris Dr Pierre Louis (1787–1872) was another scientific-minded physician who wanted to assess the efficacy of bloodletting. He examined the clinical course and outcomes of 77 patients with acute pneumonia taken

Continued on page 14

Continued from page 13

from his own and hospital records. He compared the results in patients treated with bloodletting in the early phase versus the late phase of the illness. In his conclusions he did not condemn bloodletting but concluded that the effect of this procedure “was actually much less than has been commonly believed.”¹⁰ Subsequent studies by Pasteur, Koch, Virchow, and others confirmed the validity of the new scientific methods, and the use of bloodletting gradually diminished to a few select conditions.

Bloodletting today

Today phlebotomy therapy is primarily used in Western medicine for a few conditions such as hemochromatosis, polycythemia vera, and porphyria cutanea tarda.¹¹

Hemochromatosis is a genetic disorder of iron metabolism leading to abnormal iron accumulation in liver, pancreas, heart, pituitary, joints, and skin. It is treated with periodic phlebotomy to maintain ferritin levels at a reasonable level so as to minimize further iron deposition.

Polycythemia vera is a stem cell bone marrow disorder leading to overproduction of red blood cells and variable overproduction of white blood cells and platelets. Its treatment includes phlebotomy to reduce the red blood cell mass and decrease the chance of dangerous clots.

Porphyria cutanea tarda is a group of disorders of heme metabolism with an associated abnormality in iron metabolism. Phlebotomy is also used to decrease iron levels and prevent accumulation in various organs.

In the last 25 years leech therapy has made a comeback in the area of microsurgery and reimplantation surgery. *Hirudo medicinalis* can secrete several biologically active substances including hyaluronidase, fibrinase, proteinase inhibitors, and hirudin, an anticoagulant.

The leech can help reduce venous congestion and prevent tissue necrosis. In this way it can be used in the postoperative care of skin grafts and reimplanted fingers, ears, and toes. Because of concern regarding secondary infections a “mechanical leech” has been developed at the University of Wisconsin.¹²

The leech can help reduce venous congestion and prevent tissue necrosis.

Why did it persist?

We may wonder why the practice of bloodletting persisted for so long, especially when discoveries by Vesalius and Harvey in the 16th and 17th centuries exposed the significant errors of Galenic anatomy and physiology. However as Kerridge and Lowe have stated, “that bloodletting survived for so long is not an intellectual anomaly—it resulted from the dynamic interaction of social, economic, and intellectual pressures, a process that continues to determine medical practice.”⁹

With our present understanding of pathophysiology we might be tempted to laugh at such methods of therapy. But what will physicians think of our current medical practice 100 years from now? They may be astonished at our overuse of antibiotics, our tendency to polypharmacy, and the bluntness of treatments like radiation and chemotherapy.

In the future we can anticipate that with further advances in medical knowledge our diagnoses will become more refined and our treatments less invasive. We can hope that medical

research will proceed unhampered by commercial pressures and unfettered by political ideology. And if we truly believe that we can move closer to the pure goal of scientific truth.

References

1. Magner LN. A History of Medicine. New York: Marcel Dekker, Inc; 1992:66-74.
2. Magner LN. A History of Medicine. New York: Marcel Dekker, Inc; 1992:86-96.
3. McCormic S. Blood and magic—the evolution of phlebotomy. www.associatedcontent.com/article/959576/blood_and_magic_the_evolution_of_phlebotomy.html?cat=37 (accessed 4 April 2009).
4. Seigworth GS. Bloodletting Over the Centuries. *New York State Journal of Medicine* 1980;Dec:2022-2028. www.pbs.org/wnet/redgold/basics/bloodlettinghistory.html (accessed 4 April 2009).
5. Adams SL. The medicinal leech. *Ann Intern Med* 1988;109:399-405.
6. Parapia LA. History of bloodletting by phlebotomy. *Brit J Haemat* 2008;143:490-495.
7. North RL. Benjamin Rush, MD: Assassin or beloved healer? *Proc Bayl Univ Med Cent* 2000;13:45-49.
8. Rush B. A Defence of Blood-letting, as a Remedy for Certain Diseases. In: *Medical Inquiries and Observations*. Vol 4. Philadelphia, PA; 1815. Available online at: [Arnebeck B. Benjamin Rush's A Defence of Blood-letting, as a Remedy for Certain Diseases](http://Arnebeck.B.BenjaminRush'sADefenceofBlood-letting,asaremedyforCertainDiseases). www.bobarnebeck/defence.html (accessed 4 April 2009).
9. Kerridge IH, Lowe M. Bloodletting: The story of a therapeutic technique. *Med J Aust* 1995;163:631-633.
10. Morabia A. P.C.A. Louis and the birth of clinical epidemiology. *Clin Epidemiol* 1996;49:1327-1333.
11. Lee GR, Foerster J, Lukens J, et al. *Wintrobe's Clinical Hematology*. 10th ed. Baltimore, MD: Williams & Wilkins; 1999: 1063,1079,1539.
12. Whitaker IS, Rao J, Izadi D, et al. Historical Article: *Hirudo medicinalis*: Ancient origins of, and trends in the use of medicinal leeches throughout history. *Br J Oral Maxillofac Surg* 2004;42:133-137.