



A H A

BULLETIN OF ANESTHESIA HISTORY



VOLUME 23, NUMBER 2

APRIL, 2005

The Religious Objections and Military Opposition to Anesthetics, 1846 – 1848*

By George A. Swanson, M.D.

Department of Anesthesiology

University of Alabama School of Medicine at Birmingham

This article won third place in the 2004 AHA Resident Essay Contest Award.

More than four years before the anesthetic first published in the medical literature, on March 30, 1843, Crawford Williamson Long administered sulfuric ether for the excision of a neck cyst on a patient in Jefferson, Georgia.¹ On October 16, 1846, William Thomas Green Morton (1819-1868) used sulfuric ether to anesthetize a patient at the Massachusetts General Hospital. Bigelow's first published account of anesthesia greatly influenced the spread of volatile anesthesia.² Within months anesthesia had been used throughout Europe and had even made its way to China.³ The next year on January 19, 1847 Sir James Young Simpson (1811-1870) first used sulfuric ether during the management of labor and childbirth in Edinburgh, Scotland.⁴ The first wartime use of anesthesia took place later that year on March 29, 1847, in Vera Cruz, Mexico, when Edward H. Barton administered sulfuric ether during the amputation of a gangrenous lower limb performed on a civilian teamster who had suffered an accidental gunshot wound during the Mexican-American War (1846-1848).⁵ Simpson would make a further lasting contribution to medicine in the final months of 1847 by introducing a new volatile agent to clinical practice, chloroform.⁶

From the beginning, the introduction of inhaled anesthesia would be controversial. In two areas of perennial human suffering, childbirth and warfare, where the potential for alleviation was greatest, acceptance of this new technique was not immediate. This essay presents a description of two physicians of the Victorian pe-

riod, Scottish obstetrician James Young Simpson and American Army military surgeon John Porter. Each, after seeing the effects of anesthesia on the suffering of surgical patients came to a very different conclusion. Their subsequent work and writing strove for divergent ends; one embraced the use of volatile agents; the other deplored their use.

Arguments against the use of anesthesia in British obstetrics ranged from questioning the safety of the new volatile agents for mother and fetus to challenging the theological basis for altering the birthing process. Although objections on the basis of safety are arguably the most demonstrable, as attested by the number of written accounts and historical treatment, the objections on the basis of religion described by Simpson are not as easily demonstrated but became a matter of intense interest during the twentieth century. Nearing the year 2000, the early religious opposition to anesthesia became a controversy in its own right as historical researchers sought original written sources.⁸ Opposition to the military use of anesthetics in the United States was based on Porter's anecdotal concepts regarding bleeding and wound healing and was promulgated by a few physicians in the hierarchy of the U.S. Army Medical Corps who controlled policy at military hospitals.

As reports of the use of volatile agents entered the collective professional consciousness of physicians and surgeons throughout the world, reactions were mixed. Proponents of anesthesia emerged, none more prominent than the energetic Scottish obstetrician, James Young Simpson. Remarkably, he first entered the University of Edinburgh at age 14 in 1825.⁸ Elected Chair of Midwifery at the University of

Edinburgh in 1840, he was a popular lecturer on medical topics predominantly, but had expertise in archaeology as well. He was said to be the busiest obstetrician in Scotland,⁹ and in 1847, the year of his great innovations, he was named one of Her Majesty's Physicians in Scotland.¹⁰

Simpson lived in a society immersed in religion and yet shaped by ideas of the Enlightenment period. His daily interactions were among people whose culture was shaped by two forces, an emerging secular liberalism that was by mid-century strong enough to realize the election of a non-Christian born prime minister, Benjamin Disraeli, and the enduring influence of the established Churches of Scotland and England, headed by the British Monarch. The idea of early religious opposition to anesthesia animated Simpson's professional efforts to popularize the ether and chloroform techniques. In December, 1847, he produced a thought-provoking treatise, *Answer to the Religious Objections Advanced Against the Employment of Anaesthetic Agents in Midwifery and Surgery*. He wrote the pamphlet because he had:

"during the last few months, often heard patients and others strongly object to the superinduction of anaesthesia in labour, by the inhalation of Ether or Chloroform, on the assumed ground, that an immunity from the pain during parturition was contrary to religion and the express commands of Scripture. Not a few medical men have, I know, joined in this same objection; and have refused to relieve their patients from the agonies of childbirth, on the allegation that they believed that their employment of suitable

*From the Section on the History of Anesthesia

THE WOOD LIBRARY-MUSEUM

OF

ANESTHESIOLOGY

Careers in Anesthesiology, VIII

Donald Caton, M.D.

Kathryn E. McGoldrick, M.D.
Editors

Getting Wise

A. A. Spence, M.D., F.R.C.A.

M.G. to M.G.H. — E.M.O. to Molecular Biology: An Autobiography

Julien F. Blebuycyk, M.D., F.R.C.A.

On the Maturation of the Profession

Richard J. Kitz, M.D.

A Rambling and Brief Autobiography

John W. Severinghaus, M.D.

This volume of *Careers* includes essays from four people involved with the establishment of research as an important part of clinical anesthesiology. All began their careers working "at the bench," studying problems that had important implications for basic sciences and clinical anesthesiology. One continued on this path; others fostered research as department chairs, university administrators or journal editors. Each describes factors pivotal in the development of his work in research. Taken together, the essays provide unique insight into the role played by research in the transition of the practice of anesthesiology from a technical service for surgeons and patients into a discipline that could rightfully be called a profession.

Careers in Anesthesiology, Volume VIII
Park Ridge, IL, 2004/Hardcover, ISBN 1-889595-09-8, \$60. (VISA or MasterCard)

Wood Library-Museum of Anesthesiology

520 N. Northwest Highway • Park Ridge, IL 60068-2573
(847) 825-5586 • wlm@ASAhq.org
www.ASAhq.org/wlm

THE WOOD LIBRARY-MUSEUM

OF

ANESTHESIOLOGY

EXCITING OPPORTUNITY!

THE WLM FELLOWSHIP

The WLM Fellowship will provide recipients with **financial support** for one to three weeks of scholarly historical research at the Wood Library-Museum.

The Board of Trustees of the Wood Library-Museum invites applications from anesthesiologists, residents in anesthesiology, physicians in other disciplines, historians and other individuals with a developed interest in library and museum research in anesthesiology.

For further information, contact: Librarian, Wood Library-Museum of Anesthesiology, or call (847) 825-5586. Visit our Web site at <www.ASAhq.org/wlm/fellowship.html>.

Complete proposals must be received before January 31, 2006, for consideration.

The Wood Library-Museum
*serves the membership of ASA and the
anesthesiology community.*

Wood Library-Museum of Anesthesiology

520 N. Northwest Highway
Park Ridge, IL 60068-2573
(847) 825-5586
www.ASAhq.org/wlm

THE WOOD LIBRARY-MUSEUM

OF

ANESTHESIOLOGY

Ralph Milton Waters, M.D., Mentor to a Profession

*Proceedings of the Ralph M. Waters
International Symposium on
Professionalism in Anesthesia
Madison, Wisconsin, 2002*

Lucien E. Morris, M.D., Editor
Mark E. Schroeder, M.D., Co-Editor
Mary Ellen Warner, M.D., Assistant Editor

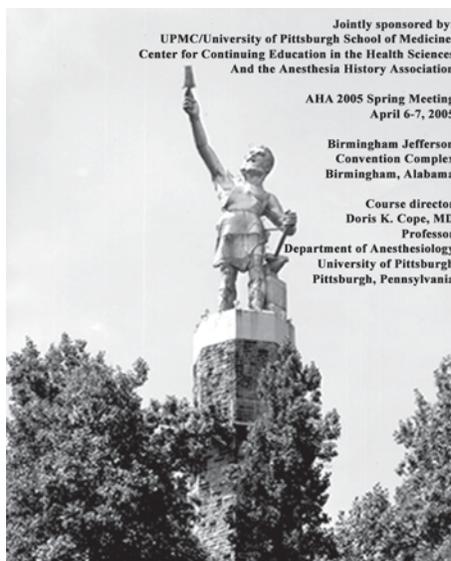
In her foreword to *RMW, Mentor to a Profession*, Kathryn E. McGoldrick, M.D., recounts the great legacy of Dr. Waters. This book records the proceedings of a conference of anesthesia historians gathered to honor the man who defined medical anesthesiology and gave direction to its eventual development in academia and clinical practice. Papers from this conference are meant to inspire, educate and delight readers with varied and unique perspectives that illuminate the remarkable accomplishments of perhaps the specialty's most prominent and revered anesthesiologist. This volume is sure to be a valuable compendium in the annals of anesthesiology and medical education.

Ralph Milton Waters, M.D., Mentor to a Profession. Park Ridge, IL, 2004/
Hardcover/ISBN 1-889595-12-8.
Paperback/ISBN 1-889595-13-6.
Library of Congress PCN 2004111696.
\$75 hardcover, \$45 paperback. (VISA or MasterCard)

Wood Library-Museum of Anesthesiology
520 N. Northwest Highway • Park Ridge, IL 60068-2573
(847) 825-5586 • wlm@ASAhq.org
www.ASAhq.org/wlm

Docents Needed

The WLM is looking for WLM Friends to volunteer as docents for the WLM exhibit at the ASA in October. Please call the WLM at (847) 825-5586 for more information.



Look for AHA 2005 Spring Meeting highlights in the July 2005 issue of the *Bulletin*.

Anesthesia History Association Resident Essay Contest 2005

The Anesthesia History Association (AHA) sponsors an annual Resident Essay Contest with the prize presented at the ASA Annual Meeting.

Three typed copies of a 1000-3000 word essay written in English and related to the history of anesthesia, pain medicine or critical care should be submitted to:

William D. Hammonds, M.D., M.P.H.
Professor of Anesthesia and Director of Pain Outcomes Research
Department of Anesthesia
University of Iowa
200 Hawkins Drive, 6JCP
Iowa City, IA 53342-1079
U.S.A.
william-hammonds@uiowa.edu

The entrant must have written the essay either during his/her residency or within one year of completion of residency. Residents in any nation are eligible, but the essay **MUST** be submitted in English.

This award, which has a \$500.00 honorarium, will be presented at the AHA's annual dinner meeting to be held in October, 2005, in New Orleans, LA This dinner is always held during the annual meeting of the American Society of Anesthesiologists. The paper will be published in full in the *Bulletin of Anesthesia History*.

All entries must be received on or before August 23, 2005.

Bulletin of Anesthesia History (ISSN 1522-8649) is published four times a year as a joint effort of the Anesthesia History Association and the Wood-Library Museum of Anesthesiology. The *Bulletin* was published as *Anesthesia History Association Newsletter* through Vol. 13, No. 3, July 1995.

The *Bulletin*, formerly indexed in Histline, is now indexed in several databases maintained by the U.S. National Library of Medicine as follows:

1. Monographs: Old citations to historical monographs (including books, audiovisuals, serials, book chapters, and meeting papers) are now in LOCATORplus (<http://locatorplus.gov>), NLM's web-based online public access catalog, where they may be searched separately from now on, along with newly created citations.

2. Journal Articles: Old citations to journals have been moved to PubMed (www.ncbi.nlm.nih.gov/PubMed), NLM's web-based retrieval system, where they may be searched separately along with newly created citations.

3. Integrated History Searches: NLM has online citations to both types of historical literature -- journal articles as well as monographs -- again accessible through a single search location, The Gateway (<http://gateway.nlm.nih.gov>).

C.R. Stephen, MD, *Senior Editor*
Doris K. Cope, MD, *Editor*
Donald Caton, MD, *Associate Editor*
A.J. Wright, MLS, *Associate Editor*
Fred Spielman, MD, *Associate Editor*
Douglas Bacon, MD, *Associate Editor*
Peter McDermott, MD, PhD,
Book Review Editor
Deborah Bloomberg, *Editorial Staff*

Editorial, Reprint, and Circulation matters should be addressed to:

Editor
Bulletin of Anesthesia History
200 Delafield Avenue, Suite 2070
Pittsburgh, PA 15215 U.S.A.
Telephone (412) 784-5343
Fax (412) 784-5350
bloombergdj@anes.upmc.edu

Manuscripts *may* be submitted on disk using Word for Windows or other PC text program. Please save files in RICH TEXT FORMAT (.rtf) if possible and submit a hard copy printout in addition to the disk. Illustrations/photos may be submitted as original hard copy or electronically. Photographs should be original glossy prints, **NOT photocopies, laser prints or slides**. If submitted electronically, images must be at least 300 dpi and saved as tif files. Photocopies of line drawings or other artwork are **NOT** acceptable for publication.

Objections. . . *Continued from Page 1*

aneesthetic means for such a purpose would be unscriptural and irreligious.”¹¹

Simpson’s encounters with his patients are perhaps his private justifications; however, his professional and very public interactions with medical colleagues and members of the theological community could serve as historic documentation for the wider audience of an assault on the fledgling practice of anesthesia. J. Parke, a surgeon from Liverpool, was to deliver a paper to the Liverpool Medical Institution of which he was a member, *On the Moral Propriety of Medical Men Recommending the Inhalation of Aether in Other than Extraordinary Cases* on November 25, 1847.

Simpson was alerted to the upcoming academic presentation and pre-emptively addressed Parke’s presumed argument. In a postscript to a letter dated November 14 to Mr. David Waldie, physician and chemist from Liverpool, who introduced the idea of chloroform to Simpson, a somewhat visceral reaction to a perceived opposition is evident:

“Imlach tells me Dr. P. is to enlighten your medical society about the ‘morality’ of the practice [of obstetric anaesthesia.] I have a great itching to run up and pound him. When is the meeting? The true moral question is, Is a practitioner justified by any principles of humanity in not using it?”¹²

We need to understand that Simpson lived in a society strongly influenced by religious institutions. In Edinburgh, this institution was the Church of Scotland, reformed theologically and Presbyterian in its form of government. Further to the heart of the religious argument, Simpson’s postscript enters into two complicated theological maneuvers, one centered on semantics and philology and the other on theology proper:

“He will be at the primary curse, no doubt. But the word translated ‘sorrow’ is truly ‘labour’, ‘toil’; and in the very next verse the very same word means this: Adam was to eat of the ground with ‘sorrow’. This does not mean physical pain, and it [the earth] was cursed to bear ‘thorns and thistles’, which we pull up without dreaming it is a sin.”¹²

As A.D. Farr points out, there is no evidence that Dr. Parke discussed any *primary curse* at the meeting of the Liverpool Medical Institution. At first glance this correspondence with David Waldie is rather cryptic. An explanation for the modern reader is in order. Simpson first refers to a theological concept, that is, the “primary

curse.”. In traditional Christianity this refers to the *physical* and *spiritual* circumstances in which humankind is said to survive after the climax of the Judeo-Christian creation story found in the Torah of Judaism and the Pentateuch of the Christian Scriptures. In the shared creation theology there is a loss of a primal “state of perfection” replaced by a “fallen state” after the *original sin* of the biblical first parents, Adam and Eve. This new fallen state is seen in orthodox Christian theology to be inherited by all subsequent generations as “human nature” manifested by a predisposition to error, harm, and fall short of perfection (sin). This condition is understood in the broader context of a “fallen world” in which the *spiritual* sins of the original parents have tainted all *physical* creation manifested by the tendency for all things to age and decay, for living creatures to suffer illness and ultimately die. This language would have been familiar to any educated member of Victorian society.

The concept of *original sin* and *primal curse* is treated variously among the different schools of Christian thought, and in Simpson’s day would have enjoyed a span of interpretation from the literal to the symbolic. Theologically then, the fallen state must be restored to goodness through a process of “redemption”. If humankind (originally the Israelites) would keep the Law of Moses they would be restored to divine favor. The “curses” embodied in the fallen state would be nullified. The specific *curse* applied to the female is mentioned in the Scriptural text, Genesis chapter 3, verse 16, and thus the key to deciphering the first part of Simpson’s postscript.

“Unto woman He said, I will multiply thy sorrow and thy conception; in sorrow thou shalt bring forth children.” (King James Version)

Ironically, Parke did not mention this “primary curse” argument until the next year, 1848, well after Simpson’s *Answer to Religious Objections* appeared in circulation.¹³ Nevertheless, Simpson’s efforts at a layman’s technical, semantic (word position) and philological (word meaning) interpretation of this particular Scripture did not go un-noticed. His detailed reliance on the work of Wilhelm Gesenius (1786-1842), *Hebrew and Chaldee Lexicon to the Old Testament*, may have brought the issue credibility. In 1849, Canada’s first rabbi, Abraham De Sola, was invited by the *British American Journal of Medical Science* to interpret the meaning of Genesis 3:16. He wrote a three part article based on

his analysis of the original Hebrew text, turning on the philology of the word *Etzebh* (labor, toil, pain or sorrow). Based on the context of the passage and higher specificity of alternate Hebrew words for the concept of suffering, De Sola rendered the verse: “Unto the woman he said, I will greatly multiply thy travail [work] and thy conception: with travail [work] shalt thou bring forth children.” *Suffering* is thus rendered *travail* (as in the French), understood as work or labor. Further, De Sola agreed with Simpson’s notion that *Etzebh* referred to contraction of the uterus and other muscles during labor. Treating the pain of labor did not interfere with toil of labor, so anesthesia should not be withheld on religious grounds.¹⁴

The second part of Simpson’s postscript to Mr. Waldie is purely theological. If the literalist reader of Scripture could not be convinced by his particular interpretation of Genesis 3:16, then perhaps the greater thrust of theology could be brought into play. Thus he writes:

“God promises repeatedly to take off the two curses on women and the ground, if the Israelites kept their covenant. See Deut. vii, 13, etc., etc. See also Isaiah xxviii. 23; extirpation of the ‘thorns and thistles’ of the first curse said to come from God. Besides, Christ in dying ‘surely hath borne our griefs and carried our sorrows’, and removed ‘the curse for us’. His mission was to introduce mercy, not sacrifice. Go up and refute him [Mr. Parke] if I don’t come.”¹⁵

Simpson speaks of the classical Christian view of the redemptive process here. If the Law of Moses could not be kept perfectly and a perpetual state of “broken covenant” were maintained between humankind and the Divine, then only an act of “atonement” could rectify an un-payable debt. Hence, Simpson refers to the death of Christ as removing “the curse for us [humankind].” Essentially, through Christian redemption theology he argues that pain is not (in itself) an act of redemption and as such plays no constructive role in human existence. So, if the argument based on Hebrew vocabulary and grammar is not a sufficient loophole, the issue is settled by extension through a central tenet of Christian theology. This second, purely theological argument was perhaps Simpson’s trump, ideally suited to address the morality of anesthesia in a manner very familiar to the Victorian mind.

Far from attempting to refute Simpson, a prominent Evangelical in the established, Anglican Church, Dr. Protheroe Smith, in late 1848 published his argument for a

physician's obligation to treat, *Scriptural Authority for the Mitigation of the Pains of Labour, by Chloroform, and Other Anaesthetic Agents*. Reiterating the points of his Scottish colleague, he developed the theme of redemptive freedom from any obligation to suffer pain, using the elaborate language of the Anglican Book of Common Prayer: "He [Christ] made a full, perfect, and sufficient sacrifice, oblation, and satisfaction for the sins of the whole world."¹⁶ Smith was not the only prominent churchman to admire the use of anesthesia early on. Thomas Chalmers, Moderator of the Free Church of Scotland witnessed chloroform anesthetics performed at the Royal Infirmary and held the opinion that there was no theological issue with its use, relegating such debate to a small group of theologians.

On April 7, 1853, Dr. John Snow (1813-1858) performed a chloroform anesthetic on Queen Victoria for the birth of Prince Leopold (her seventh child and fourth son) at Buckingham Palace, London. As Monarch, Victoria held the offices of "Temporal Head of the Church of England and Defender of the Faith." There was no recorded condemnation of anesthesia prior to or after this event by The Most Right Reverend John Bird Sumner (1780-1862), Ninety-first Archbishop of Canterbury (serving 1848-1862) and spiritual leader of the world wide Anglican Communion. That there was no formal theological opposition to volatile agents does not mean that Simpson did not experience opposition; however, absence of written pronouncements and opinions against anesthesia by the clergy and hierarchy of the established Churches argues against opposition by "organized religion." With the implied endorsement of the monarch, the six year period of potential religious opposition to obstetric anesthesia rapidly declined.

Early military opposition to the use of volatile anesthetics was initially based on anecdote and the bias of surgeons in the military establishment. When Edward H. Barton first administered sulfuric ether (then called Letheon) to anesthetize his patient for limb amputation, fellow surgeon, John B. Porter was present. Porter gained a limited experience in its use for surgical care of gunshot victims during his service with the American Army of Occupation during the remainder of the Mexican-American War. His limited clinical experience and incomplete understanding of contemporary medical literature suggested to Porter that increased hemorrhage and inhibition of wound healing occurred with the use of inhaled anesthetics (ether

or chloroform), especially in gunshot wounds and amputations. He doubted the safety of any use of anesthetics and **prohibited** their use in his medical commands.¹⁷

Porter's commentary, "Surgical Notes of the Mexican War" revealed a strong bias against the use of inhaled anesthetics in cases of gunshot wounds, and to a lesser degree, amputations in general. This opinion may have reflected an early underlying attitude among American physicians toward surgical management of battlefield trauma. However, Porter's bias did not accurately reflect the attitudes of European surgeons or the published medical literature following the Crimean War (1854-1856), where the French reported more than 25,000 operations using chloroform without a death, and the British described more than 20,000 procedures under chloroform with only one death. Porter appears to have misstated the views of the British Army Surgeon General in the Crimea, J.G. Guthrie and the French surgeon Velpeau.¹⁸ Far from condemning the use of volatile anesthetics, these surgeons in reality approved of ether and chloroform.¹⁹

Additionally, as the chief opponent of volatile anesthesia, Porter may have shared the social preconceptions of his day. Contemporary attitudes regarding the physical and emotional constitutions of adult males centered on notions of "manliness." Along with the Western notion of chivalry went a prevalent stoic idea which held that young, healthy men did not require or might even be harmed by anesthesia.²⁰ These ideas may have molded his clinical prohibitions.

The experience of battlefield surgeons at Vera Cruz would be interpreted differently by men such as Barton and Porter. Barton was a civilian and academic, eventually serving on the faculty of the newly formed Medical College of Louisiana. Porter was a career military surgeon, advancing in rank and bureaucratic influence. Each was poised to change the professional views of fellow physicians. Their estimates of the benefit of volatile anesthetics were extreme opposites. Despite Porter's efforts anesthetics were in fairly common use among military surgeons by the time of the American Civil War (1861-1865). Opposition among military physicians prior to the war between the States would be only a temporary delay in the development of trauma care in the United States as this period of history saw an acceleration in acceptance of volatile anesthetics in general.²¹

Acceptance of volatile agents and anes-

thetia overall was rather brisk as pointed out by Donald Caton in "The Secularization of Pain". Religion had "ushered in" an age in which progress meant, among other things, using the discovery of God's natural laws to human advantage. In Britain and America, medical contributions by clergy such as Joseph Priestly, Stephen Hales, and Cotton Mather illustrated the intertwined relationship of the Church and medical science. The Victorian age was a period of large ideas accompanied by technological, economic and political expansion, into which the notion of human progress fit well. Prominent was the "minister-scientist" and the clergy such as Chalmers who were deeply sympathetic to medical science and the innovation of anesthesia. Truly, the humanitarian ethic of religion drove the early development and advancement of anesthesia perhaps more so than any brief, reactionary opposition on religious grounds feared so by Simpson. Religious leaders in Britain were in agreement with the pro-anesthesia arguments of Simpson. In the United States, the Jacksonian era of populism brought an ethic of embracing practical science, which had direct benefit to the people. Barton's application of ether to trauma surgery naturally gained increasing appeal in such an intellectual climate, and military opposition as voiced by at least one military surgeon, Porter, who was relatively short-lived and faded into a curiosity of medical history.

References

1. Long CW. An Account of the First Use of Sulphuric Ether as an Anesthetic in Surgical Operations. *Southern Medical and Surgical Journal* 5:705-713. 1849.
2. Bigelow HJ. Insensibility During Surgical Operations Produced by Inhalation. *Boston Medical and Surgical Journal*, 35:309-317, 1846.
3. Caton D. The secularization of pain. *Anesthesiology* 62:493-501, 1985.
4. Simpson JY. Notes on the employment of the inhalation of sulphuric ether in the practice of midwifery. *Monthly J Med Sci* 1847-8;7:721-8.
5. Aldrete JA, Marron GA, Wright AJ. The first administration of anesthesia in military surgery. On occasion of the Mexican-American War. *Anesthesiology* 61:585-88, 1984.
6. Simpson JY. On a new anaesthetic agent, more efficient than sulphuric ether. *Lancet* 1847; ii:549-550.
7. Farr JD. Early opposition to obstetric anesthesia. *Anaesthesia* 1980;35:896-907.
8. Simpson JY. On a new anaesthetic agent, more efficient than sulphuric ether. *Lancet* 1847; ii:549-550.
9. Major RH. A History of Medicine. Springfield, Illinois: Charles C. Thomas, 1954, 818-20.
10. Rushman GB, Davies NJH, Atkinson RS. A Short History of Anaesthesia. Boston: Butterworth-Heinemann, 1996, p.25.
11. Simpson JY. Answer to the religious objections advanced against the employment of anaes-

Continued on page 14

Alberto Gutierrez: Beyond the Hanging Drop

By *J. Antonio Aldrete, M.D., M.S.*
The Arachnoiditis Foundation, Inc.
Aldrete Pain Care Center
Birmingham, Alabama

Osvaldo A. Auad, M.D.
Anesthesiologist
Anesthesia and Palliative Care
Sanatorio Mater-Dei
Buenos Aires, Argentina

Vicente Gutierrez, M.D., F.A.C.S.
Professor of Surgery
University of Buenos Aires, Argentina

A.J. Wright, M.L.S.
Associate Professor of Anesthesiology
Director, Section on the History of
Anesthesia
University of Alabama at Birmingham

It is not surprising that many of the earlier contributions to regional anesthesia were made by surgeons, as they had operated under less than ideal conditions with the general anesthetics of the time. Bier, Cushing, Matas, Braun and Pages among others, developed expertise in infiltrating local anesthetics and regional anesthesia to be able to complement their operations trying to achieve better and safer operating conditions.

The Argentinian, Alberto Gutierrez (figure 1) was an accomplished author, anatomist and surgeon; like those named above; he initially looked for alternatives to the general anesthetics (ether or chloroform) prevalent in the early YX Century. In order to facilitate and improve the care of his patients, he became acquainted with epidural anesthesia. And by careful observation, he once noted the disappearance of a drop of fluid hanging from the hub of a needle. From then on, he began to study why and how it happened. As he became more passionately involved with "extradural anesthesia," he not only joined a group of physicians practicing anesthesia, but also founded and edited their journal and participated in their congresses. For the last half century, he has received greater recognition for his description of the "hanging drop method" to identify the epidural space than for the many contributions that he made to the surgical literature.

Anatomist and Teacher

Born in November 10, 1892, into what



Fig. 1. Alberto Gutierrez (wearing white suit), anatomist, surgeon, anesthesiologist, author, editor, artist and humanist. His father Avelino Gutierrez is on his left and his uncle Vicente is on his right.

was called a "surgical family," his father Avelino Gutierrez, a Spanish immigrant had already attained a preponderant position as teacher of anatomy and distinguished surgeon; his uncle Vicente was also a well-known surgeon and teacher. Alberto's brother Elias and his cousin Vicente also became surgeons as did the latter's son (author VPG). Evidently they began to acquire surgical experience in their teens, saw patients with their fathers and sometimes assisted in the operating room at the family's "Gutierrez Clinic" where surgical interventions were performed for a private clientele (figure 2). Alberto was admitted to medical school at the University of Buenos Aires in 1911. In the second year he began as teacher-assistant in the dissections lab and wrote his thesis¹ on "Topographic Anatomy of the Peritoneum" that received an Honorary Mention in 1917. As early as 1924, Gutierrez proposed a radical plan to change the teaching methods of anatomy, emphasizing more

the topographical rather than the descriptive approach with greater clinical application, a method that was initially resisted and would not be adopted until the last fourth of the 20th century. He continued to climb the ranks of the teaching staff, from instructor in anatomy in 1921, until he was appointed Extraordinary Professor in 1942.

Throughout his career he continued to teach anatomy to medical students and to publish on surgical anatomy topics such as "Distribution of the brachial plexus,"² "Anatomy of the cecum and megacolon,"³ "the diagastric muscle,"⁴ "The anterior edge and the internal aspect of the sternocleidomastoid muscle."⁵ He also reported on anatomical abnormalities found in some of the cadavers such as "Pancreatico-duodenal anomalies,"⁶ "Anterior dissection of the iliac-lumbar region,"⁷ "Anomalies of the right subclavian artery,"⁸ "internal peritoneal hernias"⁹ and others. Internationally he was made an honorary member of the Anatomic Societies of Paris, Madrid and Rio de Janeiro.

His knowledge of anatomy and experience dissecting cadavers gave him special advantage as he carefully and meticulously studied the anatomy of the spine, specifically the subarachnoid and the peridural spaces, the distribution of the nerve roots and their topographical relation to the vertebrae. Of note is that in 1922, he went back to medical school to take a course in physiology given personally by the then recent Nobel Laureate Bernardo Houssay.

Author and Editor

Gutierrez's writings revealed a well informed surgeon who always quoted and cited others that had pioneered work on the topic in question, given credit to those that deserved it and commented gently on those that he might disagree with. References in the journals he edited did not appear at the end of articles until after 1937, but from that time on, they were regular features.

Gutierrez joined the Surgical Society of Buenos Aires in 1922, then was admitted into the Argentinian Academy of Surgery and eventually became its president in 1943. A review of the annual index shows that under the name Gutierrez were consistently the most numerous articles pub-

lished year after year with approximately 80% under the denomination of Alberto. He also wrote a total of nine books of which the most notable treatises were on:

"Lessons in the Surgical Clinic"
(298 pages), in 1931,

"Local Anesthesia for Surgery of the Abdomen"
(206 pages), in 1932,

"Atlas of Anatomy of the Newborn"
(199 pages), in 1936.

Initially, Alberto Gutierrez wrote on anatomy and surgery; his articles were first written in elegant calligraphy and eventually typed with impeccable grammar and classic style. By the time he graduated from medical school in 1917, Gutierrez had already published three articles.^{1,11,12} He founded and edited the *Revista Anatomo-Quirúrgica* in 1922, which became the *Revista de Cirugía de Buenos Aires* in 1926. By that year he already had written 88 more publications. Eventually, he wrote more than 300 articles and 13 eulogies. He received 15 Honorary Mentions from foreign countries, was the keynote speaker at 24 conferences, received three prizes from the Medical School of the Buenos Aires, supervised seven M.D. theses, gave 160 lectures at national meetings and wrote 17 books. In addition, he performed more than 12,000 operations, gave more than 6,000 epidural anesthetics and wrote to the Dean of the Medical School a one-half page daily report of his didactic activities with students. When he traveled abroad, he also mentioned details of meetings, the lectures that he gave and the prominent physicians he had met. He was well liked by the students even when he preferred to give some of his lectures on Saturdays. Moreover, his colleagues not only admired him for his scientific achievements, but also for his kind manner in communicating with them and his gentlemanly demeanor. He was always glad and willing to substitute for ill or absent professors.

Of considerable significance to the specialty of Anesthesiology was the comprehensive reviews that he published periodically including most of what was known about epidural anesthesia, always updating it. Though already a respected academic surgeon, he developed an interest in epidural anesthesia from 1932. Two years later he was lecturing on epidural anesthesia all over Latin America. He not only proposed a new approach to the peridural space, but he studied it in depth. Gutierrez remained in essence a surgeon. However,

he realized that this relatively new field needed a literary forum, so he founded and became the editor of *Revista Argentina de Anestesia y Analgesia*, later called *Revista Argentina de Anestesiología* that has continued to be published without interruption since 1939. As editor, he believed that medical writers ought to be concise and to the point. His editorials were labeled "Two Words," usually limited to one-half page and contained a message to the readership and brief commentaries on the innovative articles. In spite of his many achievements in surgery and his devotion to anatomy, six decades after his passing, Alberto Gutierrez is best known, worldwide, for the "hanging drop" method to initiate epidural anesthesia. Although his contributions are numerous and diverse, this review will point out those considered important to medicine in general and to anesthesia in particular.

Surgeon

From his early teens he assisted in the operating room at the family clinic (figure 2) and in the Hospital de Clinicas where he served as intern in surgery. He joined the surgical staff of the Hospital Espanol in 1917, became in charge of the Women's Ward in 1992 and was appointed Chief of Surgery in 1929.

From his publications, it is evident that he was a real "General Surgeon" who cared for patients with a myriad of diseases, from "Degenerative keloid scars,"¹⁴ "Hydropneumothorax,"¹⁵ "Rib graft in Pott's disease,"¹⁶ "Syphilitic granuloma of the kidney,"¹⁷ "Drainage of sphenoidal sinuses,"¹⁸ "Excision of sarcoma of the tibia"¹⁹ to mention a few. However, his real love was abdominal surgery where he published extensively on topics as varied as "Coalescence of the peritoneal sheets in abdominal incisions,"²⁰ "Bone in a laparotomy scar,"²¹ "Lateral drainage of the biliary

tract,"²² "Gastroptosis and gastrectomy,"²³ "Differences in the peritoneum of the adult and the newborn,"²⁴ "Congenital absence of the diaphragm,"²⁵ "Torsion of the spermatic cord and testicular gangrene,"²⁶ etc., etc.

Amazingly, in every case, Gutierrez gave the anesthetic and then went on to operate in the same patient, leaving a young doctor, a medical student or a nurse to care for the patient. At one time he was quoted as saying, "There is no reason for any operation to last more than one hour" and apparently he lived up to his statement.²⁷

Surgeon Anesthetist

Gutierrez made an unannounced transition gradually becoming interested in anesthesia. His successor as editor of the *Revista Argentina de Anestesia y Analgesia*, Juan A. Nesi,²⁷ in his eulogy, mentioned that Alberto understood the importance of the anesthesia in surgery outcomes and was attracted to this field as he noticed that he could apply his vast knowledge of anatomy as well as his clinical dexterity. This combination of personal characteristics allowed him to unravel the science while practicing the art. His assistants noted that during surgery they received a lesson in surgery while at the same time learning how to administer regional anesthesia. Gutierrez emphasized that it was not only an infiltration of the tissues, but the anesthetizing solution ought to be deposited precisely in the path of the nerves going to the operated regions. Any surgeon who pretended to operate under local or regional anesthesia should possess a complete knowledge of the topographical anatomy, patience, calmness and gentle handling of every tissue as necessary virtues. Gutierrez possessed them all, allowing him to obtain excellent surgical outcomes. Some of his disciples were known to have said that "the patients not



Fig. 2. Abdominal operation in the Gutierrez Clinic (circa 1912); no gloves were used, the patient was in the lateral position, Alberto Gutierrez was assisting and a male nurse is shown "dripping" chloroform.

Continued on page 8

Gutierrez. . . Continued from Page 7

only had their symptoms relieved, but survived the operation."

Gutierrez was aware of the seminal works of Braun,²⁸ Labat²⁹ and other masters of regional anesthesia who insisted that the operation could not be perfect if the anesthesia was not perfect, too. He developed modifications of many of the techniques described by these pioneers and he also created some of his own, leaving a legacy of regional blocks for certain surgical procedures, among them were regional anesthesia for:

- Biliary Tract surgery³⁰
- Gastric surgery³¹
- Urological surgery³²
- Parotidectomy³³
- Appendectomy³⁴
- Mastectomy for cancer³⁵
- Meningocele³⁶
- Female and Male genital organs³⁷
- Addition of Vasopressin to Novocaine³⁸

To expedite and facilitate these techniques, he constructed a device (figure 3) that would allow him to infiltrate and inject nerve trunks and tissues easily, promptly and without having to withdraw the anesthetic directly from a glass ampule. Instead, using a presterilized glass jar with a wide opening, a cork or rubber stopper with two orifices that would accept a glass tubing was connected to an 18 French rubber hose that would adapt to a three-way stop-cock with an entry connected to a control syringe (with rings for the middle, index and thumb fingers) and the other going to the needle through a segment of rubber hose of about 10 cm. The whole set could be sterilized easily and the anesthetic solution would be emptied into the jar, requiring minimal assistance and preventing contamination.³⁹ As if this was not enough, he also considered the treatment of some chronic conditions that produce severe long lasting pain, including:

- Splanchnic plexus block⁴⁰
- Hutchinson's operation for Trigeminal Neuralgias⁴¹
- Braun's anterior Splanchnic anesthesia⁴²
- Excision of the superior and inferior Maxillary nerves as they exit the Skull⁴³
- Anterior Paraperitoneal Lumbar Sympathectomy⁴⁴
- Hallus valgus⁴⁵
- Calcaneus Spurs⁴⁶
- Three cases of "clicking" temporo-mandibular joint.⁴⁷



Fig. 3. Device for regional and infiltration anesthesia, designed by Gutierrez to save time and prevent contamination.

Anesthesiologist

As we have previously noted,⁴⁸ there is usually no coincidence in discovery, as not uncommonly, some of the newly described events most likely have occurred before. However, only an alert and curious observer can recognize their value. Concerned about some of the accidents occurring with general anesthetics, desiring to achieve a more dependable anesthesia Gutierrez turned first to spinal anesthesia and then to epidural anesthesia using the approach called at that time "direct method," currently named the "loss of resistance" of

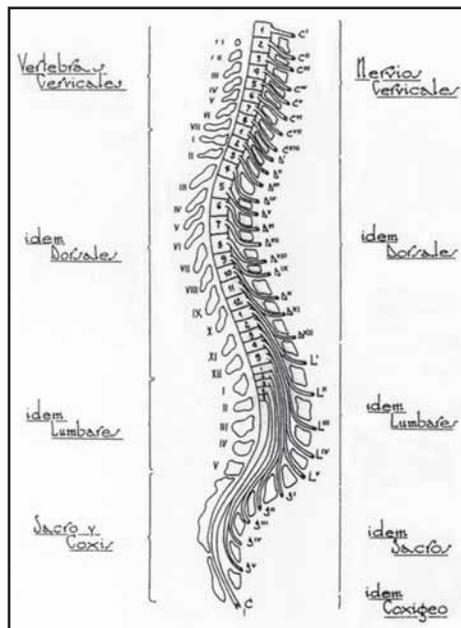


Fig. 4. Drawing depicting the vertebro-radicular relationship of the emergence of the nerve roots to the level of the spinous process, in the adult.

finding the epidural space. Occasionally he used what was labeled as the "indirect method" when the needle was intentionally introduced into the dural sac and then withdrawn a few millimeters, gradually until the point at which CSF stop dripping; at that moment, it was assumed that the bevel was in the extradural space.

Gutierrez⁴⁹ presented his preliminary results on May 28, 1932, at his surgical clinic class at the medical school, where medical students and other physicians were present. He briefly reviewed the experiences re-

ported previously by Pages⁵⁰ in 1920 and by Dogliotti⁵¹ in 1931 and then proceeded to describe the anatomy of the spine and to explain the differences between intradural versus the extradural injection of local anesthetics. This was followed by a more detailed description⁵² of his brief experience mentioning that the patients were usually in the sitting up position, discussed how the dosages were chosen (mostly by trial and error, as some patients apparently were numbed up to the mandible) noting that the greater the volume, the higher the spread of the block, though in some instances a "metameric" distribution was observed as some patients were able to move their feet. Gutierrez noted that a period of 20 minutes was necessary to obtain optimal surgical analgesia and that usually lasted for about 90 minutes, gradually fading, completely disappearing by two hours. Subsequently, most of his assistants and other colleagues in Buenos Aires began using this technique of peridural segmental anesthesia.

In this publication, Gutierrez defined which would be the best spinal level at which to introduce the needle in reference to the type of surgery contemplated. He realized that to achieve metameric anesthesia, the anesthetic solution must be deposited in the area of the spine where the nerve roots, for that particular operative site, emerge, so the anesthetic would fix on those specific nerve roots, a phenomenon that he called "neuropexia." He relied on his knowledge of anatomy and experience on the dissection table to specifically pinpoint which roots to block, taking also into consideration the innervation of the thoracic and/or the abdominal wall, as well as, that of the viscera that were to be manipulated emphasizing the need to relate

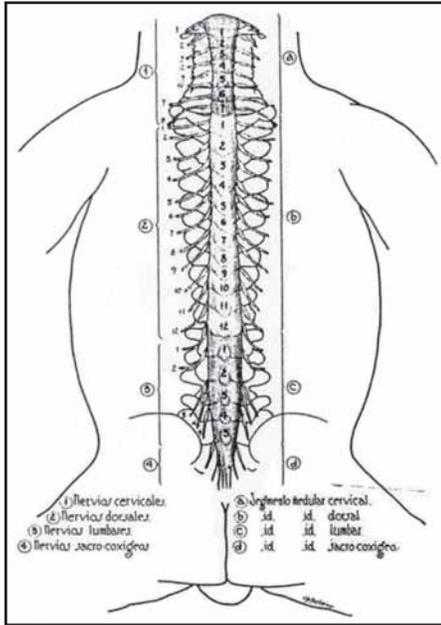


Fig. 5. Cutaneous projection of the nerve roots (left) as they emerge from the spinal cord's segments (right), in the newborn.

it to the spinous processes, used as points of reference.⁵²

Accordingly, he suggested that in the cervical region of adult patients, this could be determined by adding a 1 to what ever spinous process is felt by palpation, so just below the spinous process of the 5th cervical vertebra, the sixth cervical nerve root will emerge (figure 4). In the upper levels of the thoracic spine, a number 3 will have to be added, for example at the level of T₄ spinous process, the seventh thoracic nerve root emerges. In the lower segments, below the spinous process of T₁₁, is the exit of the third, fourth and fifth lumbar roots. The sacral roots emerge just below the spinous process of T₁₂. (figure 5), therefore if the desired blocked segment is between T₇ and T₁₂, theoretically the optimal level to insert the needle would be at T₉-T₁₀. This representation helps to understand some complications of the neuraxis after spinal anesthetics are injected near T₁₂, where the cauda equina is usually located. The former concept was more theoretical, than practical, as later on he felt that there was no need to insert needles above T₁₂.

In the neonate, there is a closer "parallelism" between the contents (spinal cord) and the container (vertebral canal) the relation between spinal roots and spinous processes is nearly direct, so the first four cervical pairs of roots relate to the first three cervical vertebrae. The 5th cervical to the first dorsal pairs, the nerve roots emerge in a segment corresponding from C₄ to T₂ interspinous levels (figure 5). The

2nd to the 12th dorsal pair of roots, correspond to a location between T₂ and T₉. The first to the fourth lumbar pair of nerve roots, originate at a segment corresponding to the spinous processes between the T₁₀ and T₁₂ vertebrae. The fifth lumbar and from the first to the fourth sacral pair of nerve roots topographically correspond to the L₁ level. From the conus medularis, usually located at the level of L₂ vertebra, exit the 3rd, 4th and 5th sacral pairs of roots and the coxygeal nerve. This representation is similar to that seen in the fetal spine.

By early 1933, a report by Gutierrez and his associate Lopez-Rubido⁵³ describing their experience on their first 150 cases was published, the injection of 45cc of 2% procaine for gastric surgery, 40cc for biliary tract surgery and only 30cc for rectal operations, injected at L₁-L₂, L₂-L₃ and L₃-L₄ levels, respectively, produced satisfactory surgical anesthesia. For renal interventions, the injection was made at L₁-L₂ administering between 40 and 45cc in intermittent bolus, preferably with the patient in the corresponding lateral decubitus. For radical mastectomies the puncture was made at the T₁₂-L₁ level, requiring 40cc to have adequate anesthesia.

The Hanging Drop

About the same time, while attempting to find the epidural space by the "loss of resistance" method, with fluid; as he ap-

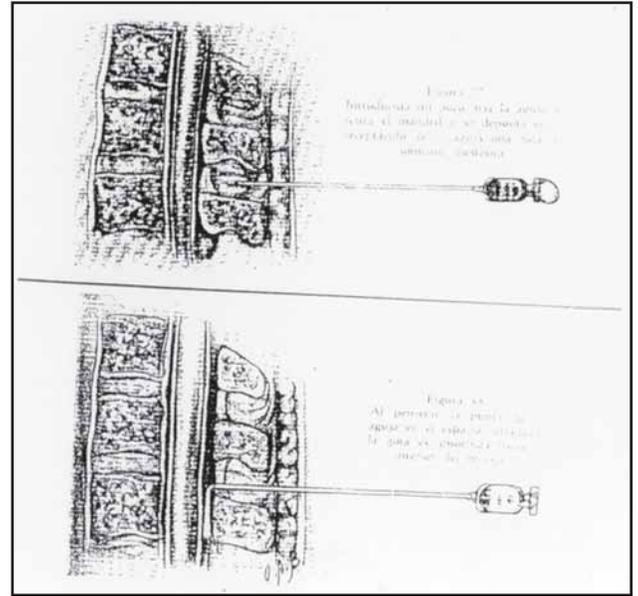


Fig. 6. Drawing by Alberto Gutierrez demonstrating the hanging drop (top) and its disappearance into the peridural space (bottom).

proached the ligamentum flavum, he felt undue resistance, so he disconnected the syringe and noted that a drop of the fluid was left hanging from the hub, he did not re-attach the syringe but continued to advance the needle very slowly, suddenly he noticed that the drop disappeared (figure 6). He then reconnected the syringe and aspirated without obtaining fluid; injecting 5cc of 1% procaine without feeling resistance; after a short interval and in the absence of warmth or numbness, he repeated four more bolus; the patient developed complete anesthesia up to just above the umbilicus and underwent a saphenectomy and vein ligation in 25 minutes, uneventfully. The first twenty cases were reported within few months.^{54,55}

Not long thereafter, most surgeons at the Hospital Espanol, where Gutierrez was

Chief of Surgery, learned and practiced the hanging drop technique replacing, in two years general and spinal as the most popular type of anesthesia (figure 7) administered in 1933.⁵⁶ Other studies with colorants injected into the epidural space, in cadavers, failed to show dural crossing.⁵⁷

Nevertheless, as it is common with most innovations, apparently in

Anestesia	1929	1930	1931	1932	1933
General: cloroformo o éter	443	385	378	157	29
Local	147	145	150	209	117
Peridural	—	—	—	185	561
Raquidea	47	17	26	15	2
Local y general	—	18	3	11	—
Peridural y general	—	—	—	13	8
Raquidea y general	—	—	1	3	—
Varias	—	—	2	5	3
Total	637	565	560	598	720

Fig. 7. Table listing the type of anesthetics given at the Hospital Espanol of Buenos Aires from 1929 to 1933 demonstrating the rapid popularity of peridural anesthesia among Gutierrez group of collaborators.

Gutierrez. . . *Continued from Page 9*

November 17, 1937, in response to a negative commentary about extradural anesthesia⁵⁸ made by one of his colleagues at the Academy of Surgery, Gutierrez responded that in the 4,000 cases which he and his group had thus far performed, the interval from the start of the anesthetic to the initiation of surgery, averaged about 20 minutes, similar to the induction with ether, the inadequate anesthetics reported were probably due to defective technique and suggested to the audience, that if in some cases the anesthesia or relaxation of the abdominal wall was inadequate, this could be remedied by the infiltration, of 15 to 20cc of 1% procaine, into the rectal muscles; he then proceeded to encourage the critic to further pursue this technique and to present documentation of his experience, concluding his remarks by saying "An optimal technique is needed to produce better results."

International Survey

In 1938, Gutierrez⁵⁹ published the results from a mail survey by mail that he had sent the year before. Some of the respondents were well known surgeons using extradural anesthesia in Argentina, Chile, Brasil, Uruguay and Italy. The results were as follows:

Dogliotti (Italy) reported on 4000 anesthetics; apparently using 20cc of 3% procaine plus one cc of 1:1000 adrenaline, pre-medicating with morphine and scopolamine. The epidural space was found by the loss of resistance method using a manometer to confirm it and quantitate it. The operations were abdominal and some thoracic (thoracoplasties and lung resections). They considered that the anesthesia was excellent in 90% of the cases. As far as complications, they had fainting in 5%, apnea in 2% of cases and one death in a septic patient that had several punctures of the dura while trying to reach the epidural space. Finally soon after the anesthetic was injected it resulted in a high spinal with respiratory paralysis and could not be resuscitated. Dogliotti suggested that if this occurs, to leave the needle in place, then "irrigate" the subarachnoid space through a cysternal puncture, washing the subarachnoid space with normal saline injecting it caudad.

Hugo Grove from Chile had given 500 anesthetics between 1936 and 1938, using 1.5% procaine (from 60 to 75cc) with 1 or 2mg of adrenaline and administering morphine and atropine as pre-medication. The loss of resistance was his approach and in

addition, he suggested to inject 2cc of air, if resistance to injection was found. Rene Gonzalez (Chile) had performed 250 epidural anesthetics using the same technique. He administered from 45 to 70cc of 1.5% procaine. Few patients developed hypotension and one case in which he was unable to see the hanging drop disappear, he had used the loss of resistance in the fourth attempt, with sudden total spinal with mydriasis and bradycardia. The patient was treated with

10ml of niketamide and artificial respiration for 10 minutes and recovered completely. In four cases the anesthesia was unsatisfactory. Jorge Soto Moreno had performed 78 cases by June of 1938, identifying the epidural space by the loss of resistance, injecting 70cc of 1.5% procaine, considering contraindications to be acute sepsis, ethanol intoxication, and excessive obesity. He noted that he had not seen cases of meningismus or permanent paralysis as it had occurred to him when he used spinal anesthesia.

Benedicto Montenegro from Brasil had completed 80 epidural anesthetics. In each case, he used the hanging drop, the loss of resistance and one more method that consisted in injecting 4cc of distilled water which, if followed by severe evanescent pain on the back, apparently also confirmed the presence of the tip of the needle in the peridural space. From the same country, Alipio Correia-Netto had done 308 cases as of 1938 using hydrocodone as sedative, administering from 40 to 60cc of 2% procaine. He had only 71% success, preferring epidural to spinal anesthesia to avoid the "stormy events that may occur with the latter."

Two Uruguayans, Barbara and Plazola used the loss of resistance technique, administered 55cc of 2% procaine in every one of their 268 cases. They felt that this technique should not be used in patients under 12 years of age.

In Argentina, Pedro

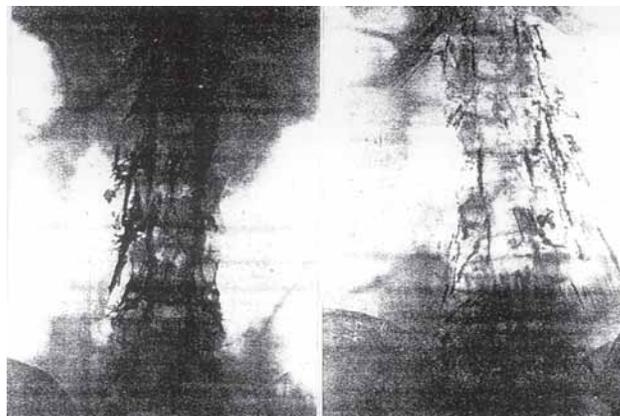


Fig. 8. Roentgenographs of the lumbar spine showing the distribution of a mixture of lipiodol (50%) with olive oil, injected epidurally by Gutierrez. Photographs of films taken 5 minutes (left) and 30 minutes (right) after injection.

Jauregui had performed 750 epidural anesthetics using 2 or 3% procaine in volumes of 40 to 30cc, respectively. He preferred to use the "hanging drop method" injecting the medication at intervals reporting six hypotensive episodes, three postdural puncture headaches and four cases of confusion. Two deaths occurred, in extremely ill patients in whom the hanging drop was positive. In 2.7% of cases the anesthetic failed and in 4.4% was unsatisfactory. Alberto's cousin, Vicente Gutierrez had performed 186 epidural anesthetics with the loss of resistance method, administering from 30 to 50cc of 2% procaine with one cc of 1:1000 adrenalin, he used morphine as premedication. R.E. Passman had performed 230 anesthetics finding the epidural space by the loss of resistance using 2% procaine with "XX gtts of adrenalin 1:1000"; he had noted three cases of cephalgia. R.P. Penin had done 582 epidural anesthetics with the hanging drop, including five C-sections; he reported two



Fig. 9. Under peridural anesthesia, Alberto (right) and his cousin Vicente (left) operate on a patient wearing masks, gloves and gowns. Notice the doctor at the head of the table and the visitors, behind.

deaths that occurred in the first 100 cases attributed to serious illnesses of the patients. E. Sammartino had given 196 anesthetics, using the hanging drop and a combination of procaine and tetracaine for anesthetic he reported one death in the post-operative period from sepsis and cardiac arrhythmias.

Other contributors with lower number of cases are not mentioned here; nevertheless, the review included a total of 12,195 cases, of which 4,630 were performed by Gutierrez and his group that included M. Lopez Rubido, V. Ruiz, T. Moreno Burton, I. Lazaro, C.R. Uribe, J. Rahola, B. Labandibar, F.M. Del Rio and A. Coviello. The one common denominator was that every one approached the epidural space with the patients sitting up using some kind of preanesthetic sedation, with the exception of Gutierrez that preferred not to use it, unless specifically indicated. Other colleagues like Odom,⁶⁰ Morton, and Black from the USA, Smith and Rego Luins from Brasil and Tello from Chile had visited and learned the technique from him, but for some reason or another they did not reply to the survey. As a matter of fact, on June of 1939, when Emery A. Rovenstine traveled to Buenos Aires and Rosario to demonstrate cyclopropane, thiopental and spinal anesthesia, he watched Gutierrez give a demonstration of the hanging drop technique.⁶¹

In every new publication Gutierrez contributed new observations.⁶² This was summarized in his presentation before the Argentinian Congress of Surgery in 1938 entitled "Peridural Anesthesia" where he reported about the distribution of the anesthetic solutions, using a mixture of lipidol and olive oil injected epidurally and taking roetgenograms showing a more caudad than cephalad displacement, as well as through the lateral foramina and the intervertebral foramen, following the path of the nerve roots (figure 8). From that study, he proposed that their probable, site of action was directly on the extradural portion of the nerve roots and the dorsal ganglia. He, however, still did not feel that anesthetics crossed the dura. As side effects, he listed fainting and pallor as the most common, specially when the anesthetic solution was injected rapidly and another observation was that evidently, nausea and vomiting usually occurred, when bradycardia and, or hypotension developed.

In the same year, a 95-page book entitled "Extradural Anesthesia"⁶³ was published by Gutierrez including an extensive historical review of the subject, pointing out the specific important contributions made

En una estadística destinada a conocer el grado de penetración de la aguja, hemos obtenido los siguientes datos sobre un total de 3.200 observaciones:

Distancia del espacio extradural al tegumento	Número de casos	Tanto por ciento	Distancia del espacio extradural al tegumento	Número de casos	Tanto por ciento
2 cm.	6	0,1875	5½ cm.	59	1,8437
2½ »	40	1,25	6 »	116	3,625
3 »	294	9,1875	6½ »	15	0,4647
3½ »	579	18,0937	7 »	31	0,9687
4 »	1,064	33,2812	7½ »	7	0,2187
4½ »	455	14,2187	8 »	3	0,0937
5 »	529	16,5312	10½ »	1	0,0312

Como se puede deducir de esta estadística, la distancia más frecuente que media entre el espacio extradural y el tegumento es de cuatro centímetros; en segundo lugar, la de cinco centímetros; en tercero, la de tres y medio centímetros; en cuarto, la de cuatro y medio centímetros.

Fig. 10. Commentaries and table showing the measurements made in 3,200 patients of the distance from the skin to the epidural space (1st column), the number of cases being at each distance (2nd column) and the percentages of the total number (3rd column).

by each author citing the early studies by Cathelin⁶⁴ in 1901. Performing epidural anesthesia through the sacral approach, he also mentioned that the bicarbonate of procaine had been used in 1911, by Laewen,⁶⁵ to shorten the onset and intensify the blockade. In addition, Van Earps⁶⁶ noted in 1927 that two epidural injections, one at the top of the desired anesthetic area and one at the sacral hiatus, dividing the total anesthetic dose in two, resulted in a slow onset ranging from 20 to 30 minutes, but a deeper block.

After recognizing, the earlier studies by Janzen⁶⁷ and by Heldt and Malloney⁶⁸ who reported that the peridural space had negative pressure, Gutierrez mentioned that Giordanengo,⁶⁹ an assistant to Dogliotti measured the pressure connecting the hub of a needle to a glass tube in "U" shape with water, advocating that the pressure became negative when the tip of the needle pushed against the posterior wall of the

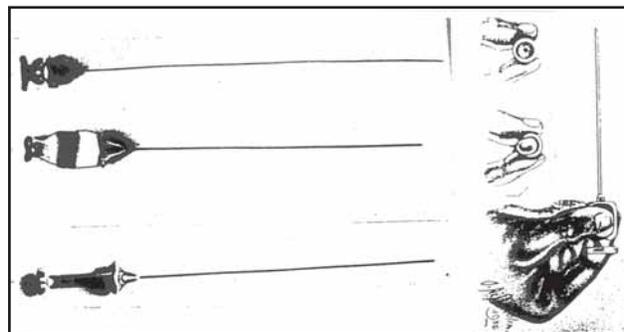


Fig. 11. Drawing of different views of Gutierrez's needle and stylette (longer). The hub was flat to facilitate an easier hold with the thumb and index fingers (top right), without touching the hanging drop that can easily occur in round or square hub needles (top left).

dural sac. Zorraquin⁷⁰ in 1933 used a manometer to measure the epidural space pressure at various levels by the loss of resistance method, found the pressure to be more negative at the thoracic than at the lumbar or cervical regions.

Gutierrez⁶³ also designed an anesthetic record in order to collect data that would reflect the conduct of the anesthetic by his group and to objectively derive statistics from their cases, including every one of his collaborators:

Name of the patient,
Date,
Operation,
Preoperative blood pressure and pulse,
Name of the doctor who made the puncture,
Position of the patient,
Sensory level,
Distance of penetration of the needle,
Dosage of anesthetic,
Levels of anesthesia 10 and 20 minutes post puncture,
Motor block,
Time when the operation was started,
Time when the anesthetic was finished,
Accidents during the anesthetic (pallor, diaphoresis, nausea, syncope, anxiety, respiratory difficulties),
Blood pressure and pulse after the injection of the anesthetic,
Blood pressure after the completion of surgery,
Was there complete relaxation?
Relaxation of sphincters,
Quiet viscera?
Nausea? Vomiting?
Was there anesthesia at the end of surgery?
Postoperative Period: cephalalgia, raquialgia, nausea, urinary retention?

By this time, the anesthetics were performed in an induction room with a nurse and an assistant who eventually moved the pa-

Continued on Page 12

Gutierrez. . . Continued from Page 11

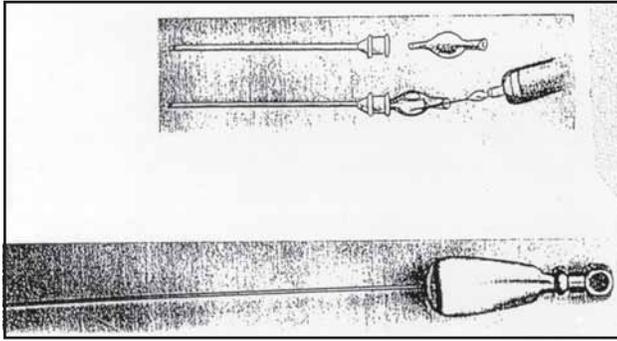


Fig. 12. Modification of the Gutierrez's needle proposed by Sammartino (bottom), turning the hub upwards to prevent the incidental "fall" of the drop and to better observe its disappearance when the bevel reached the epidural space and by Zorraquin's glass adaptor (top) connected to the hub of a regular needle, allowing easier deposition of the fluid and prompt observation of the drop's disappearance.

tient to the OR and a medical student or a doctor who stayed at the head of the table, in case he needed to assist the patient (figure 9).

From the data obtained from the anesthesia record, the distance from the skin to the epidural space in 3,200 patients was measured by determining the length of the needle left out, after the space had been identified, then subtracting it from the total length of the needle. As shown in figure 10, in 81% of the patients the distance from skin to epidural space ranged between 3.5 and 5 cm.

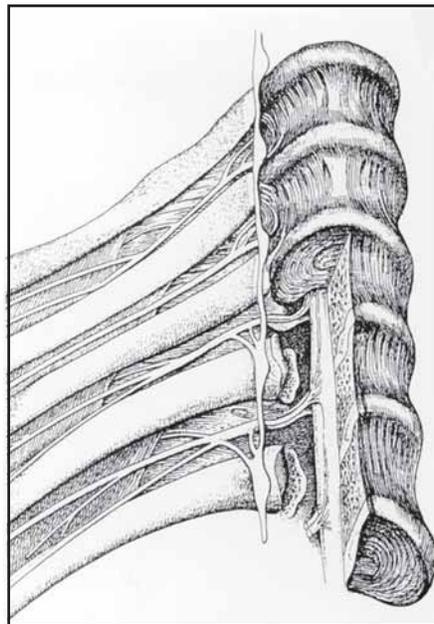
Gutierrez⁶³ did not like to use needles made for spinal anesthesia. To best perform the approach of the "hanging drop," the needle had to be as horizontal as possible, to prevent it from dropping, so the patient's spine had to be well flexed. As occasionally the tip of the thumb and index fingers, used to hold the hub of the needle, touched the drop, in which case the drop disappeared, he designed a special stainless steel needle, 12 cm long with internal diameter no more than 1mm, that would have a flat hub with concave sides, that also required a special stylette (figure 11). Modifications to this needle were proposed by Sammartino⁷¹ who rotated the hub, so the orifice would be upwards preventing the drop from falling (figure 12). Zorraquin⁷² adapted a glass open bubble that connected to any hub, through the proximal end so fluid could easily be injected (figure 12). Everyone preferred glass syringes with a well-fitted plunger that would allow for easy displacement and would not have friction that could give a false sense of resistance.

Local Anesthetics

Until 1937 Gutierrez used 2% procaine which in most cases produced consistent analgesia and muscle relaxation⁵⁹. In 4,500 cases, his group reported that the volume injected was between 30 and 35cc in 570 cases (12.6%), from 35 to 40cc in 2,445 patients (54.3%), from 40 to 45cc in 1,056 patients (23.46%) and from 45 to 50cc in 256 patients (5.6%). One hundred and seventy three others (3.8%) received less than 30cc. In a subsequent report in 1941, he described his experience

combining procaine 500mg with tetracaine 50mg diluted in 50cc of normal saline that in his opinion produced a more profound and long lasting anesthesia. The mixture was prepared just before the procedure and after sterilization by the tyndallization method.⁷³

The dosages recommended varied according to the operation planned. However, if there was any indication that an incidental dural puncture had occurred, he insisted injecting first the dose required for spinal anesthesia and waiting for at least five minutes as indicated for a subarachnoid block. When there was no doubt about being in the epidural compartment to obtain longer lasting anesthesia and



wider effect (from the mandible to the toes) it was suggested administering 50cc of the combination to which 1cc of 1:100 adrenalin was added. More specific dosages were suggested for certain types of surgery. For example, for gastric surgery the injection of 50cc of the mixture was usually done at the T₁₂-L₁. For biliary surgery 35 to 40 cc were injected at the same level. For colon surgery, 50cc of the same anesthetic were injected at L₁-L₂. And for appendectomies and pelvic surgery 30 to 35 cc were administered usually at L₂-L₃ space. For mastectomies 40cc of the same anesthetic were injected at the T₁₂-L₁ level.

The group reported 28 failures, mostly from technical difficulties; Gutierrez advised to convert the anesthetic into a spinal if an incidental dural puncture occurred and if the epidural space was not found after more than four attempts he proposed to consider general anesthesia. In cases of high spinal with respiratory function impairment, patients were treated with manual ventilation, vasoconstrictors and analeptic drugs.

Mediator, Philosopher and Artist

In the early forties, Gutierrez found himself in the middle of two specialties, so dependant on each other but at times, in conflict. By then, more and more physicians were dedicating themselves full time to anesthetize patients. At least three of them had returned from having being trained at the University of Wisconsin under Ralph Waters introducing cyclopropane, closed circuit anesthesia with the to-and-fro apparatus⁶¹ and apparently more proficient in spinal anesthesia. Eventually, at the insistence of Alberto Gutierrez, the Argentinian Society of Surgeons created a separate chapter in Anesthesiology on June 26, 1943. Being the editor of both journals, Gutierrez wrote one article in each of the journals with slightly different contents, but similar title "About relations between surgeon and anesthesiologist,"^{74,75} recognizing that to provide the best care for the patient both physicians need to assist each other in order to maintain professional harmony and a cordial relationship, setting up the principles of inter-specialty relations and mutual respect that ought to exist between the two groups, keeping in mind, above all, the good of the patient.

Taking the role of an unofficial intro-

Fig. 13. Diagram from an anatomical specimen showing the site of action of epidurally injected local anesthetics on the sympathetic chain. The body of the three lowest vertebrae has been sectioned to illustrate the communicating rami.

spective examiner on topics being debated at the time, and based on his knowledge, didactic experience and scientific productivity he wrote on:

“How is Anatomy taught in Buenos Aires”⁷⁶
 “Errors, hazards and advice in Surgery”⁷⁷
 “Asepsis in Surgical Operations”⁷⁸
 “On the Formation of a Surgeon”⁷⁹ and
 “Vices of modern Medicine”⁸⁰

He also expressed some curiosity about the history of his specialties by writing on:

“Lister and antiseptic Medicine”⁸¹
 “Simmelweis and Infections”⁸²
 “Horacio Wells and inhalation anesthesia”⁸³

Since his medical student days, Alberto Gutierrez drew many of his anatomical lessons, and later he also drew a good number of the illustrations in his articles and books (figures 3, 4, 6 and 13), although he had the more complex illustrations in his publications drawn by a professional medical illustrator D. A. Bartolomei. Nevertheless, his distraction and hobby was oil painting, mostly landscapes that took him often to the family’s ranch in the province of Rio Negro and to the Andes mountains. It was there where unexpectedly this outstanding and distinguished physician died suddenly, probably from an acute cardiac illness in Bariloche on February 23, 1945, where he had been on vacation with his wife Nelly Sheffick de Gutierrez. His tomb is in La Recoleta cemetery in Buenos Aires.

Surgeon par excellence, Gutierrez in the summit of his professional carrier, “gambled” his fame and professional reputation by engaging in the study of a relatively new technique of what was, at the time, a specialty branched out of the surgical trunk. Soon he was lecturing on it. He was visited by local and foreign colleagues coming to learn his approach. Some may say “it is just a hanging drop,” but having made that simple observation, it took a special individual with scientific curiosity and an inquisitive mind to figure out why and what did actually happen. That would have been meritorious alone, but Gutierrez went back to the anatomy lab and tried to figure out the physiological reasons for that event. In the clinic, he mastered the technique, recognizing its potentials and its shortcomings, developed what can be considered a dose/effect response, noticing the consequences from changing either the volume or the concentration, pointing out the necessary dose required

to block the visceral reflexes elicited as the abdominal cavity was entered.

Initially, Gutierrez called this form of anesthesia “epidural,” as Sicard and others had called it, then at some time he began to address it as “metamerica” in agreement with Pages who wanted to imply that it was segmental, referring to the block of sensory dermatomes. As he realized that the site of action he then addressed it as “peridural” since the local anesthetics truly surround the dural sac. When it became evident that there was need to stipulate if the anesthetics were injected in or out of the sac, he proposed to call them “intradural” and “extradural,” respectively, discarding the misnomers of “spinal” anesthesia for the former and epidural for the latter.

By correlating the topographical relation of the site of emergence of each of the nerve roots, to the spinous process that serve us as anatomical landmarks, Gutierrez related the level of the puncture to the level of analgesia obtained from a certain dosage and noted that the sympathetic chain would be affected as the local anesthetics exit through the lateral foramen (figure 13). He also realized that intra-abdominally the parasympathetic nervous system may be stimulated by manipulation of the viscera, so he determined what sensory level would need to be blocked, in order to prevent undesirable vagal stimulation.

With the self-confidence of the seasoned teacher he guided other surgeons, trainees and medical students in the intricacies of this technique. He was eager to show that it worked in the hands of everyone that would carefully and patiently follow the protocol.

Even today, it would be difficult to conduct a multiple-author survey that would be followed by a group of colleagues from different countries, in over 12,000 patients, and to collect meaningful data. It was a remarkable task, even by today standards, when multi-institutional studies are commonly done. With a mind of an investigator and a will of an intense scientist that knew, when the opportunity presented itself Gutierrez took such opportunity. On the year of the 60th anniversary of his unexpected passing, that occurred in the peak of his professional productivity, it is appropriate to recognize not only his contributions to extradural anesthesia, but also his many other accomplishments which deserve recognition and emulation.

Acknowledgement

The gathering of the data herein pre-

sented could not have been possible without the extraordinary assistance of Dr. Vicente Gutierrez, nephew of Alberto, who knew him personally. He trusted us with important documents, photographs and valuable information about the Gutierrez family. Many other colleagues contributed information, anecdotes and documents, among them are Dr. Alberto Gonzalez Varela and his collaborators of the Museum of the Argentinian Federation of Associations of Anesthesiologists, Dr. Alberto Torrieri, Director of Residency Training Program, Dr. Oreste Luis Cerazo, Dr. Herbert Ferrari and Pablo Rusca, Librarian of the Library of the AFAA. Through Dr. Vicente Gutierrez we were able to have access to libraries of the Academy of Medicine and the Academy of Surgery from Buenos Aires.

References

1. Gutierrez A. Anatomia topografica del peritoneo. Tesis, Facultad de Medicina, Universidad de Buenos Aires. 1917, pp.1-294.
2. Gutierrez A, Ducheneau L. Disposicion del plexo braquial. *Rev Circ Med* 1916;16:476.
3. Gutierrez A. Observaciones anatomicas: ciego movil ectopico. Persistencia de un mesocolon ascendente. *Rev Circ Med* 1918;18:1551.
4. Gutierrez A. Investigacion del Musculo digastrico. *Rev Ciurc Med* 1919;19:1261.
5. Gutierrez A. Investigacion del borde anterior y la cara profunda del musculo esternocleidomastoideo. *Rev Circ Med* 1920;20:53.
6. Gutierrez A. Anomalia duodeno-pancreatica. Su interperetacion. *Semana Med* 1922;1:409.
7. Gutierrez A. Investigacion anatomico-quirurgica de las regiones lumbo-iliaca y lumbo-abdominal por via anterior. *Rev Anatomico-Quirurg* 1922;1:79.
8. Gutierrez A. Anomalia de la arteria subclavia derecha. *Semana Med* 1922;1:697.
9. Gutierrez A. Fosas peritoneales y hernias internas. *Rev Anatomico-Quirurg* 1923;2:19.
10. Gutierrez A. Oclusion intestinal por calculos biliares. *Bol Soc de Cirugia* 1924;7:94.
11. Gutierrez A. Sobre una anomalia renal. *Rev Circ Med* 1914;14:827.
12. Gutierrez A. Tumor mixto de la region submaxilar. *Rev Circ Med* 1915;15:1021.
13. Gutierrez A. La insuficiencia hepatica en cirugia. *Semana Med* 1918;1:661.
14. Gutierrez A. Cicatrices queloides degeneradas. *Rev Circ Med* 1918;18:774.
15. Gutierrez A. Observaciones anatomicas: hydropneumotorax. Ptosis y basculamiento hepatico. *Rev Circ Med* 1919;19:112.
16. Gutierrez A. El injerto costal en el mal de Pott. *Rev Asoc Med Arg* 1922;33:342.
17. Gutierrez A. Tumoracion sifilitica del rinon. *Semana Med* 1923;2:906.
18. Gutierrez A. Senos esfenoidales y sus relaciones de vecindad. Consideraciones practicas. *Rev Anatomico Quirurg* 1923;2:27.
19. Gutierrez A. Sarcoma myeloplaxico de la extremidad inferior de la tibia. Resecion del tumor. Injerto peroneal. *Rev Cirugia* 1926;9.
20. Gutierrez A. The value of peritoneal sheets of coalescence in abdominal surgery. *Surg Gynec Obstet* 1926;468-73.
21. Gutierrez A. Incisiones abdominales. *Rev Circ Med* 1919;2:300.
22. Gutierrez A, Tagliavache N: drenaje lat-

Continued on Page 14

Gutierrez. . . Continued from Page 13

eral en cirugía de las vías biliares. *Prensa Med Arg* 1920/21;7:205.

23. Gutierrez A. Sobre gastroptosis and gastrectomia. *Rev Asoc Med Arg* 1922;5:17.

24. Gutierrez A. Ausencia parcial del musculo diafragma con ectopia de las visceras. *Rev Cirugia* 1929;8:75-9.

25. Gutierrez A. Produccion osea en una cicatriz de laparotomia. *Semana Med* 1919;2:296-7.

26. Gutierrez A. Torsion del cordón espermático con gangrena epididimo testicular. *Bol Soc Cirugia* 1925;9:105.

27. Nesi JA. Profesor Alberto Gutierrez, 1892, 1945. *Rev Arg Anest Analg* 1945;7:5-10.

28. Braun H: Local anesthesia. Its scientific basis and practical use. Lea & Fibiger, Philadelphia. 1914.

29. Labat GL: Regional anesthesia. Its technic and clinical application. W.B. Saunders, Co. 1924.

30. Gutierrez A. La anestesia local en cirugía de las vías biliares. *Bol Soc Cirugia* 1925;9:369-374.

31. Gutierrez A. Anestesia local en cirugía gastrica. *Rev Cirugia* 1927;6:221-232.

32. Gutierrez A. La anestesia local en cirugía renal. *Rev Cirugia* 1930;8.

33. Gutierrez A. Parotidectomia total y anestesia local. *Rev Cirugia* 1936;14.

34. Gutierrez A. Apendicectomia con anestesia local. Encuesta. *Rev Circ Med* 1930;13:1705.

35. Gutierrez A. Anestesia local y carcinoma de la glandula mamaria. *Rev Arg Anest Analg* 1941;3:1-7.

36. Gutierrez A. Anestesia local y meningocela subaracnoideo de la region sacra. *Rev Arg Anest Analg* 1942;4:73-85.

37. Anestesia local y cirugía de los organos genitales externos masculinos y femeninos. *Rev Arg Anest Analg* 1943;5:11-15.

38. Gutierrez A. A proposito de la anestesia con novocaina, vasopresina. *Bol Soc Cirugia* 1932.

39. Gutierrez A. Dispositivo para anestesia local. *Rev Hosp Español* 1932;9:39-40.

40. Gutierrez A. Anestesia esplanica; algunas consideraciones sobre ella. Contribucion personal. *Semana Med* 1922;29:1-16.

41. Gutierrez A. La operacion de Hutchinson en las neuralgias del trigemino. *Rev Cirugia* 1929;5:547-53.

42. Gutierrez A. Anestesia esplanica anterior de Braun. *Bol Soc Cirugia* 1928;12:606-8.

43. Gutierrez A. Sobre reseccion de los nervios maxilares superior e inferior a susalida del craneo.

Rev Cirugia 1926;12:456-65.

44. Gutierrez A. Simpatectomia lumbar, anterior paraperitoneal. *Rev Cirugia* 1936;15:625-34.

45. Gutierrez A. Hallus valgus. *Rev Cirugia* 1936;15:181-194.

46. Gutierrez A, Gutierrez A. Espolon calcaneo doloroso. *Rev Cirugia* 1931;10:287-8.

47. Gutierrez A. Sobre tres casos de articulacion temporomaxilar chasqueante. *Bol Soc Cirugia* 1932.

48. Aldrete JA, Sainz, Cabrera H, Wright AJ. Manuel Martinez Curbelo and continuous lumbar epidural anesthesia. *Bull Anesth History* 2004;22(1):20.

49. Gutierrez A. Anestesia Metamerica epidural. Clase de Clinica Quirurgical dictada 28 de Mayo, 1932. *Dia Medico* Agosto 1, 1932.

50. Pages DF. Anestesia metamerica. *Rev Espanol Cirugia* 1921;46-54.

51. Dogliotti AM. Un nuovo metodo di anestesia tronculare in studio. La rachianestesia peridurale segmentaria. *Arch Ital Chir* 1932;38:797-800.

49. Gutierrez A. Anestesia metamerica epidural. *Rev Hosp Espanol* 1932;665-682.

53. Gutierrez A, Lopez, Rubido M. Resultados obtenidos con la anestesia peridural. *Rev Cirugia* 1933;12:93-101.

54. Gutierrez A. El valor de la aspiracion liquida en el espacio epidural en la anestesia peridural. *Dia Medico* March 27, 1933.

55. Gutierrez A. Valor de la aspiracion liquida en el espacio peridural, en la anestesia peridural. *Rev Cirugia* 1933;12:225-7.

56. Gutierrez A. Anestesia metamerica epidural. *Bol Asoc Med Bahia Blanca* 1933;16:791-3.

57. Gutierrez A, Labandibar B. Estudio comparativo de las anestias usadas en el Servicio durante el año 1933. *Rev Hosp Espanol* 1934;12:745-5.

58. Gutierrez A. Temas en Discusion: Anestesia extradural. Sesion Nov. 17, 1937. *Soc Cirugia Bs As* 1937;21:1075-7.

59. Gutierrez A. Anestesia extradural. *Rev Cirugia* 1938;17:409-67.

60. Odom BC. Epidural anesthesia. *Amer J Surg* 1936;547-9.

61. Aldrete JA. Impact of Ralph Waters in the development of academic anesthesia in Latin America. In Ralph Milton Waters: Mentor to a profession. L.E. Morris, M.E. Schroeder, M.E. Warner (eds). Wood Library-Museum of Anesthesiology, Park Ridge. 2004; pp. 217-26.

62. Gutierrez A. Anestesia peridural. *Dia Medico* Nov. 14, 1938.

63. Gutierrez A. Anestesia Peridural. A.

Gutierrez (ed), Imprenta A. Guidi Buffarini, Buenos Aires, 1938, pp. 2-95.

64. Cathelin MF. Anesthesie epidurale. *Soc Chirurg Paris* 1922.

65. Laewen A. Uber Extraduralanaesthesia für chirurgische Operationen. *DT sch Z Chir* 1911;108:1.

66. Van Earps R. Essais sur l'anesthesie epidural segmentaire. *Arch Franco Belges Chir* 1927;101.

67. Janzen E: Der negative Vorshlag bei lumbalpunktion. *Deutsch Z Nervenheilk* 1926;94:280. 5.

68. Heldt TJ, Malloney JC. Negative pressure in epidural space. *Am J Med Sci* 1928;175:371-376.

69. Giordanengo G. Considerations sur la technique de l'anesthesie peridurale segmentaire. *Giorn Ital Anest Analg* 1938;3.

70. Zorraquin G. Anesthesie metamerique peridurale et physiologie chirurgicale del espace peridural. *Press Med* 1936;44:783-791.

71. Sarmartino E. Aguja para inyectar en el espacio epi o peridural. Tecnica de la puncion del mismo espacio. *Semana Medica* 1934;(4).

72. Zorraquin G. Le domaine des anesthesie peridurales en chirurgie et en therapeutique. *Rev Med Cubana* 1934;45:379-386.

73. Gutierrez A. Extradural anesthesia. *J Internat Coll Surg* 1941;4:16-17.

73. Gutierrez A. De las relaciones entre anestesioologo y cirujano. *Rev Soc Arg Cirujanos* 1944;276-278.

74. Gutierrez A. de las relaciones entre anestesistas y cirujanos. *Rev Arg Anest Analg* 1944;6:1-3.

75. Gutierrez A. Como se ensena la anatomia actualmente en Buenos Aires. *Rev Cirugia* 1924;1:237-240.

76. Gutierrez A. Errores, peligros y consejos en cirugía. *Rev Cirugia* 1927;3:324-327.

77. Gutierrez A. Asepsia integral en las intervenciones operatorias. *Dia Medico* 1939;44:992-994.

78. Gutierrez A. La formacion de un cirujano. Imprenta A Guidi Bufferini, Buenos Aires. 1941, pp. 2-74.

79. Gutierrez A. Sobre los vicios de la medicina actual. *Dia Medico* June 7, 1943.

80. Gutierrez A. Lister y la cirugía antiséptica. *Rev Cirugia* 1937.

81. Gutierrez A. Semmelweis y la infección. *Rev Cirugia* 1940;19:200-206.

82. Gutierrez A. Horacio Wells y la anestesia por inhalacion 1844. 1944. *Rev Arg Anest Analg* 1944;6:43-52.

Objections. . . Continued from Page 5

thetic agents in midwifery and surgery. Edinburgh: Sutherland & Knox. 1847.

12. Farr AD. Religious opposition to obstetric anesthesia: a myth? *Annals of Science* 40:159-177, 1983.

13. Farr AD. Religious opposition to obstetric anesthesia: a myth? *Annals of Science* 40:159-177, 1983.

14. Cohen J. Doctor James Young Simpson, Rabbi Abraham De Sola, and Genesis Chapter 3, Verse 16. *Obstet Gynecol* 88:895-898, 1996.

15. Simpson JY. Postscript to letter to Mr. Waldie of Liverpool. Memoir of Sir J.Y. Simpson. Edinburgh: J. Duns, 1873, pp 215-6.

16. Farr, AD. Religious opposition to obstetric anesthesia: a myth? *Annals of Science* 40:174, 1983.

17. Porter JB. Medical and surgical notes of

campaigns in the war with Mexico during the years 1845, 1846, 1847 and 1848. *Am J Med Sci* 47:2-30, 1852.

18. Albin MS. The use of anesthetics during the Civil War, 1861-1865. *Pharm Hist* 42:99-114, 2000.

19. Guthrie JG. In: Pain and Anesthetics 2-8, 1863. *Neveu R. J Hist Allied Sci* 1:607-8, 1945.

20. Pernick MA. A Calculus of Suffering: Pain, Professionalism, and Anesthesia in Nineteenth-Century America. New York: Columbia University Press, 1985.

21. Albin MS. The use of anesthetics during the Civil War, 1861-1865. *Pharm Hist* 42(2000):99-114.

22. Caton D. The secularization of pain. *Anesthesiology* 62:493-501, 1985.

Moving Boldly Forward: A History of Neuroanesthesia

By Fred J. Spielman, MD

Professor

Department of Anesthesiology

The University of North Carolina School of Medicine

Today thousands of patients will undergo neurosurgery. The surgery often requires invasive and elaborate monitoring, complex anesthetic delivery devices, challenging airway manipulation, and detailed knowledge of neuroanatomy and physiology. Success in the operating room should inspire anesthesiologists to be appreciative that they have the tools, knowledge, and skills to routinely deliver safe care for the most challenging operations. We are indebted to the pioneers of neuroanesthesia.

The oldest form of neurosurgery is trephining. Multiple holes, four or five centimeters in diameter, were cut or drilled into skull. Examples have been discovered all over Europe and parts of Africa and Asia, as well as North and South America. The holes were made by cutting, scraping, or boring with a sharp stone. The cavities were created to allow devils, spirits, or supernatural elements to escape, thereby facilitating the cure for convulsions, developmental delay, insanity, or infection. Hippocrates trephined to treat blindness and headaches. Researchers are unclear how or if anesthesia was employed. In Peru, coca leaves may have been chewed and spit into the wound to be used as a local anesthetic. Possibly pressure on the carotid artery was used to produce a state of unconsciousness. The Greek word for carotid artery means the "artery of sleep."

Significant advances in neurosurgery required safe and adequate anesthesia. Despite the use of narcotics, nitrous oxide, cannabis, alcohol, and herbs no reliable and potent anesthetic available was until 1842 when ether was first employed by Dr. Crawford Long. Neurosurgery became recognized as a specialty towards the end of the nineteenth century. In 1884 Sir Rickman Godlee was the first surgeon to successfully remove a brain tumor. In 1886 Arthur Barker drained a brain abscess. By the turn of the century progress in neurosurgery was hastened by the discovery of antiseptics, functional anatomy of the central nervous system, and advanced diagnostic techniques. Shortly after the advent of aggressive brain surgery, it became apparent that in no other branch of surgery could inattentive anesthesia hinder the surgeon or jeopardize the patient more easily. The inherent challenges of anesthesia



"Ernst von Bergmann Performs a Brain Operation" painted by Franz Skarbina. Reproduced with kind permission of Bildarchiv Preussischer Kulturbesitz, Berlin, Germany.

for neurosurgery were quickly appreciated. Patients with diseases of the central nervous system are frequently prone to develop significant disturbances of respiration and circulation, and manipulation of the brain markedly increases the magnitude such disorders. The operative site so close to the patient's airway requires that the anesthesia care provider perform his or her work far removed from the patient's head. In addition, operative approaches often require a patient to be placed in a position unfavorable to the maintenance of the airway.

Sir Victor Horsley (1857-1917), one of the founders of neurosurgery as a specialty in Great Britain, experimented with chloroform and ether in animals. He concluded that ether was not to be recommended because it produced a rise in blood pressure and an increase in blood viscosity. He was also concerned about postoperative excitement, headache, and vomiting which he ascribed to ether. Chloroform was responsible for a decrease in blood pressure, but this was not recognized as a disadvantage since a reduction in brain swelling would follow. Ether was favored in the United States. Harvey Cushing did not trust the effects of chloroform on the blood pressure. The preferences for the two anesthetics can

be explained, in part, by the fact that chloroform was first employed in Edinburgh while ether was introduced in America. Horsley's success with neurosurgery in London at the National Hospital for Nervous Diseases greatly influenced Harvey Cushing's (1869-1939) career in Boston at the Massachusetts General Hospital. Cushing's contributions to anesthesiology were significant and everlasting. An intraoperative death of one of Cushing's patients in 1893 stimulated him to introduce the "ether chart," a record of vital signs during surgery. In 1895 he stated, "I still feel that one of the most important elements in the giving of an anesthetic is to have the anaesthetist keep during its administration a detailed chart of pulse, respiration, and blood-pressure." His record keeping also included details of the patient's preoperative drugs, pupillary size, and the amount of anesthetic delivered. In 1900 Dr. Cushing visited Italy and met Scipione Riva-Rocci (1863-1937) who had introduced the blood pressure cuff in 1896. Cushing immediately recognized its advantages and introduced the new method of sphygmomanometry monitoring in the operating room. The reaction to Cushing's requirement for better surveillance

Continued on Page 16

Neuroanesthesia . . .

Continued from Page 15

prompted the Harvard Medical School to issue the following concern: "The adoption of blood-pressure observations in surgical patients does not at present appear to be necessary as a routine measure (1904)." Cushing became a champion of local anesthesia for neurosurgery. He is credited as being the first person to use the term "regional anesthesia." His enthusiasm for local anesthetics was stimulated by the high rate of intraoperative deaths. Students at both Johns Hopkins and Harvard Medical Schools were permitted to administer anesthesia with little or no training. He was an advocate for anesthesiology, writing in 1908, "regardless of the drug to be employed, it is essential that it be administered by an expert—preferably by one who makes this his specialty."

Cushing was not alone in his zeal for local anesthesia. In 1904 and 1905, cocaine and procaine, respectively, were first employed for surgery. In 1909 Braun removed a recurrent brain tumor under local anesthesia using procaine mixed with epinephrine. After the First World War many prominent neurosurgeons endorsed the use of local anesthesia. They preached that it was more suitable than general anesthesia because local anesthesia decreased intracranial tension and bleeding. Surgeons also believed that less vomiting and respiratory complications were associated with local anesthesia. In 1918 Cushing stated, "General anesthesia encourages the use of rougher methods, which a patient under local anesthesia would not tolerate, and which therefore are in all likelihood harmful."

Colonic absorption of ether insufflated via the rectum had been used since 1847. Cunningham and Lahey (1905) stressed that for cranial surgery it had the advantage of moving the site of anesthetic administration away from the head. "In operations upon the head the absence of the ether cone not only lessens the technical difficulties of the operation, but also minimizes the chances of sepsis and lessens considerably the time necessary to perform the operation." Other presumed advantages of rectal ether were the elimination of the excitement stage, no bronchial secretions, and quick recovery. Writing in the *Annals of Surgery* (1928), neurosurgeon Charles Frazier described the use of rectal ether for removal of brain tumors, laminectomies, and subtemporal decompressions. At the conclusion of the operation, the bowel was irrigated with one pint of warm water, four

ounces of olive oil, and four to eight ounces of black coffee.

The management of the airway and ventilation during neurosurgery was a great challenge to the pioneer anesthesiologist. The routine use of endotracheal intubation and muscle relaxants were two of the most important advances in neuroanesthesia. They enabled the anesthesiologist to be in control of ventilation. Hypoventilation and increased intracranial pressure was avoided. The anesthesia care provider could maintain a safe distance from the surgeon and provide a smooth induction and emergence. This was especially the case with patients placed in the prone or sitting position.

During the past five decades researchers and clinicians in neuroanesthesia have contributed much to the safety of all patients undergoing an operation. Discovery, innovation, and enhancement have occurred in the areas of deliberate hypothermia, induced hypotension, acute normovolemic hemodilution, central venous monitoring, and transesophageal Doppler and echocardiography. In 1981 an editorial in *The New England Journal of Medicine* praised anesthesiology for its contributions to patient safety. "The development of neuroanesthesia and microsurgical techniques has reduced postoperative morbidity and mortality to the point at which surgical treatment may be the safest course (even) in most patients with asymptomatic unruptured intracranial aneurysms." The key to success is, in large part, unchanged from 1930 when Dr. Z. Mennell, writing on the challenges of neuroanesthesia in the *British Journal of Anaesthesia* stated, "gentleness and speed on the part of the surgeon, clear air way with intra-tracheal ether on the part of the anaesthetist and knowledge, confidence and calmness in both, spell success in this often and difficult and trying work."

The painting that accompanies this essay shows Dr. Ernst von Bergmann (1836-1907) ready to commence a neurosurgical operation. Dr. von Bergmann was an innovative surgeon, one of the first to specialize in cranial procedures. His experience as a medical officer in three military battles contributed to his knowledge and proficiency. In 1888 he published **Surgical Treatment of Diseases of the Brain**. This textbook contained chapters on the treatment of tumors of the brain, trephining for epilepsy, ventricular puncture for the relief of increased intracranial pressure, and the management of deep abscesses. Little is known about the artist Franz Skarbina (1849-1910). He was born

in Berlin and attended the Berlin Academy. He continued his training in Paris where he had his first exhibitions and won several prizes. In spite of the fact that none of the operating team is wearing gloves, Dr. von Bergmann introduced an exacting and uniform aseptic practice and developed techniques for instrument sterilization. The nurse at the right delivers instruments from a sterilizer. To her right a male nurse pours sterile irrigation fluid into a bowl. The anesthetist monitors the patient's status with a finger on the carotid artery. The artist has placed the surgeon at the center of action. He is an authoritative figure, taller and broader than others. He commands the attention of everyone while he teaches. The painting was completed in 1906, one year after Cushing proclaimed neurosurgery as a separate surgical specialty. The painting was on display in a Berlin museum but vanished during World War II.

Suggested Readings

1. Guthkelch AN. "Where I came in": A glimpse of the history of neurosurgery to 1940. *Ariz Med* 1985;42:156-160.
2. Frazier CH. Colonic anaesthesia in operations upon brain and spinal cord. *Ann Surg* 1928;87:161-171.
3. Shepard DEA. Harvey Cushing and anaesthesia. *Can Anaes Soc J* 1965;12:431-442.
4. Shannon EW, Gardner WJ. Pentothal sodium anesthesia in neurologic surgery. *NEJM* 1946;234:15-6.
5. Gardner WJ. The control of bleeding during operation by induced hypotension. *JAMA* 1946;132:572-4.
6. Dandy WE. "Avertin" anesthesia in neurologic surgery. *JAMA* 1931;96:1860-2.
7. Hauber CH, Philips CA. The evolution of organized neurological surgery in the United States. *Neurosurgery* 1995;36:814-24.
8. Furness DN. Controlled respiration in neurosurgery. *Br J Anaesth* 1957;29:415-8.
9. Bilsland WL. Controlled hypotension by arteriotomy in intracranial surgery. *Anaesthesia* 1951;34:20-5.

MedNuggets

By Fred J. Spielman, MD

Professor

Department of Anesthesiology

The University of North Carolina School of Medicine

Spinal anesthesia has come to stay, and it behooves us to learn all we can about it and to use it, not indiscriminately, but in properly selected cases.

—F. Webb

Southern Medicine and Surgery 92:504,
1930

From time to time drugs are introduced which are heralded as perfect, but most of them quickly die out and are forgotten.

—R. Blair Gould

Anaesthesia 6:108, 1951

Anesthesia in rectal surgery is like golf. Each man in a foursome may use a different club to reach the greens and likewise the same club would not be used under all circumstances. It seems that there should be a certain amount of flexibility in anesthesia for rectal surgery. Every now and then it becomes necessary to substitute some other anesthesia in place of your favorite one.

—R. I. Brashear

American Journal of Surgery 79:147,
1950

Recent years have seen the introduction of numerous electronic devices reputed to "monitor" cardiac activity, to "warn" the anesthetist of impending cardiac arrest and even to treat cardiac arrest should this catastrophe occur. Some of these devices have been introduced to the accompaniment of advertising material which may give a false sense of security to the user of these remarkable inventions. This advertising would lead one to believe that as long as the light shines or the bell rings or the needle moves, the cardiac action is satisfactory.

—David A. Davis

American Surgeon 24:647, 1958

The development and progress of surgery is inseparable from the advance of anesthesia, and it is to the interest of surgeons to encourage men trained in the basic sciences and in medicine to specialize in anesthesia.

—Charles F. McCuskey

New Orleans Medical and Surgical Journal 85:1, 1932

We do not believe in fussing with patients under spinal anesthesia. We do not ask them how they feel every few minutes, nor do we note their blood pressure every so often. We determine the blood pressure before and after the injection, and again only when the patient shows symptoms of collapse.

—Joseph J.A. McMullin

Surgery Gynecology and Obstetrics
45:651, 1927

It may well be perceived that every patient is a law unto itself as far as the effect of the anesthetic upon the circulatory mechanism is concerned, inasmuch as his particular organic makeup is different from every other and that what may be minimum dosage for one in particular might be maximum or toxic for another.

—William C. Woolsey

New York State Journal of Medicine
11:338, 1911

Well trained nurse anaesthetists under the supervision of physician anaesthetists can and do give most satisfactory and safe inhalation anaesthesia and serve to maintain anaesthesia costs at lower levels, a point of no small importance to the patient, the hospital, the surgeon, and the progress of anaesthesia.

—Frank H. Lahey

Surgery, Gynecology and Obstetrics
59:943, 1934

According to the new technic, a solution of 2.50 per cent of pentothal is injected into the manubrium of the sternum. It offers several advantages, for instance the possibility of producing anesthesia in persons whose veins are not on the surface, of injecting repeated doses without requiring any apparatus of fixation of the needle and for keeping it passable, and the possibility of easy control during anesthesia.

—Foreign letters- Italy

Journal of the American Medical Association 134:825, 1947

The specialty of anesthesia holds out the prospects of a tremendous economic saving in the cost of operating and the expense of maintaining hospitals. Through the use of newer anesthetics, perfected

methods and medical specialists in anesthesia, the patient's stay in the hospital may be so shortened that in a given year under this new dispensation, almost a fourth more surgical or obstetrical patients may be handled without adding another bed or nurse or member of the staff. No matter what such anesthesia costs it pays for itself three times over.

—F.H. McMechan

Current Researches in Anesthesia and Analgesia 8:7, 1929

The fundamental basis for the importance of regional anesthesia lies in the fact that through nerve injections we may voluntarily bring about the isolation of any region or organ from the remainder of the body. Thus the subject comes to encompass every specialty and separate domain of medicine.

—E.M. Livingston

American Journal of Surgery 23:210,
1934

Today, the anesthesiologist finds himself mired in an endless amount of new information, and I am sure that many of us often wish we could screen out the discussions that are really vital.

—Editorial

Anesthesiology 15:560, 1954

Anesthetists frequently have not been accorded proper recognition, financially or otherwise, for the important part they play in the care of patients. They resented being relegated to the position of a technician. Yet far too often they have been content to be only technicians and have not been willing to equip themselves to assume the role of a real consultant who not only can carry out a skillful, technical procedure but also, by virtue of a background of fundamental knowledge of physiology, pharmacology and even medicine and surgery, can render a valuable opinion as a consultant.

—Casimir Harris

New England Journal of Medicine
236:829, 1947

In order that medical men and women shall devote their time and study to anaes-

Continued on Page 20

From the Literature

by A.J. Wright, M.L.S.

Associate Professor of Anesthesiology

Director, Section on the History of Anesthesia

University of Alabama at Birmingham

Note: I have examined most of the items listed in this column. Books can be listed in this column more than once as new reviews appear. Older articles are included as I work through a large backlog of materials. Some listings are not directly related to anesthesia, pain or critical care but concern individuals important in the history of the specialty [i.e., Harvey Cushing or William Halsted]. I also include career profiles of living individuals. Non-English materials are so indicated. Columns for the past several years are available as "Recent Articles on Anesthesia History" in the "Anesthesia History Files" at www.anes.uab.edu/aneshist/aneshist.htm. I urge readers to send me any citations, especially those not in English, that I may otherwise miss!

BOOKS

Baker B. Australia's First Anaesthetic Department 75 Years at the RPA. Camperdown, N.S.W.: Jobson Foundation, 2005 172pp. [Illus., names index]

Flannery MA. Civil War Pharmacy: A History of Drugs, Drug Supply and Provision, and Therapeutics for the Union and Confederacy. Pharmaceutical Products Press, 2004. 347pp. [rev. Haller JS Jr. *J Hist Med Allied Sci* 60:234-235, 2005]

Hayes B. Five Quarts: A Personal and Natural History of Blood. New York: Ballantine Books, 2005. 290pp. [ref. lists, index]

Jeffreys D. Aspirin: The Remarkable Story of a Wonder Drug. Bloomsbury/St. Martin's, 2004. 352pp. [rev. Bagchi S. *JAMA* 293:1268-1269, 2005]

Kitz R, ed. "This is No Humbug!" Reminiscences of the Department of Anesthesia at the Massachusetts General Hospital. Ashland, Ohio: Atlas Books, 2003. 459pp. [rev. Calicott RW. *Bull Hist Med* 79:162-163, 2005]

Hamilton J. A Life of Discovery: Michael Faraday, Giant of the Scientific Revolution. New York: Random House, 2004. 496pp. [Illus., maps, notes, bibliography, index. Rev. Rutter S. *Library J* January 2005, pp 142, 147]

McGoldrick KE, ed. Careers in Anesthesiology: Autobiographical Memoirs. B. Raymond Fink, Luke Masahiko Kitahata, J. Roger Maltby, Thomas T. McGranahan. Volume VI. Park Ridge, Illinois: Wood Library-Museum of Anesthesiology, 2001. 189pp. [rev. Calmes SH. *Bull Hist Med* 78:921-922, 2004]

Meldrum ML, ed. Opioids and Pain Relief: A Historical Perspective. Seattle: IASP Press, 2003. 222pp. [rev. Campbell ND. *Bull Hist Med* 78:894-895, 2004; Hickman T. *Soc Hist Med* 18:131-132, 2005]

Reynolds LA, Tansey EM, eds. Innovation in Pain Management. London: Wellcome Trust

Centre for the History of Medicine, 2004. 156pp. [Wellcome Witnesses to Twentieth Century Medicine, Vol. 21]

Schuttler J, ed. 50 Jahre Deutsche Gesellschaft für Anesthesiologie und Intensiv Medizin. Tradition and Innovation. Berlin: Springer-Verlag, 2003. 584pp. [rev. Ruprecht J. *Hist Anaesth Proc* 32:64-65, 2003]

Snow S. The History of Anaesthesia. Oxford University Press, 2005

Stratmann L. Chloroform: The Quest for Oblivion. Sutton Publishing, 2003. 256pp. [rev. Connor H. *Hist Anaesth Proc* 32:64, 2003]

Vinten-Johansen P, Brody H, Paneth N, Rachman S, Rip M. Cholera, Chloroform, and the Science of Medicine: A Life of John Snow. Oxford: Oxford University Press, 2003. 437pp. [rev. Snow SJ. *Hist Anaesth Proc* 32:66-67, 2003; Joy RJT. *Bull Hist Med* 78:896-897, 2004]

ARTICLES AND BOOK CHAPTERS

Ball C, Westhorpe R. Local anaesthetics—the introduction of Xylocaine into clinical practice. *Anaesth Intens Care* 32(6):733, December 2004 [illus., 4 refs.]

Bause GS. ASA's Freudian prelude: from mesmerism to cocaine. *ASA Newsletter* 68(9):22-23, September 2004 [6 illus.]

Boulton TB. Henry Rex Marrett MRCS, LRCP, FRCA, DA an appreciation. *Hist Anaesth Soc Proc* 32:68-71, 2003 [6 refs.]

Bowden ME, Hicks RD. Joseph Priestley, radical thinker. *Chemical Heritage* 22(3):24-25, fall 2004 [3 illus.; describes Priestley exhibit at the Chemical Heritage Foundation in Philadelphia]

Browner SP. Professional medicine: democracy and the modern body: the discovery of etherization. In: Browner SP. *Profound Science and Elegant Literature: Imagining Doctors in Nineteenth-Century America*. Philadelphia: University of Pennsylvania Press, 2005, pp 15-38 [notes, bibliography, index]

Chestnut DH. Efficacy and safety of epidural opioids for postoperative analgesia. *Anesthesiology* 102:221-223, 2005 [11 refs.; Classic Papers Revisited series]

Dreyfuss M. Anesthesiologist's heart transplant is a success story. *Anesthesiology News* 31(1): 22-23, January 2005 [profile of Edward Lowe, M.D.]

Ellison N. Reflections on 30 years as a defense expert witness. International Anesthesia Research Society, 2005 Review Course Lectures, pp 23-30 [6 tables, 7 illus., 10 refs.]

Ganidagli S, Cengiz M, Aksoy S, Verit A. Approach to painful disorders by Serefeddin Sabuncuoglu in the fifteenth century Ottoman period. *Anesthesiology* 100:165-169, 2004 [6 illus., 24 refs.]

Gisvold SE, Lindahl S. Eric Nilsson in me-

moriām (1915-2004). *Acta Anaesthesiol Scand* 49:270, 2005

Gordon N. History of cluster headache. *Curr Pain Headache Rpts* 9:132-134, 2004 [23 refs.]

Grenvik A, Pinsky M. In memoriam: Iqbal Mustafa, MD, PhD, FCCM. *Curr Opin Crit Care* 10:433, 2004

Grogono AW. The Abt report: what was it and what happened? *ASA Newsletter* 68(9):20-21, September 2004 [1 illus.]

Haddad FS. Pictorial history of anesthesia at the American University of Beirut. *Middle East J Anesthesiol* 17(6):987-1008, 2004 [37 PowerPoint slides, 20 refs.]

Hansen DD, Hickey PR. History of anesthesia for congenital heart disease. In: Andropoulos DB, ed. *Anesthesia for Congenital Heart Disease*. New York: Blackwell Futura, 2005, pp 3-16 [2 illus., 54 refs.]

Hathaway W. The man who defied pain; for some, treatment of Horace Wells, anesthesia pioneer, still hits a nerve. *Hartford Courant* December 11, 2004 [Connecticut newspaper]

Haytock J. Marriage and modernism in Edith Wharton's *Twilight Sleep*. *Legacy* 19(2):216-229, 2002 [Notes; works cited listing. Wharton's 1927 novel uses "twilight sleep," a morphine-scopolamine combination for labor pain relief popular in the first half of the 20th century, as a metaphor]

Hicks RD. Joseph Priestley Exhibit to open. *Chemical Heritage* 22(2):34, summer 2004 [illus.; exhibit at Chemical Heritage Society in Philadelphia, Pennsylvania]

Hines RL. Nicholans M. Greene, M.D.: 1922-2004. *ASA Newsletter* 69(2):35-36, February 2005 [portrait]

Jardine L. On a Grand Scale: The Outstanding Life of Sir Christopher Wren. New York: HarperCollins, 2002. [Illus., notes, bibliography, index. pp 88-89 and 122-128 describe Wren's 1650s experiments with blood transfusion]

Johnson K. British political cartoonist in era of enlightenment. *New York Times* January 7, 2005 [Exhibition of prints by James Gillray at New York Public Library; one of his works satirizes Davy's nitrous oxide demonstrations at the Royal Institution in London]

Join the party and celebrate ASA's 100th birthday. *ASA Newsletter* 69(1):10-11, January 2005

Klobuchar CM. Pioneering anesthesiologist continues to shape his field. *Anesthesiology News* 31(1):25, January 2005 [profile of J. Antonio Aldrete, M.D.]

Lake CL. History of pediatric cardiac anesthesia. In: Lake CL, Booker PD, eds. *Pediatric Cardiac Anesthesia*. 4th ed. Philadelphia: Lippincott Williams & Wilkins, 2005, pp 1-6 [table, 65 refs.]

Maia RJF, Fernandes CR. Dawning of inhalational anesthesia: a historical perspective. *Rev Bras Anesthesiol* 52(6):774-782, November-December 2002 [Portuguese]

Markel H. The accidental addict. *N Engl J Med* 352(10):966-968, March 10, 2005 [illus., 4 refs.; William S. Halsted]

Marlene Paulino dos Reis 20/08/1942-12/12/2003. *Rev Bras Anesthesiol* 54(6):877, November-December 2004 [Portuguese and English]

McGoldrick KE. A hero for all seasons. *Ambulatory Anesthesia* 119(4):1, 5, October 2004 [portrait; Leroy Vandam]

New Priestley exhibit marks 200th anniversary of his death. Shamokin [Penn.] News-Item February 3, 2004 [describes exhibit at the Joseph Priestley House in Northumberland, Pennsylvania]

Raj PP. Historical aspects of regional anesthesia, ambulatory anesthesia, and continuous outpatient infusions. In: Steele SM, Nielsen KC, Klein SM, eds. New York: McGraw Hill, 2005, pp 9-34 [9 tables, 8 illus., 271 refs.]

Rudavsky S. Leroy Vandam, 90, pioneer in anesthesia. *J Clin Anesth* 16: 481-482, 2004

Sebastiao Marra Marques 10/11/1930-26/07/2004. *Rev Bras Anesthesiol* 54(6): 878, No-

vember-December 2004 [Portuguese and English]

Smith T. The development of the anaesthetic vaporiser. *Bulletin of the Historical Medical Equipment Society*, London. 10:3-4, August 2003

Spalding JMK. Artificial respiration in Oxford in 1950s. *Bulletin of the Historical Medical Equipment Society*, London. 10:10-13, August 2003

Sternbach GL, Varon J. The discovery and rediscovery of oxygen. *J Emerg Med* 28(2):221-224, 2005 [13 refs.]

TahaJasser M. Anaesthesia in the history of Arab and Islamic medicine. *J Int Soc History Islamic Med* 1(1):21-24, April 2002

Tan PSK, Grenvik A, Pinsky M. In memoriam: Iqbal Mustafa, MD, PhD, FCCM. *Crit Care Med* 33(2):475, 2005 [illus.]

Tetzlaff JE, Lautsenheiser F, Estafanous FG. Dr. George Crile – early contributions to the theoretic basis for twenty-first century pain medicine. *Reg Anesth Pain Med* 29(6):600-605, November-December 2004 [3 illus., 15 refs.]

Ture H, Ture U, Gogus FY, Valavanis A, Yasargil MG. The art of alleviating pain in Greek mythology. *Neurosurgery* 56(1):178-186, January 2005 [6 illus., 32 refs., comments]

Unzueta MC, Casas JI, Merten A. Macintosh's laryngoscope. *Anesthesiology* 102: 242, 2005 [letter; 7 refs.]

Vale NB, Delfino J. Nine Biblical anesthetic premises. *Rev Bras Anesthesiol* 53(1):127-136, January-February 2003 [Portuguese]

Vandam LD. Concerning neurologic sequelae of spinal anesthesia. *Anesthesiology* 100:176-177, 2004 [13 refs.; Classic Papers Revisited series]

Vlessides M. Wine, whiskey and laudanum...analgesics of choice for Lewis and Clark. *Anesthesiology News* 31(3):1, 36, March 2005

Wainwright M. The talented Mr. Priestley is finally honoured at home. *The Guardian* February 9, 2004

Ward ME, Boulton TB. Obituary: Stanley Arthur Mason. *Anaesthesia* 60:92-93, 2005 [portrait]

Welch RA. Spotlight on...Lawrence S. Berman, M.D.—ever-vigilant, at work and at sea. *ASA Newsletter* 69(1):19-20, January 2005 [portrait]

Zauder HL. The Macintosh laryngoscope blade. *Anesthesiology* 102:241-242, 2005 [letter; 4 refs.]

This Month in Anesthesia History*

1578 April 1: William Harvey, the English physician who first described blood circulation, is born.

1760 April 13: Thomas Beddoes is born. In the late 1780s Dr. Beddoes began attempts to implement Joseph Priestley's idea for the therapeutic applications of "factitious airs" or gases. By 1798 Beddoes had established the Pneumatic Institute in Bristol, England, and hired the teenager Humphry Davy as Research Director. Their experiments with nitrous oxide began the following year. Beddoes authored the classic *Observations on the Nature of Demonstrative Evidence* [1793] and numerous other works.

1770 April 7: English poet William Wordsworth is born. In 1799 Wordsworth, when both were living in Bristol, asked Humphry Davy to read and suggest revisions to the manuscript for the second edition of *Lyrical Ballads*, the classic collection of poetry by Wordsworth and Samuel Taylor Coleridge. During this period Davy and Thomas Beddoes were engaged in their studies of nitrous oxide and other gases. Wordsworth later became Poet Laureate and authored *The Prelude* among many other poems.

1805 April 2: Danish author Hans

Christian Andersen is born in Odense. Andersen was a frequent traveler and kept a diary during his trips. In August, 1847, he visited Edinburgh, Scotland, for several days. Several dinners were arranged by the locals for this famous author, and on the night of August 17 Andersen and numerous others dined at the house of prominent physician James Young Simpson. In his autobiography, Andersen wrote that "...in the large circle which was gathered there several experiments were made with breathing in ether. I thought it distasteful, especially to see ladies in this dreamy intoxication...there was something unpleasant about it, and I said so, recognizing at the same time that it was a wonderful and blessed invention to use in painful operations..." Simpson did not discover the anesthetic properties of chloroform until November of that year. [See Secher O. Hans Andersen and James Young Simpson. *Br J Anaesth* 44:1212-1216, 1972] Andersen died in Copenhagen on August 4, 1875.

1807 April 18: British physician and writer Dr. Erasmus Darwin dies. The grandfather of Charles Darwin, Erasmus was a member of the famed Lunar Society of scientists and industrialists who provided financial and other support to Dr. Thomas Beddoes' investigations of the medical uses of gases in the 1790s. Darwin was a prolific author on medical and sci-

entific subjects and developed a theory of evolution decades before Charles.

1829 April 12: Dr. Jules Cloquet amputates a breast from a woman asleep under hypnosis.

1830 April 5: Henry Hill Hickman dies. Six years earlier Hickman had attempted anesthesia in a series of experiments on animals using carbon dioxide gas. Scientists in both France and England [including Humphry Davy!] failed to recognize Hickman's achievement. "Nevertheless, he deserves the credit of having been the first of the modern investigators to prove by experimentation on animals that the pain of surgical operation could be abolished by the inhalation of a gas." [Keys TE. *The History of Surgical Anesthesia*. Krieger, 1978, p.19].

1847 April 7: Physician/dentist Nathan Cooley Keep administers the first obstetric anesthetic in the United States. The patient was Fanny Longfellow, wife of poet Henry Wadsworth Longfellow. Under ether anesthesia, Fanny did not lose consciousness but felt no pain during the birth of her daughter.

1852 April 29: First edition of Peter Mark Roget's famous thesaurus is published in England. After graduation from medical school in Edinburgh, Roget spent 1799 in Bristol working with Thomas

*For the full calendar, go to www.anes.uab.edu

Calendar. . . *Continued from Page 19*

Beddoes and Humphry Davy on their famous nitrous oxide research. Roget later wrote the Encyclopedia Britannica entry on Beddoes and near the end of his life created the thesaurus for which he is so well known. Roget also invented the slide rule and the pocket chessboard and did research on vision physiology later used as the basis for motion pictures.

1853 April 7: Dr. John Snow chloroforms Queen Victoria for the birth of Prince Leopold. This event removed much of the stigma then associated with pain relief in childbirth in Great Britain.

1856 April 12: Dr. Marshall Hall [1790-1857] describes artificial respiration in *The Lancet*.

1869 April 8: The great neurosurgeon Harvey William Cushing is born in Cleveland, Ohio. In 1894 Cushing and his fellow "house pup" at the Massachusetts General Hospital, E.A. Codman, developed the first anesthesia record.

1871 April 16: John Millington Synge, Irish dramatist and poet [Riders to the Sea] is born. In 1916 Synge published a fascinating account of his experiences under ether anesthesia: "I seemed to traverse whole epochs of desolation and bliss. All secrets were open before me...." {*Interstate Medical Journal* 23:45-49, 1916}. Synge's account is part of a large body of literature related to anesthesia and mystical experiences.

1887 April 27: George Thomas Morton, son of William T.G. Morton, performs first appendectomy.

1898 April: Henry Hillard describes induction of nitrous oxide anesthesia with face mask and maintenance of anesthesia with nasopharyngeal insufflation.

1923 April 7: First brain tumor operation under local anesthesia performed by Dr. K. Winfield Ney at Beth Israel Hospital in New York City.

1939 April 30: The New York World's

Fair opens. Included in the opening ceremonies was an address by President Franklin D. Roosevelt via a brand-new medium, television. "The 1939 New York World's Fair [also] presented a unique opportunity for the newly recognized specialty of anesthesiology to be presented to the general public. With funding supplied by the Winthrop Chemical Company of New York City and careful planning, a committee of physician-anesthetists was able to design a display that illustrated all aspects of the physician-anesthetist's role in health care: general "gas" anesthesia, regional techniques, pain management, resuscitation, and oxygen therapy. Further information was offered concerning training of physicians in the specialty, and speculation involving the future mission of anesthesiology was presented. Surprisingly, issues and discussions concerning the fashion in which anesthesia was to be presented at this exhibit remain germane to current presentations of the specialty to the general public. Although no record remains of the public's response to the exhibit, the World's Fair was an international showcase and an important opportunity for public recognition of anesthesiology." [abstract for Bacon DR, Lema MJ, Yearley CK. For all the world to see: anesthesia at the 1939 New York World's Fair. *J Clin Anesth* 5:252-258, 1993]

2005 April 17: Lt. Commander Wheeler B. Lipes dies in New Bern, North Carolina. In September 1942 Pharmacist's Mate Lipes was aboard the submarine Seadragon on patrol in the South China Sea and about a week's journey from the nearest Allied port. A young seaman named Darrell Dean Rector developed appendicitis, and Lipes, who had observed several appendectomies as a laboratory technician in a naval hospital, became the surgeon. Metal spoons were bent at right angles to use as muscle retractors, and sulfa pills were ground up and used as the antiseptic. An ether mask was made from a tea strainer

covered with gauze, and the ship's communications officer, Lt. Franz P. Hoskins, became the anesthetist. The surgery was successful and one of two such operations performed aboard U.S. submarines during World War II. Seaman Rector was later one of 78 crewman lost aboard the submarine Tang when it was struck by a torpedo in October 1944. George Weller of the *Chicago Daily News* won a Pulitzer Prize for his article about the surgery, which was featured in such films as *Destination Tokyo* [1943] and *Run Silent, Run Deep* [1958] and on the 1950s television series, *The Silent Service*. Lipes' obituary appeared in the *New York Times* on April 20, 2005.

MedNuggets. . . *Continued from Page 17*

thetia the public as well as the profession must be taught that safety lies in having the anaesthetic well administered and that such expert service must be properly recompensed, according to the skill required, the responsibility assumed and the financial circumstances of the patient. It is evident that the medical profession itself does not sufficiently appreciate this point.

-Wesley Bourne

American College of Surgeons 14:32,
1930

The image of anesthesia is not only created by anesthesiologists, but the image created by the failure of medicine to permit the reflection of anesthesia in an undistorted mirror.

-John B. Dillion

Journal of the American Medical Association 190:999, 1964

Bulletin of Anesthesia History

Doris K. Cope, M.D., Editor
200 Delafield Road, Suite 2070
Pittsburgh, PA 15215
U.S.A.