



# Developing a Specialty: J.S. Lundy's Three Major Contributions to Anesthesiology

Terry A. Ellis, II, MD,\* Bradley J. Narr, MD,†  
Douglas R. Bacon, MD, MA‡

Department of Anesthesiology, Mayo Clinic, Rochester, MN

*John S. Lundy was able to accomplish three major goals during the early years of his stewardship of the section on anesthesia of the Mayo Clinic. In 1925, Lundy established the first anatomy lab at the Mayo Clinic. He believed that the lab would serve as a useful tool for teaching residents as well as research into regional anesthetic techniques. Second, Lundy desired to advance the science of anesthesiology. Lundy developed the concept of balanced anesthesia, pioneered the introduction of barbiturates to the practice of anesthesia, developed anesthesia section services for the use of ventilators, ventilator vests, oxygen tents, and nasal oxygen supplementation. Lastly, in 1935, he established the nation's first blood bank. Lundy and Ralph Tovell had the opportunity to do pioneering work in transfusion medicine, which led to an improvement in the quality of service, and patient safety. These three major accomplishments provided Lundy with abundant scientific material to present to the American Medical Association (AMA) in Chicago. These trips to Chicago allowed him to gain the ear of Olin West, Morris Fishbien, and James E. Pallin. Lundy was able to successfully lobby in 1939 for the creation of a section of anesthesia within the AMA. In 1940, Lundy's dream came true with the recognition of anesthesia as a specialty by the AMA. © 2004 by Elsevier Inc.*

**Keywords:** Anesthesiology history; biography; J.S. Lundy; MD.

## Introduction

In 1920, when John Silas Lundy began his private practice of anesthesia as a physician in Seattle, Washington, anesthesiology was not yet considered a medical specialty. Yet Lundy had gained valuable experience in anesthesia long before medical school. As was the custom at the turn of the twentieth century, he administered anesthetics for the physicians in his home town during undergraduate studies at the University of North Dakota. He continued providing anesthetic care during medical school in Chicago until he graduated in 1919. Lundy's career was focused on the science and art of anesthesia and he directed his efforts toward the recognition of anesthesia as a medical specialty.<sup>1</sup>

In 1924, Lundy met William Mayo at a medical meeting in Seattle, who offered him a position at the Mayo Clinic. His goal was to make at least one contribution to the specialty for every year he practiced.<sup>2</sup> It was Lundy's desire to belong to an organization of physicians with special interest in anesthesia so that he would have

\*Resident in Anesthesiology

†Assistant Professor of Anesthesiology

‡Professor of Anesthesiology and the History of Medicine

Address correspondence to Dr. Bacon at the Department of Anesthesiology, Mayo Clinic, 200 First Street, S.W., Rochester, MN 55905, USA. E-mail: Bacon.Douglas@mayo.edu

Received for publication March 3, 2003; revised manuscript accepted for publication July 21, 2003.

other professionals with whom to share information about this rapidly evolving specialty. Lundy himself stated it best:

In those early years I felt as if I were garbed in Joseph's coat of many colors. I was anxious to join some organization in which a physician like myself with a primary interest in everything pertaining to anesthesia might take part in a relationship which would be of mutual benefit to society, to physicians and surgeons, and especially to patients. I, therefore, applied to the American College of Surgeons, since every member of that organization had a basic concern with anesthesia. But the College refused to consider me for membership because I was not a surgeon. I then applied to the American College of Physicians, which straightaway gave me the same reception. I thus remained suspended in a medical limbo, and I often maintained that I was the last person the patient ever saw between the attending physician or surgeon and the undertaker. But, since I never became known for indecision or abnegation, I set about to hot up the fire and see what rare distillation I could brew.<sup>2</sup>

Using the unique resources of the Mayo Clinic, Lundy was able to develop three programs; a functioning anatomy laboratory, a method for rapid development and integration of new anesthetic agents and techniques into clinical practice, and the first infusion therapy blood bank in the United States. These initiatives helped define the specialty during his first 10 years as chair of the section on anesthesia, develop his national reputation within the field, and helped him in dealing with the American Medical Association (AMA). With the assistance of the AMA, Lundy was able to realize his ultimate dream, the recognition of anesthesia as a medical specialty.

### The First Objective: Education and The Anatomy Laboratory

In 1924, when Lundy arrived at the Mayo Clinic, regional anesthesia was already established. The arrival of Charles McCuskey in 1925 allowed Lundy to begin expansion of the section beyond day to day clinical anesthesia services. He sought to establish a training program for physicians wishing to specialize in anesthesia. In 1924 Lundy had to agree to take on several surgical fellows each year, teaching them the basics of regional anesthesia.<sup>a</sup> He noticed two things about the surgical fellows: they were not primarily interested in learning regional anesthesia and they were not adept at performing regional anesthetics.<sup>b,c,d</sup> In addition to this, Lundy's real interest lie in finding fellows willing to specialize in anesthesia.<sup>c</sup> He was able to initiate a program to help surgical residents and allow physicians interested in advancing regional anesthetic techniques to both benefit. In 1925, Lundy proposed the first anatomy laboratory at the Mayo Clinic.<sup>d,e</sup>

<sup>a</sup>Lundy J. First Annual Report of the Section on Anesthesia from January 1, 1924, to January 1, 1925. Collected Papers of John Silas Lundy. Rochester, MN: Mayo Foundation Archive.

<sup>b</sup>Lundy J. The Third Annual Report of the Section on Anesthesia for the Year 1929. Collected Papers of John S. Lundy. Rochester, MN: Mayo Foundation Archive.

<sup>c</sup>Lundy J. Report of the Section of Anesthesia for the Year 1930. Fourth Annual Report. Collected Papers of John S. Lundy. Rochester, MN: Mayo Foundation Archive.

<sup>d</sup>Lundy J. Carbon Copy of a Letter from John S. Lundy to William Mayo, June 18, 1925. Collected Papers of John S. Lundy. Rochester, MN: Mayo Foundation Archive.

<sup>e</sup>Mayo W. Letter from William Mayo to John Lundy, Jun 23, 1925.

Lundy believed that the anatomy laboratory would serve as a useful tool for the entire clinic and would augment a basic science not already directed by another clinical department.<sup>a</sup> He thought that the laboratory would provide him with activities to fully occupy the time of the surgical fellows studying regional anesthesia.<sup>d</sup> Lundy also believed that this laboratory would help to attract fellows to the Mayo Clinic to specialize in anesthesia. He realized that those who would choose to specialize in anesthesia would be giving up careers in general practice to do so and would no doubt need a review of anatomy.<sup>d</sup> Additionally, Lundy knew that a thorough review of anatomy would benefit the entire section of anesthesia in the development of new and safer regional anesthesia techniques. With the blessing of the Mayo Clinic and the personal approval of William J. Mayo, in 1925, John Lundy established the first anatomy laboratory at the Mayo Clinic.<sup>e</sup>

Lundy's efforts exceed all expectations. The anatomy laboratory was a success on every level. During the first full year of operation, the staff and fellows spent 2,035 hours in the laboratory.<sup>f</sup> In the second year of operation, the staff spent more than 6,600 hours in the laboratory. In addition to being a popular addition to the Clinic, it was also a cost-effective training tool. Lundy estimated that the average cost of operation of the lab per student hour was \$0.36.<sup>g</sup> Lundy soon remodeled the laboratory to accommodate more people as well as expanding upon the curriculum. Lundy established a series of lectures performed by staff members. He set up a curriculum to cover major anatomic groups and teach dissection. Without anesthesia residents to teach, Lundy established a surgical simulation course in which surgical fellows would perform post-mortum operations on specimens in order to learn new techniques and improve their operating room performance.<sup>g,h</sup>

Lundy and the members of the section on anesthesia were able to use the anatomy laboratory to study gross peripheral nerve anatomy, and perfect regional anesthesia techniques.<sup>f,11</sup> The laboratory provided the anatomic basis for publication of articles that allowed Lundy and his colleagues in the section on anesthesia to teach many regional anesthetic techniques around the United States.<sup>c,i,3</sup> By the 1930s, thirty percent of all surgical cases done at the clinic had regional anesthesia. Although spinal anesthesia was popular, field blocks for abdominal explorations and sacral anesthesia for operations on the rectum were in common use.<sup>11</sup> In less than 5 years, Lundy was able to take the anatomy laboratory from concept to reality. He used the anatomy laboratory as a teaching tool,

Collected Papers of John S. Lundy. Rochester, MN: Mayo Foundation Archive.

<sup>f</sup>Lundy J. Annual Report of Anatomy Service January 1, 1927, to January 1, 1928. Collected Papers of John S. Lundy. Rochester, MN: Mayo Foundation Archive.

<sup>g</sup>Lundy J. Anatomy Service Report. February 14, 1929. Collected Papers of John S. Lundy. Rochester, MN: Mayo Foundation Archive.

<sup>h</sup>Lundy J. Carbon Copy of the Schedule of the Anatomy Service Quarter Beginning January 2, 1928. Collected Papers of John S. Lundy. Rochester, MN: Mayo Foundation Archive.

<sup>i</sup>Lundy J. Fourth Report of the Anatomy Service. Collected Papers of John S. Lundy. Rochester, MN: Mayo Foundation Archive.

a research center, and as a mechanism to advertise the Mayo Clinic Section on Anesthesia to attract fellows wishing to specialize in anesthesia.

### The Second Objective: Scientific Advancement

The second objective Lundy accomplished during the early years of his tenure at the Mayo Clinic was contributing to the advancement of the scientific foundations of anesthesia. Lundy and his colleagues in the section on anesthesia understood that recognition of anesthesia as a medical specialty relied upon expansion the specialties' scientific infrastructure. They understood that physician anesthesiologists needed to not only advance the underlying scientific principles of the field but to promote and share their new discoveries with their colleagues. Lundy placed a heavy emphasis on the value of research, and his efforts were fruitful.<sup>2</sup>

In 1925, Lundy developed the concept of balanced anesthesia.<sup>1,4</sup> He introduced the idea of combining more than one anesthetic technique to improve operating conditions for the surgeon, patient safety, and to reduce the side effects of anesthesia, thus increasing patient satisfaction. By the end of his first year at the Mayo Clinic, Lundy had helped to develop more than 30 different regional and general anesthetic techniques.<sup>j</sup> He was able to expand his anesthetic practice rapidly mainly due to the surgical volume of the Mayo Clinic. In 1925, for example, Lundy and the section on anesthesia performed more than 21,000 anesthetics.<sup>j</sup>

John Lundy is best known for his introduction of intravenous (IV) anesthesia into clinical practice. Working with the pharmaceutical industry, he tested many new drugs and is even credited with the naming of Nembutal, an IV barbiturate that he helped to develop and popularize.<sup>5</sup> One of the most important drugs that Lundy introduced into anesthetic practice was thiopental sodium.<sup>5,6</sup> Lundy worked hard to share his new discoveries with the anesthetic community worldwide. In 1930, he invited Sir Ivan Magill to the Mayo Clinic. During this visit, he taught Dr. Magill the technique of IV anesthesia using Nembutal. In return, Magill taught Lundy his method of tracheal intubation.<sup>5</sup> Lundy and his colleagues at the Mayo Clinic expanded greatly on this technique and published many papers on its use in a variety of different of surgical procedures.<sup>7,8</sup>

Lundy also improved the technical aspects of anesthesia. He worked endlessly to improve anesthesia devices and to develop superior equipment. Lundy modified anesthesia machines to deliver the new drugs being developed at the time.<sup>j</sup> The machines he developed were vast improvements over older models, they contained more sophisticated features, and they were capable of delivering a mixture of multiple different gasses. Lundy and his colleagues in the section on anesthesia also developed needles and syringes used to perform the many different types

<sup>j</sup>Lundy J. The 1925 Annual Report of the Section of Anesthesia. Collected Papers of John S. Lundy. Rochester, MN: Mayo Foundation Archive.

of regional anesthesia.<sup>k</sup> In 1929, in cooperation with the Heidbrink Company, Lundy developed a pulmonary ventilator capable of temporary support of ventilation.<sup>b</sup> His innovations improved patient care from the operating room to the medical floors. In 1929, Dr. Lundy and Dr. Ralph Tovell, who was the first anesthesia resident at the Mayo Clinic, created an anesthetic record and follow-up information that could be converted into punch cards. These cards could be passed through a machine that collected and tallied the data, not unlike the system used at that time by Ralph Waters and his colleagues at the University of Wisconsin. This allowed Lundy and the section on anesthesia to track the occurrence of untoward reactions to anesthetics as well as the incidence of complications from surgical procedures.<sup>c</sup> This vastly improved the anesthetic care being delivered at the Mayo Clinic.

Lundy also cultivated a pain control service at the Mayo Clinic.<sup>l</sup> Intractable pain was a keen interest of Dr. Lundy, and he worked to treat it in any way he could. He adapted work being done with regional anesthesia to treat many painful conditions. He worked in concert with the departments of internal medicine and neurology to develop and perform many diagnostic, therapeutic, and neurolytic peripheral nerve blocks.<sup>l</sup> Lundy would often correspond with patients upon whom he had performed a block to see the results of his care.<sup>m</sup> In addition, the section on anesthesia at the Mayo Clinic was placed in charge of the respiratory support services for the entire Mayo Clinic in 1933. This included the use of nasal oxygen, ventilator vests, and the new lung ventilator.<sup>9,n,o,p</sup> In 1935, Lundy proposed that respiratory support and resuscitation efforts be centralized and taught to all staff members and nurses at the clinic, the Rochester Fire Department, and even the local Boy Scout troops.<sup>l</sup>

### The Third Objective: Intravenous Therapy

Lundy completed third objective in 1935 when he established the first blood bank in the United States.<sup>1</sup> In 1933, Dr. Charles H. Mayo asked Dr. Lundy to shoulder the responsibility of the transfusion of blood to children hospitalized at the Mayo Clinic. The section on anesthesia was so adept at this task that in less than one year, they were given responsibility of all blood transfusions at the Mayo Clinic.<sup>1</sup> Lundy relates the sequence of events best:

<sup>k</sup>[Anon.]. Dr. John S. Lundy 1894-. Collected Papers of John Lundy. Rochester, MN: Mayo Foundation Archive, 1959.

<sup>l</sup>Lundy J. Report of the Section on Anesthesia for the Year 1935. Collected Papers of John S. Lundy. Rochester, MN: Mayo Foundation Archive.

<sup>m</sup>Numerous letters between John Lundy and his patients 1927-1945. Collected Papers of John S. Lundy. Rochester, MN: Mayo Foundation Archive.

<sup>n</sup>Lundy J. Annual Report of the Section on Anesthesia for the year 1933. Collected Papers of John S. Lundy. Rochester, MN: Mayo Foundation Archive, 1934.

<sup>o</sup>Lundy J. Report of the Section on Anesthesia for the Year 1934. Collected Papers of John S. Lundy. Rochester, MN: Mayo Foundation Archive, 1935.

<sup>p</sup>Lundy J. Report of the Section on Anesthesia for the Year 1935. Collected Papers of John S. Lundy. Rochester, MN: Mayo Foundation Archive., 1936.

In 1933, Dr. Charles H. Mayo decided that I should begin the transfusion of blood to children, and by the end of the year, I was asked to do the same for adult persons. In 1935, I began to refrigerate blood in the cooler of Dr. W. C. MacCarty's laboratory in Saint Marys Hospital; this action preceded by one year the installation of the blood bank in the Cook County Hospital in Chicago.<sup>5</sup>

Lundy and Tovell established a blood transfusion service at the Mayo Clinic and began initial studies in the developing science of transfusion medicine. The section of anesthesia did pioneering work in transfusion therapy, improving its safety and efficiency while reducing the complications of blood transfusions at the Mayo Clinic. In 1934, a total of 1021 transfusions were performed, and there were 148 untoward reactions to those transfusions.<sup>m</sup> In 1936, a total of 2,057 transfusions were performed, and only 141 reactions were reported.<sup>9</sup>

### Politics

The achievement of these three goals by Dr. Lundy represented not only groundbreaking medical advancements, they were accomplishments that brought significant attention and credit to Lundy himself. A vast quantity of scientific material covering multiple medical specialties allowed him to present at the AMA annual meetings in several different forums. These frequent presentations earned him the respect and trust of influential AMA members. Over time, Lundy used his reputation, and the influence of the Mayo brothers to become active and effective within the AMA. This involvement allowed him to gain the ear of Dr. Olin West, the secretary and general manager of the AMA. Whenever Lundy could manage a trip to Chicago, he would call on Dr. West and lobby him for assistance in the effort of gaining recognition of anesthesia as a medical specialty.<sup>5</sup>

In 1939, the deaths of F. H. McMechan, the leader of organized anesthesia from 1915 until his demise, and Dr. William J. Mayo, while unfortunate, provided Lundy the opportunity to achieve his lifelong dream. It was already apparent to the medical community at large that anesthesia was more than a necessary evil, and that there was a large and expanding fund of knowledge within the field. At the time, however, there was reluctance to admit anesthesia as a medical specialty within the AMA because of conflicts between the AMA and McMechan.<sup>10</sup> This political obstacle was eliminated when Dr. McMechan passed away.

The worldwide medical community mourned the death of Dr. William Mayo. His funeral in Rochester brought many leaders of the medical community to Minnesota. Dr. Lundy used this opportunity to present his case once again to Dr. Olin West, Dr. Morris Fishbein, and Dr. James E. Palin from the AMA.<sup>10</sup> This time he was successful; convincing the AMA to recognize anesthesia as a medical specialty. In 1940, the House of Delegates of the AMA approved a section on anesthesia for the 1941 meeting.<sup>10</sup> The only stipulation was that Lundy was to remain secretary of this new section until it was in a strong and

<sup>9</sup>Lundy J. Annual Report for 1936 of the Section on Anesthesia Including Information on Blood Transfusion, Intravenous Therapy, and the Anatomy Laboratory. Collected Papers of John S. Lundy. Rochester, MN: Mayo Foundation Archive., 1937.

autonomous condition.<sup>5</sup> Lundy held this position for 17 years. Thus, Lundy was able to realize and create his dream of a professional organization encompassing the science, practice and future of anesthesia.

### Epilog

The formation of the Section on Anesthetics within the AMA was perhaps the zenith of Lundy's career. During World War Two, Lundy served as a member of the Subcommittee on Anesthesia of the National Research Council. This subcommittee ran the 90-day courses that trained physicians to administer anesthesia in the armed forces and had teaching sites across the country, including the Mayo Clinic, University of Wisconsin at Madison, Bellevue Hospital in New York, and Massachusetts General Hospital. As editor of *Anlet*, a newsletter composed of letters from the graduates of these courses back to their instructors, Lundy helped insure that the course was modified to fit the needs of the military physician anesthesiologist.<sup>12</sup> Lundy was a member of the American Board of Anesthesiology for more than 20 years, and President of the American Society of Anesthesiologists in 1946. He continued as head of the section of anesthesia at the Mayo Clinic until 1952 and retired in 1959. Lundy continued to work as an anesthesiologist first at the Chicago Veteran's Administration Hospital and then back in private practice in Seattle. He died in 1973.<sup>13</sup>

### References

1. Eckman J: John Silas Lundy. In: Volpitto P, Vandam L (eds): *The Genesis of Contemporary American Anesthesiology*. Springfield, IL: Thomas Books, 1982:34–48.
2. Lundy JS: Memories of 30 years of group experience in anesthesia. *Minn Med* 1968;51:867–73.
3. Brown DL, Winnie AP: Biography of Louis Gaston Labat, M.D. *Reg Anesth* 1992;17:249–62.
4. Lundy J: Balanced anesthesia. *Minn Med* 1926;9:399–404.
5. Lundy J: From this point in time: some memories of my part in the history of anesthesia. *J Am Assoc Nurse Anesth* 1931;34:95–102.
6. Lundy J: Intravenous anesthesia: preliminary report of the use of two new thiobarbiturates. *Proceedings of the Staff Meetings of the Mayo Clinic* 1935;10:536–43.
7. Lundy J, McCuskey C, Tovell R: A review of the anesthetic agents and methods used in the Mayo Clinic in 1930 (Annual report). *Proceedings of the Staff Meetings of the Mayo Clinic* 1931;6:25–32.
8. Tovell R: Intratracheal anesthesia. *Curr Res Anesth Analg* 1931;10:97–103.
9. Lundy J: Annual report of the Section on Anesthesia for the year 1932. Anesthesia and blood transfusion. *Proceedings of the Staff Meetings of the Mayo Clinic* 1933;8:646–52.
10. Bacon D: John S. Lundy, Ralph Waters, Paul Wood: the founding of the American Board of Anesthesiology. *Bull Anesth Hist* 1995;13:1, 4, 5, 15.
11. Kopp SL, Horlocker TT, Bacon DR: The contribution of John Lundy in the development of peripheral and neuraxial nerve blocks at the Mayo Clinic: 1925–1940. *Reg Anesth Pain Med* 2002;27:322–6.
12. Waisel DB: The Role of World War II and the European theater of operations in the development of anesthesiology as a physician specialty in the USA. *Anesthesiology* 2001;94:907–14.
13. Nelson CW: Dr John S. Lundy and the 75th anniversary of anesthesiology at Mayo. *Mayo Clin Proc* 1999;74:650.