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John Snow's Practice of Obstetric Anesthesia

Donald Caton, M.D.*

IN 1847, obstetrician James Young Simpson won lasting fame for suggesting that physicians regularly use anesthesia to abolish the pain of childbirth. To Simpson's surprise, his suggestion evoked more criticism than praise.¹⁻³ Virtually every leading obstetrician in Western Europe and the United States argued that anesthesia was dangerous and unnecessary for normal deliveries. Many women also objected, either from fear or because they thought anesthesia was unseemly.

Within 10 yr, however, medical opposition to obstetric anesthesia faded. Historians attribute this to the influence of patients who coerced physicians when they learned that prominent women, such as Fanny Longfellow and Queen Victoria, had demanded anesthesia for delivery of their newborn infants.^{4,5} Although appealing, this explanation seems simplistic. Medical opposition to obstetric applications of anesthesia had been too acrimonious and widespread to dissipate so quickly simply from social pressure. Moreover, it overlooks the issue of safety, the primary concern of physicians who opposed Simpson's innovation. Evidence suggests that opposition to obstetric anesthesia disappeared only when physicians began to believe that it was safe and that the person who did most to change their minds was not James Simpson, as

many suppose, but John Snow, the London physician who anesthetized the Queen.

Simpson's Failure

By rights, James Young Simpson's opinion should have carried more weight. The year in which he introduced obstetric anesthesia he also discovered the anesthetic properties of chloroform, an accomplishment for which he earned a commemorative plaque in Westminster Abbey. Only 36 yr old, he was one of Europe's best-known physicians, already having served 7 yr as Professor of Midwifery at the University of Edinburgh, the oldest and most prestigious chair of its kind in the Western world. Hard working, charismatic, and an excellent publicist, Simpson was a leader in a movement that sought more active management of childbirth. Its goals included care by physicians rather than by midwives and more frequent use of ergots to stimulate labor and of forceps to facilitate delivery. Anesthesia was a natural adjunct to such practices. In theory, the mitigation of pain was also a popular social message. Sustained by faith in progress and imbued with ideals of humanitarianism, mid century Victorians believed it their duty to abolish suffering wherever they found it.⁶

Why did such a popular message fail? First, many conservative physicians disagreed with Simpson's aggressive style of practice. They argued that childbirth was a "natural," not a pathologic, process and that anesthesia represented just one more form of "meddling." Second, many distrusted Simpson. One London physician criticized him personally for indiscriminately taking up every new idea or technical innovation.⁷ Another decried Simpson's blatant use of publicity:

I did not expect that Dr. Simpson would have appealed so directly, and through so many channels, to the feelings and imperfect knowledge of society in general, for it is, I am happy to say, still very uncommon, in our profession, to find those of its members who would give tone to its bearing and conduct, professors, for instance, of our ancient universities, going about from one city to another to announce and

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* Professor of Anesthesiology and Obstetrics and Gynecology.

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Address for reprint requests to Dr. Caton: c/o Editorial Office, Department of Anesthesiology, PO Box 100254, Gainesville, Florida 32610-0254. Address electronic mail to: caton@anest2.anest.ufl.edu

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exhibit the wonder effects of a new gas, and, as I am informed, somewhat after the fashion of a showman, to demonstrate them personally, at dinner parties, and in drawing rooms.⁸

Simpson dismissed such criticism, attributing it to professional jealousy and chauvinism. In 1850, at the height of the controversy, he wrote, "London physicians have, on several occasions, specially distinguished themselves by their determined and prejudiced opposition to all innovation in practice not originating among themselves."⁹

There was, however, more to the criticism than jealousy and chauvinism. Simpson failed to allay concern about the safety of anesthesia. Advocacy of obstetric anesthesia may have won Simpson praise for his compassion, but when he claimed that chloroform made childbirth safer, skeptical colleagues asked for proof. As medical historian Richard Shryock observed, humanitarian sentiments may have motivated nineteenth century physicians, but science shaped their practice.¹⁰

Simpson's arguments for obstetric anesthesia contained very little science. His initial paper described only six patients. His method for administering anesthesia was crude, unmodified from the technique first used for surgery. He simply poured ether, or chloroform, onto a cloth draped over the patient's face. He initiated the anesthetic during the first stage of labor and kept his patients unresponsive until after delivery of the placenta. He paid little attention to dosage and discounted the possibility of any harmful effect on uterine contractions or the newborn. Thus, he neither acknowledged nor resolved any of the medical issues that concerned his colleagues. Furthermore, he did not persist with this work. After an initial flurry of papers and letters, Simpson turned from obstetric anesthesia to other issues, a criticism often raised by his detractors.

John Snow's Success

John Snow began his work in anesthesia with few of Simpson's advantages. He was a practitioner, not the incumbent of a prestigious chair at a famous university. He was, however, known and respected in London, a remarkable feat considering the inauspicious start of his career. Born in Yorkshire in 1813, the son of a common laborer, Snow began medicine apprenticed to a local physician. After completion of this training, he moved to London, where he practiced and studied, eventually earning a degree from the Hunterian School of Medicine

on Great Windmill Street. Still not satisfied, he earned a doctorate from the University of London and then became a licentiate of the Royal College of Physicians, the highest level of professional attainment available for a physician who had not studied at Oxford or Cambridge.¹¹⁻¹³

Snow's reputation grew in part from his involvement with the Westminster Medical Society, an organization formed for clinical presentations and scientific demonstrations. Snow served as an officer and frequently spoke at meetings. Early issues of *The Lancet* often quote comments that he made at various meetings. Snow also published original articles. In 1841, for example, he wrote, *On Asphyxiation, and on the Resuscitation of Still-Born Children*, in which he described a method for ventilation of the newborn and discussed recent discoveries concerning the physiology of neonatal respiration, oxygen consumption, hypoxia, and effects on changes of body temperature.¹⁴ The article illustrates Snow's understanding of scientific principles and his talent for applying them to clinical problems.

Anesthesia quickly became the focus of all Snow's work. He was systematic and thorough. Within a year of the introduction of ether anesthesia to Great Britain, he published a short treatise entitled, *On the Inhalation of the Vapor of Ether*.¹⁵ Simultaneously, he began a series of papers in which he reported his clinical experience with anesthesia, commented about the pathophysiology of adverse reactions, speculated about mechanisms of action, and described original experiments in which he measured physical, chemical, and pharmacologic characteristics of various agents.¹⁶ His second book, *On Chloroform and Other Anesthetics: and Their Action and Administration*, appeared in 1857, the year after his death.¹⁷ In addition, Snow kept notes about the more than 4,000 anesthetics that he administered during his career. They fill four books. The first disappeared, but the rest survive and may be read in a transcription prepared by the late Richard Ellis.¹⁸ Clearly, both as a scientist and a clinician, Snow spoke with authority, a fact that must have been as apparent to his contemporaries as it is to us today.

John Snow's Practice of Obstetric Anesthesia

The absence of the first casebook precludes us from knowing anything of Snow's early practice of obstetric anesthesia. The first entry in the surviving casebooks bears the date July 17, 1848, but the first description of

an obstetric anesthetic is October 16, 1848, almost a year and a half after Simpson's landmark article. By that time, several other authors had already written articles about obstetric anesthesia for prestigious journals.¹⁹⁻²² Because of Snow's interest in anesthesia, his familiarity with medical events, his curiosity, and his propensity to experiment, it seems unlikely that he waited that long to anesthetize his first obstetric patient, but this is speculation.

The surviving casebooks make clear, however, that Snow's experience with obstetric patients was extensive and varied. He used several agents (many of which have long since disappeared), chlorated muriatic ether (one patient), and the "Dutch Liquid," a "hydrochlorate of chloride of acetyl" (three patients).²³ He liked the Dutch Liquid, but found it tedious to prepare and difficult to administer and stopped using it after 1849 because he thought that it offered no advantage to chloroform. For six obstetric patients, he used amylene, an agent that he originally helped to promote but then abandoned after two surgical patients died. Snow mentions using laudanum once for postpartum pain and twice for labor. Considering the propensity of Victorian physicians to use opioids for other types of pain, this seems unusual. In this regard, however, Snow conformed to contemporary practice. Experts warned that opioids would depress uterine contractions and endanger the newborn child, the same arguments that were later invoked against the use of inhalation agents.²⁴ Interestingly, Snow never mentioned using diethyl ether for obstetrics, although he did use it for surgery until it was displaced by chloroform. Despite its dangers, chloroform was a much easier drug to administer.

Snow anesthetized 77 obstetric patients with chloroform. His technique differed significantly from Simpson's. He delayed initiating the anesthetic until patients approached the second stage of labor and he limited the dose, recognizing that he could achieve satisfactory analgesia without rendering patients completely unconscious.²⁵ At delivery, he described his patients as being in the "second degree" of anesthesia, "feeling only the first half of the contraction," on the "border of unconsciousness," or "partially conscious." Many pushed on command. Snow wrote that light levels of anesthesia had little effect on labor and said that he had even observed instances in which labor appeared to accelerate after he began anesthetic induction. He recognized, however, that deep levels of anesthesia would soften the *os uterii* or relax the fundus. Snow believed it possible for the obstetrician to administer the anesthetic, but suggested

that it would be safer if that responsibility were delegated to some other person.²⁶

Precision was a hallmark of Snow's work. He designed experiments to learn the clinical signs associated with different concentrations of anesthetics. To achieve better control over inspired concentrations, he built a brass vaporizer that he immersed in water to stabilize the temperature and, thereby, the vapor pressure of the liquid anesthetic. Predictably, Snow disparaged Simpson's open-drop technique and suggested that it was dangerous.

Whenever I have had occasion to give chloroform in this way, I have felt it to be a very complicated process, on account of the difficulty of getting even an approximative knowledge of what I was doing, by the best calculation I could make.¹⁶

In fact, Snow even suggested that Simpson's reputation had unduly influenced others to adopt inferior techniques, to the detriment of practice.²⁷ Curiously, despite his predilection for using a vaporizer, Snow reverted to open-drop chloroform both times that he anesthetized the Queen.

Most of Snow's obstetric patients underwent normal delivery of newborns, half delivering of their first child. Associated medical problems included advanced pulmonary tuberculosis in one patient and osteosarcoma of the shoulder in another. The patient died within a few days of delivery of the newborn. Obstetric problems included abnormal presentations (elbow, shoulder, and a footling breech), retained placenta, and postpartum hemorrhage. On several occasions, Snow used chloroform to relax the uterus for an internal cephalic version or to facilitate manual extraction of the placenta. He also used chloroform to treat hyperemesis gravidarum. Snow described administering anesthesia for nine forceps deliveries, a low incidence in view of frequent descriptions of prolonged labor and cephalopelvic disproportion in nineteenth century medical literature.²⁸ He resuscitated several infants, one by "dashing cold water" and another by blowing "a little air into its lungs." Snow never mentioned administering an anesthetic for a cesarean section, but this too was in accord with existing standards of care. Because of the exceptionally high mortality rates, physicians reserved this operation for women already near death. One obstetrician quipped that woman had a better chance of surviving a cesarean section if she performed the surgery herself, or if her abdomen were ripped open by the horn of a bull.²⁹

Occasionally, Snow delivered newborns himself, but usually he anesthetized a parturient at the request of her

primary physician. He named 32 obstetricians with whom he worked; several deserve special mention. William Tyler-Smith and Francis Ramsbotham, for example, were prominent in London medical circles. Each had written a popular obstetric textbook. Initially, both opposed obstetric anesthesia, but later changed their minds. In fact, it was Ramsbotham who asked Snow to assist with the woman who later died of osteosarcoma. Of his conversation, Ramsbotham wrote:

Experience has fortunately proved, that the gloomy anticipation which I have formed respecting the danger universally attending the administration of anesthetics, have turned out to be in some degree, fallacious; or at least it is not so great as I feared it would be; for the casualties that have resulted from their use during that period have been astonishingly few.^{30,31}

Other significant contacts were Dr. James Ferguson, Sir James Clark, and Charles Locock, the three physicians who attended Queen Victoria each time Snow anesthetized her. These professional associations were decisive in the conversion of British physicians to the use of obstetric anesthesia.

John Snow's Influence on the Practice of Obstetric Anesthesia in Great Britain

That Snow worked with Ferguson, Clark, and Locock attests to his stature in London medical circles. The fact that they asked him to anesthetize the Queen is even more remarkable. Initially, none of the Queen's physicians favored anesthesia: Locock declined to use anesthesia when he cared for Sir Robert Peel after his fatal injury; Clark and Ferguson also had reservations.³² In a casebook entry dated May 1, 1850, Snow wrote how he had been called by a patient to administer anesthesia for a tooth extraction *against* the advice of her physician, who, as it happened, was Dr. Ferguson. In 1848, Ferguson, Locock, and Clark consulted Simpson, and, in 1849, they conferred with Snow, possibly at the instigation of Prince Albert who expressed an interest in obtaining anesthesia for his wife. Despite this, the Queen was administered no anesthetic for her seventh delivery of a newborn infant in 1850. Whatever the reservations then, they seem to have disappeared when the physicians called Snow to assist with the Queen's eighth delivery on April 7, 1853. The Queen, of course, was delighted with "the blessed chloroform."

What happened between 1850 and 1853? Did the Queen command and did her physicians capitulate, as so

many accounts imply, or had her physicians already changed their minds? We have no way of knowing, but circumstances point to the influence of John Snow. During the interval between the deliveries of Queen Victoria's seventh and eighth newborn infants, each of these physicians had considerable contact with Snow, when he assisted in the management of various medical or surgical problems such as seizures, fistula *in ano*, dental extractions, and laryngeal stridor, for example. He also assisted them with special obstetric problems. Working with Snow must have given them an opportunity to evaluate his character and his skill. Presumably they learned more of him from colleagues, such as Ramsbotham and Tyler-Smith, who, by that time, had worked with Snow and were well-along in their conversion to the use of anesthesia. Most important, by April 1853, Snow had amassed considerable experience anesthetizing obstetric patients, to the point that he was within weeks of publishing a definitive paper, which addressed all of the medical issues that originally had concerned conservative physicians.²⁷ Presumably, Snow spoke of these things as he worked with the Queen's physicians on other cases. In other words, between 1850 and 1853 there appears to have been ample opportunity for the Queen's physicians to learn about obstetric anesthesia from someone who had mastered the technique. If so, the turning point for obstetric anesthesia came with the conversion of Snow's colleagues, not with the public announcement of the Queen's anesthetic, as many have supposed.

In a recent article, Connor and Connor³² also cast doubt on the idea that social pressure caused the change in attitude of physicians toward obstetric anesthesia. They note that few contemporary newspapers mentioned the Queen's anesthetic, and they suggest the improbability that a popular movement could have arisen from an event that was virtually unknown to the public.³²

Connor and Connor³² also suggest, however, that the Queen's anesthetic had little influence on Snow's practice of obstetric anesthesia. They note that Snow administered only 28 obstetric anesthetics before he anesthetized the Queen, but gave 66 afterward. They point out, however, that the total number of anesthetics also increased, so that the proportion of his practice devoted to obstetrics remained virtually constant: 1.8 *versus* 2.3% ($P > 0.05$). Taken by itself, this information would suggest that Queen Victoria's anesthetic failed to impress, not just the public, but also the physicians. My analysis of Snow's casebooks leads me to a different conclusion.

The 28 obstetric anesthetic inductions are not evenly distributed throughout the period before April 1853. More were given earlier rather than later, which suggests some diminution in public or medical interest in the technique. In fact, during the 52 weeks immediately before Queen Victoria's first anesthetic, only 2 of Snow's 462 patients were obstetric patients. In contrast, during the 52 weeks immediately after Queen Victoria's delivery, 16 of 487 anesthetic inductions were for obstetric patients. The difference is statistically significant ($P < 0.01$, chi-square test). In addition, there appears to have been some change in the social standing of the obstetric patients whom Snow was asked to anesthetize. Before Queen Victoria, Snow mentions only two obstetric patients who might have had some social standing: one the wife of a physician and the other with the title of "Lady." Afterward, he administered obstetric anesthesia to four titled women: three women who were relatives of an archbishop, the daughter of a justice, the wife of a physician, and, of course, Queen Victoria for her ninth, and last, delivery of a newborn infant. The general population may not have known of their Queen's anesthetic, but the social elite in London certainly did. It had been announced in the *Court Circular* by the Queen's accoucheurs.

Physicians also knew of Queen Victoria's anesthetic from an extended comment published in the *Association Medical Journal*. When Thomas Wakely, the irascible, founding editor of *The Lancet*, challenged the accuracy of the information and castigated the Queen's physicians for even considering anesthesia, publishers of the *Association Medical Journal* reaffirmed their reliability of sources.^{33,34}

Summary

The influence of Queen Victoria on the acceptance of obstetric anesthesia has been overstated, and the role of John Snow has been somewhat overlooked. It was his meticulous, careful approach and his clinical skills that influenced many of his colleagues, Tyler-Smith and Ramsbotham and the Queen's own physicians. The fact that the Queen received anesthesia was a manifestation that the conversion of Snow's colleagues had already taken place. This is not to say that this precipitated a revolution in practice. Medical theory may have changed, but practice did not, and the actual number of women anesthetized for childbirth remained quite low. This, however, was a reflection of economic and logistical prob-

lems, too few women were delivered of newborn infants during the care of physicians or in hospitals.³⁵ Conversely, it is important to recognize that John Snow succeeded in lifting theoretical restrictions on the use of anesthesia.

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