

## DENTISTRY AND ANAESTHESIA

Dentistry and dentists played an important role in the evolution of anaesthesia. Of all surgical procedures in the early 19th century, tooth extraction was by far the most common, and a regular reminder that surgery and pain were inseparable partners.

Although reports of pain relief in surgery appear in early European, Arabic, Chinese and Japanese literature, the herbal concoctions that were used remain obscure to us today, and were likely only partially effective. Operative surgery was a rare event. By the 1840s, three ingredients for successful mitigation of surgical pain had been available for some time: ether had been known since the 16th century; nitrous oxide had been described by Joseph Priestley in 1773; and chloroform was prepared independently by three different scientists in the 1830s. All had been observed to cause unconsciousness, but no-one saw the possibilities.

The first recorded clinical use of ether anaesthesia took place in Rochester, New York, when medical student William Clarke administered ether to 'Miss Hobbie', the sister of a fellow student, while the dentist Elijah Pope extracted her painful tooth. The anaesthetic's effects were dismissed by Clarke's preceptor, Professor Moore, as likely to be merely a hysterical reaction in a young lady, and Clarke did not repeat the event.

In 1844 another dentist, Horace Wells of Hartford in Connecticut, decided to experiment with nitrous oxide, or 'laughing gas', after observing its use by Gardner Colton, a travelling medical student-showman, for amusing the townsfolk. Having noticed a volunteer fail to respond to a painful gash while under the influence of the gas, Wells had his own tooth painlessly removed by a colleague after inhaling some. He continued to use nitrous oxide successfully in his practice and soon sought an opportunity to demonstrate its efficacy to the surgeons of Boston. His demonstration failed, as the medical student who submitted himself for the experiment cried out during the extraction, despite later acknowledging that he had felt no pain.

Two years passed before another dentist, Wells' former pupil William Morton, took the advice of a Boston chemist and experimented with ether on his students. On 30 September 1846, Eben Frost appeared at Morton's door with excruciating toothache, pleading: 'Can't you mesmerise me?' Morton replied, 'I have something better', and



Cat. 245 Woolwich-Elliott Chemical Company Ltd (Sydney, active 1929–65), distributed by Felton, Grimwade & Co. Pty Ltd (Melbourne, active 1867–1930), *Ethyl chloride (pure) for local anaesthesia*, c. 1929, paper, glass, cardboard, metal; box 7.0 × 20.5 × 4.3 cm; bottle 17.0 × 4.3 cm (diam.). MHM03722, Medical History Museum, University of Melbourne.

proceeded to apply ether on a handkerchief, before removing the tooth, while Frost ‘made neither sign nor sound but remained immobile’. The success led to another request to the surgeons at Boston’s Massachusetts General Hospital for an opportunity to demonstrate painless surgery. Gilbert Abbott submitted to the removal of a tumour under the jaw by chief surgeon John Warren, with Morton administering the ether. The success of that demonstration, on 16 October 1846, led to news of anaesthesia spreading around the globe.

The news and subsequent adoption of anaesthesia spread most prolifically after a letter from Jacob Bigelow to his surgical colleague and friend Francis Boott in London arrived on 16 December: ‘I send you an account of a new anodyne process lately introduced here, which promises to be one of the important discoveries of the present age. It has rendered many patients insensible to pain’. Boott wasted no time and, together with London dentist James Robinson, performed a tooth extraction under ether on 19 December. Two days later, the renowned surgeon Robert Liston performed a painless amputation using ether.

When news of ether anaesthesia arrived in Australia, it came from England, firstly in a short article in *Bell’s Messenger*, and then in more detail in the 9 January 1847 issue of *The Illustrated London News*. The journey of some 100 days meant that the latter report arrived in late May. The first use of ether in Australia took place on 7 June 1847, in both Sydney and Launceston. In Sydney dentist John Belisario and in Launceston surgeon James Pugh—both copying the apparatus shown in *The Illustrated London News*—successfully administered ether anaesthesia.

Early scepticism, especially from the medical profession, soon gave way to enthusiastic endorsement. Chloroform followed a year later, introduced by James Simpson in Edinburgh, and largely displaced ether, being easier to administer, requiring smaller quantities, and being much more agreeable to the patient than the pungent ether. It was also non-flammable—important when administering anaesthesia by lamp-light!

Following its reintroduction by Gardner Colton in 1863, dentists found nitrous oxide more suitable than chloroform for their work in the dental chair. It was usually given as an asphyxiating 100 per cent gas until unconsciousness took hold, the dentist then having to work quickly before the patient (usually) recovered, amid coughing and spluttering. An advertisement in *The Sydney Morning Herald* of 3 October 1870 reports that ‘Mr E. Reading, Dentist, 128 Phillip Street, administers the nitrous oxide gas on Tuesday, Wednesday, Thursday and Friday. Patients wishing the gas applied must make appointments the day before’.

Initially, dentists manufactured their own nitrous oxide and stored it in gasometers, from whence it was decanted into large bags as required. Compressed liquid gas in metal cylinders became available in 1870, making administration more convenient. Until 1898, when local Australian manufacture of compressed gas began, cylinders were imported as deck cargo.

In 1868 American surgeon Edmund Andrews suggested the addition of oxygen to nitrous oxide as a safety measure. The idea was slow to catch on, but it was dental equipment manufacturers who produced the forerunner of today’s ‘anaesthetic machines’ in the mid-1880s. They devised apparatus to mix the two gases from cylinders into a delivery system and thence to a face-mask. Nevertheless, the use of pure nitrous oxide continued until at least the 1930s in many countries, including Australia.

In 1895 a Swedish dentist, HJ Carlson, noted that some of his patients became unconscious when he used ethyl chloride spray as a topical anaesthetic for tooth extraction. Ethyl chloride inhalation gradually became popular for dental procedures, especially in children, and the substance could be perfumed with herbal agents such as boronia or eau de Cologne. Cocaine, introduced as a local anaesthetic in 1884 by Koller, was used for dentistry, but had a propensity to induce cardiac arrest in the patient and addiction in the dentist. The synthesis of procaine (novocaine) in 1904 provided a much safer injectable alternative, and the introduction of lignocaine in 1948 provided dentistry with a very safe local anaesthetic, still in use today.

Nevertheless, many patients preferred to be ‘put under’, and the use of inhaled nitrous oxide, and later intravenous sedation, for office-based dentistry continued for many years. Often the dentists themselves administered the anaesthesia, with minimal regard to safety and resuscitation. From the 1950s, responsibility for anaesthesia was increasingly entrusted to medical practitioners, and ultimately to specialist anaesthetists. In Great Britain, this transfer of responsibility took far longer, until the 1990s, with many unnecessary deaths being recorded. It was the introduction of dedicated anaesthesia services to office-based dental surgery that led to the development of the day-surgery facilities that are a feature of modern health care.

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