

Providing Anesthesia in the Oral and Maxillofacial Surgery Office: A Look Back, Where We Are Now and a Look Ahead

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The role of dentistry and oral and maxillofacial surgery in providing anesthesia in the office has a long history, emanating from the time of Horace Wells' practice in Hartford, Connecticut to contemporary techniques using multiple medications. Anesthesia for dental procedures typically involved prevention of pain during surgery, with tooth extraction being the prototypical procedure. Extractions were often performed for patients in acute pain, with infection in the region creating situations in which local anesthesia alone was inadequate. Even in Wells' time there was controversy because his presentation of the effects of nitrous oxide for dental extractions was not appreciated, with his work dismissed as "humbug." This review of ambulatory anesthesia in oral and maxillofacial surgery will review the past, discuss where we are now, and attempt to look ahead a bit, as part of this anniversary series of the *Journal of Oral and Maxillofacial Surgery (JOMS)*.

Anesthesia is appreciated as a continuum from the awake state to obtunding a patient. Once intoxicating substances were identified, whether occurring in nature (eg, cocaine) or synthesized in a laboratory, the effects on humans have been observed and scientifically studied. A range of responses was noted and classifications were made. Currently, the American Society of Anesthesiology recognizes 4 stages of anesthesia (Table 1), and these are clinically correlated with various physiologic and mental status changes. How practitioners use the available medications to manage their patients, improve patient satisfaction with the planned surgery, and combine with other medications has progressed along an evolutionary pattern. The

inadequacies of drugs, such as undesirable side effects, that are synthesized out or replaced with better agents, patient monitoring and recovery, and management of postsurgical discomfort also are addressed.

Anesthetic Medications

INHALATIONAL ANESTHETICS

The recognition of nitrous oxide as an anesthetic agent was not immediately embraced because of prejudices at the time. Many believed pain was an important component to the positive outcome of a surgical procedure, so obtunding that response was not a priority of the surgeon. However, as surgical knowledge improved and with the expansion of surgery, patient cooperation and, to some extent, patient comfort became important. Having a cooperative patient was eventually recognized as improving outcomes, because the surgeon could provide more controlled care.

Although the intoxicating effects of various inhalational agents were known as early as 1760, for a long period no one made the connection that these agents could be used to obtund pain during surgery. Nitrous oxide was produced by Joseph Priestly in 1772. In 1798, Humphrey Davy wrote about the effects of nitrous oxide and gave it the name "laughing gas" that still in current use. Interesting, he reported on his own dental pain and how, after 3 "doses" of nitrous oxide, the pain diminished. He speculated that nitrous oxide would be "capable of destroying physical pain, it may probably be used with advantage during surgical operations." However, no one in the medical or dental

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Table 1. CONTINUUM OF LEVELS OF SEDATION AND ANESTHESIA

| | Minimal Sedation Anxiolysis | Moderate Sedation (Conscious Sedation) | Deep Sedation | General Anesthesia |
|-------------------------------|---|---|---|---|
| Responsiveness | Normal response to voice | Purposeful response | Purposeful after repeated stimulation | Unarousable |
| Airway | Unaffected | No intervention needed | Intervention might be required | Intervention is required |
| Spontaneous ventilation | Unaffected | Adequate | Might be inadequate | Frequently inadequate |
| Cardiovascular function | Unaffected | Usually maintained | Usually maintained | Might be impaired |
| Examples in dental anesthesia | Oral benzodiazepine (low dose) ± nitrous oxide | Low-dose intravenous benzodiazepine | Intravenous benzodiazepine + opioid + low dose intravenous agent (eg, propofol) | Higher-dose intravenous agents, multiple-drug technique, potent inhalational agents (eg, sevoflurane) |

Note: Adapted from the American Society of Anesthesiologists. ASA standards, guidelines and statements, October 2007 (<http://www2.asahq.org/publications/p-106-asa-standards-guidelines-and-statements.aspx>).

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professions recognized the importance of his comments. Another missed opportunity to develop anesthesia occurred when Henry Hickman published his work in 1824 on the use of carbon dioxide (CO₂) during surgical procedures on animals. His article describing placing the animals into a state of "suspended animation" also went unappreciated for its importance.

In the 1840s it was not uncommon to have nitrous oxide demonstrations in public settings as a form of entertainment. One such demonstration was held in Hartford on December 10, 1844. Professor Gardner Colton was presenting such a program during which individuals would pay to come up on stage to inhale nitrous oxide while audience members would pay a bit less to enjoy their antics. Wells (Fig 1) was at this event; when one of the active participants fell off the stage and injured his leg, Wells noticed he did not cry out in pain. Wells had Colton come to his dental office the next day, where Colton administered nitrous oxide to Wells, while his partner, dentist John Riggs, extracted a tooth. Wells reported no recollection of the procedure or feeling any pain. Colton taught Wells how to produce nitrous oxide and Wells proceeded to use it in his dental practice.



FIGURE 1. Portrait of Horace Wells, a dentist who practiced in Hartford, Connecticut and is credited with the clinical application of anesthesia. Courtesy of the Horace Wells Club, Hartford, CT. Q20

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