

Morbidity, and Mortality Associated With IV Sedation in Dental Offices

“Those who fail to learn from history are doomed to repeat it”

-Sir Winston Churchill

History

Nitrous oxide and other sedation techniques have been used in dentistry since the mid 1800s. The morbidity and mortality associated with these techniques have prompted dentists to seek alternatives to these modalities.

Today:

1. Shorter acting agents are used
2. Reversal agents available
3. Monitoring capabilities and options much improved
4. Training requirements becoming standardized
5. Regulatory process in play

Morbidity and Mortality Studies – Limitations

- Anecdotal Reports – Incomplete, inaccurate
- Retrospective Surveys – Inherently biased
- Reports to national regulatory agencies, governmental bodies, insurance companies, and professional societies – Limited in scope
- Closed Claim Studies - Limited access

Even the terms “Morbidity” and “Mortality” have different meanings and can be misleading. The definitions of morbidity range from unmet expectations of outcome to a life-threatening situation. While everyone agrees that mortality means death, the cause of death may be proven not to be related to anesthesia and/or be the fault of the anesthesia provider.

Mortality in medical anesthesiology

- | | |
|---------------------------|-----------|
| ➤ Beecher & Todd (1954) | 1:1,560 |
| ➤ Clifton & Hotton (1963) | 1:3955 |
| ➤ Lunn (1982) | 1:10,000 |
| ➤ CEPOD (1987) | 1:185,000 |
| ➤ Harvard (1989) | 1:200,000 |

From: “Anesthesia in medical practice
Cooper JB et al: Anesthesiology 60:34, 1984”

Mortality in dental anesthesiology

Southern California Society of Oral and Maxillofacial Surgeons conducting surveys of its members

1978 - 1:860,000

1988 - 1:633,000

Indiana Retrospective Survey

Type	Est. #	# Deaths	Rate/million
Local Only	1,179,845	2	1.7
Conscious Sed.	275,664	0	0
Deep Sedation	488,510	1	2.05
General Anesth.	294,317	1	3.4
Total	2,238,336	4	1,7

Anesthesia Morbidity and Mortality, 1989-1999: Claims Statistics From AAOMS National Insurance Company*

- M & M Analysis of 12 year period
- Only Oral Surgeons covered by this agency
- 14,206,923 estimated IV sedation cases
- ~1/3 Conscious Sedation
- ~2/3 Deep Sedation/General Anesthesia
- Handled 136 claims running the gamut from the trivial to wrongful death

*A.E. Deegan, Anesth Prog., 2001 Summer; 48(3): 89-92

Breakdown of Anesthesia Claims

Type of Claim	Number
Vein/nerve injuries	52
Death/brain damage	37
Falls	6
Inadequate anesthesia	7
Premature discharge	3
Allergic reactions	3
Stormy emergence	5
Arrhythmia/resuscitation	6
Acute myocardial infarction	2
Other	15
Total Anesthesia Claims	136

Vein/Nerve Injuries	Number
Phlebitis	41
Nerve damage	11
Total	52

Office Deaths/Brain Damage	Number
Office Deaths	22
Local only	3
Conscious sedation	9
Deep sedation/general anesthesia	9
Brain Damage	1

Hospital Deaths/Brain Damage	Number
Deaths	11
Brain damage	4

Remaining 15 Claims	Number
Aspiration	1
Corneal abrasion	1
Loss of voice	1
Shoulder injury	1
Renal failure (halothane)	1
Miscarriage	1
Laryngeal spasm	1
Hypotension	1
Pharyngeal perforation	1
Lip scarring	1
Deposition assist	1
Stroke	1
Failure to inform	1
Seizures	1
Dislodged nose ring	1

One of the more interesting conclusions drawn by the author of the study was that it would be better for all IV sedation patients, regardless of planned anesthetic depth, to be monitored by electrocardiogram.

In a review of deaths in dental offices related to anesthesia, the Dentists Insurance Company of California (TDIC) stated that three factors were present in most instances where death or serious morbidity occurred:

1. Inadequate preoperative evaluation of the patient
2. Lack of knowledge of the pharmacology of the drugs being administered
3. Inadequate monitoring during the procedure

M & M Case Examples

Case #1

20 y.o. female presented to have surgical removal of 3rd molars

PMH: Hx. of tobacco use. Height unknown, patient weighs 128 lbs.

The plan agreed upon by dentist and patient was conscious sedation

Patient was confirmed NPO, 2 assistants were in the room, not known which monitors were placed

Nitrous oxide and oxygen were started, and an IV was started in the right ACF

During the procedure, a total of 20 mg diazepam and 50 mg meperidine were administered, and local anesthetic injected

The patient appeared very nervous from the start and began hyperventilating. Several times she would jerk her head and try to reach up and grab the dentist's hand.

He had to stop and start several times. He called in another assistant to help restrain the patient.

While removing the third molar, the patient jerked and the tooth disappeared down the pharynx. The patient did not appear to have any reaction to the event.

The 4th tooth was removed without difficulty. After a routine recovery period, the patient was kept an additional 45 minutes; there was not apparent respiratory distress or chest pain.

Dentist told patient that since not respiratory reaction, no further treatment needed since she probably swallowed the tooth.

Patient's sister called that evening stating the patient had chest pain and wheezing

In the local emergency department, a CXR showed the tooth in the right mainstem bronchus. Bronchoscopy was performed and the tooth removed.

The patient alleged she thought she would be asleep and was not, and alleged she received inappropriate care

The judge from arbitration panel ruled that even if a CXR had been taken immediately after the event, bronchoscopy would still have been needed

Panel found in favor of dentist, no settlement

What did the dentist/anesthesia team do wrong?

1. _____
2. _____
3. _____
4. _____
5. _____

Case #2

35 y.o. male had removal of a lower third molar four days prior. Two days post-op, the patient developed firm swelling in the submandibular and submental spaces, and a temperature of 102-103 degrees Fahrenheit.

The surgeon prescribed hydroxyzine, meperidine, clindamycin, and erythromycin. The patient called the night of the third day post-op stating the swelling was worsening.

Even though the office was due to be closed the next day, the clinician asked the patient to come to the office

After examining the patient, the surgical plan was incision and drainage with intravenous sedation. Verbal consent was obtained, and NPO status was not stated.

An intravenous line and pulse oximeter were placed

During the procedure, a total of 2 x 20 mg boluses of methohexital were administered, and additional clindamycin was given IV

As the I & D began, there was a spontaneous rupture of pus

The I & D was completed, the dentist gathered the used instruments and was bringing them into the next room when the pulse oximeter alarm sounded

The oral surgeon returned to find the patient with significant swelling of the tongue and trismus

The dentist attempted to ventilate by mouth to mouth, then ran to get a bag/valve/mask and called 911

Oral and nasal airways were placed. O₂ saturation never exceeded 70%.

EMT arrived, performed nasal intubation. By that time patient exhibited exhibited decorticate posturing. Pt. was admitted, ultimately discharged to rehab facility in a persistent vegetative state.

Diagnosis was hypoxic encephalopathy.

Settlement out of court in the seven-figure range

What did the dentist/anesthesia team do wrong?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Case #3

33 yr. old male presented with two painful third molars

Because of a heavy travel schedule and being NPO since midnight, the patient and dentist agreed to remove the teeth and perform a lingual frenectomy with (presumably) deep sedation

PMH: Hx. of use of OTC appetite suppressants, none taken within 5 days of surgery. Hx. of hypercholesterolemia. Patient is 5'6" and weighs 175 lbs.

Patient was confirmed NPO, monitors placed included a pulse oximeter, and nitrous oxide and oxygen were started. An IV was started in the right ACF, 2 assistants in the room.

At the start of the procedure, a total of 5 mg midazolam, 100 mg meperidine, 0.625 mg droperidol, 12 mg dexamethasone were administered

As the frenectomy began, the patient became more talkative and restless. The dentist gave an additional 2 mg midazolam. Within 30 seconds, the patient became acutely tachycardic with a heart rate >130. The dentist called 911.

Lidocaine 100 mg was given within 2 minutes of the onset of tachycardia, then bradycardia developed with a HR of 45.

Epinephrine 10 ml of 1:10,000 was given, heart rate increased to 120. Vital signs stabilized, with saturation at 98% and palpable pulses. Dentist administered 0.4 mg naloxone and 0.2 mg flumazenil.

EMT arrived and gave another dose of naloxone and flumazenil. The patient became more alert but saturation dropped and became hypotensive.

In the emergency department, the BP was still low so fluid boluses were given. Admission CXR showed acute pulmonary edema and ARDS, so Lasix was begun

Cardiac catheterization showed no significant findings. The cardiologist opined that the “patient received too much anesthetic”.

No cause was ever identified, patient was hospitalized for 4 days then discharged without any injury or sequelae. No suit or settlement.

What did the dentist/anesthesia team do wrong?

1. _____
2. _____

Case #4

60 year old female presented for extraction of 1 tooth with GA

ASA II

Asked 3 times to confirm NPO status

5 mg diazepam, 150 mg methohexital, 12 mg dexamethasone

After tooth was extracted, an emesis containing meatballs/pasta/sauce occurred

Unknown hospital stay, no complications

When she awoke, she apologized. Said her husband had asked her to have lunch with him to repair their marriage

No suit, no settlement

What did the dentist/anesthesia team do wrong?

1. _____

Be a team leader during emergencies

- •Do not raise your voice
- •State your instructions as clearly and precisely as possible
- •Avoid making statements into thin air -- address individuals
- •Close the communication loop -- request acknowledgement

Response to an emergency

Call for help!

Mistakes to avoid:

- *Lack of recognition an emergency is occurring
- *Incorrect assumption the situation will resolve without intervention
- *Pride, fear, and risk of embarrassment impair judgment

Damage control

- *Ensuring records are complete and accurate
- *Informing patient and family circumstances and expected course
- *Notification of malpractice carrier

