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Is Precedex based Outpatient Anesthesia a Solution to Preventing Airway Emergencies?

Exploring Precedex as sedative and sharing experience of an academic setting

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Background and significance

- Outpatient anesthesia is increasingly used for office-based dentoalveolar and minor surgical procedures.
- Airway emergencies remain the major safety concern, including obstruction, hypoventilation, desaturation, and laryngospasm.
- Traditional regimens using benzodiazepines, opioids and propofol are effective but can narrow the respiratory safety margin given their respiratory depressive effect.

Clinical question

Can opioid-free or opioid-sparing regimens, regimens, particularly dexmedetomidine-based based sedation, reduce airway complications complications while preserving procedural conditions and patient comfort?

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Dexmedetomidine overview

- Introduced in 1999, Alpha-2 adrenoceptor agonist with sedative, analgesic, and sympatholytic effects.
- Since 2008, Often described as producing sedation with relatively limited respiratory depression compared with traditional sedative-opioid approaches.
- Relevant for outpatient practice because the patient may remain arousable and spontaneously ventilating.

Regulatory context

Current FDA labeling supports sedation use in monitored settings such as procedural and ICU contexts. Dental and office-based OMS applications are practice extensions rather than a dedicated dental label indication.

Key caution: the label still reports hypotension, bradycardia, and clinically important cardiorespiratory adverse effects.

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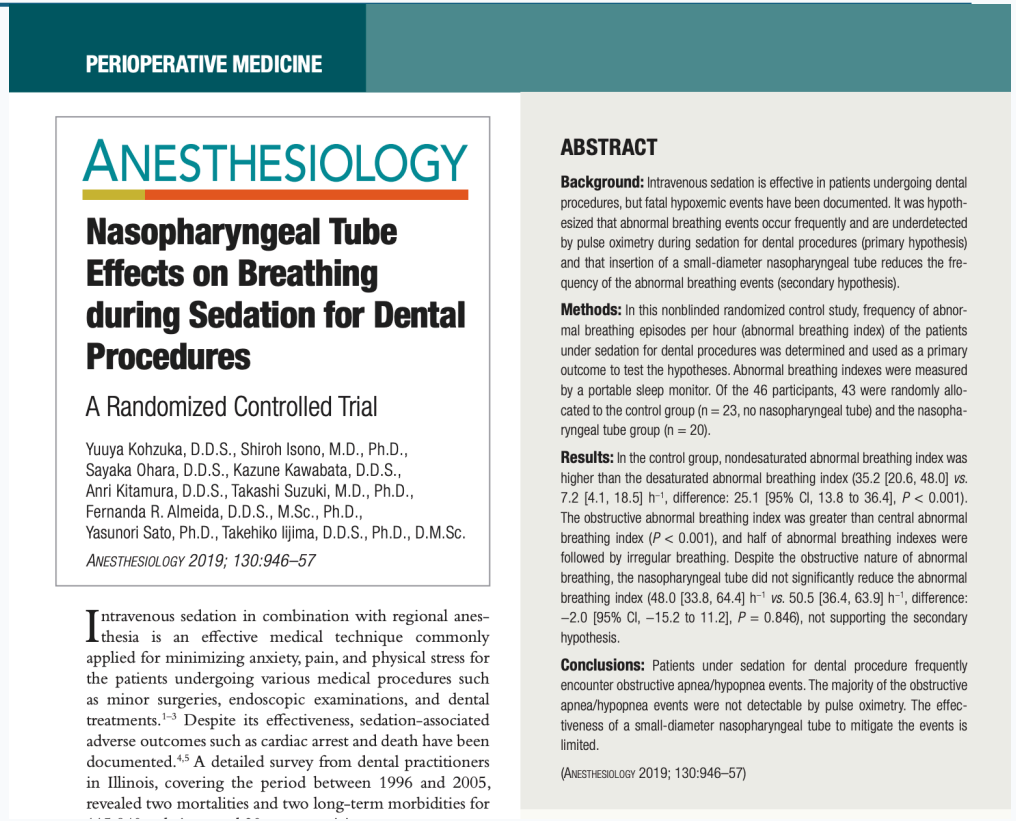
Airway emergencies in outpatient sedation

Why "OPEN AIRWAY" margin is so narrow?

- Most office-based sedation relies on spontaneous ventilation.
- Minor changes in depth, positioning, stimulation, or secretions can precipitate obstruction or desaturation.
- When sedation becomes layered with opioids and/or propofol the assistive airway maneuvers are often necessary[5, 6]



PERIOPERATIVE MEDICINE

ANESTHESIOLOGY

Nasopharyngeal Tube Effects on Breathing during Sedation for Dental Procedures

A Randomized Controlled Trial

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ANESTHESIOLOGY 2019; 130:946–57

Intravenous sedation in combination with regional anesthesia is an effective medical technique commonly applied for minimizing anxiety, pain, and physical stress for the patients undergoing various medical procedures such as minor surgeries, endoscopic examinations, and dental treatments.[1–3] Despite its effectiveness, sedation-associated adverse outcomes such as cardiac arrest and death have been documented.[4,5] A detailed survey from dental practitioners in Illinois, covering the period between 1996 and 2005, revealed two mortalities and two long-term morbidities for

ABSTRACT

Background: Intravenous sedation is effective in patients undergoing dental procedures, but fatal hypoxemic events have been documented. It was hypothesized that abnormal breathing events occur frequently and are underdetected by pulse oximetry during sedation for dental procedures (primary hypothesis) and that insertion of a small-diameter nasopharyngeal tube reduces the frequency of the abnormal breathing events (secondary hypothesis).

Methods: In this nonblinded randomized control study, frequency of abnormal breathing episodes per hour (abnormal breathing index) of the patients under sedation for dental procedures was determined and used as a primary outcome to test the hypotheses. Abnormal breathing indexes were measured by a portable sleep monitor. Of the 46 participants, 43 were randomly allocated to the control group (n = 23, no nasopharyngeal tube) and the nasopharyngeal tube group (n = 20).

Results: In the control group, nondesaturated abnormal breathing index was higher than the desaturated abnormal breathing index (35.2 [20.6, 48.0] *vs.* 7.2 [4.1, 18.5] h^{-1}, difference: 25.1 [95% CI, 13.8 to 36.4], $P < 0.001$). The obstructive abnormal breathing index was greater than central abnormal breathing index ($P < 0.001$), and half of abnormal breathing indexes were followed by irregular breathing. Despite the obstructive nature of abnormal breathing, the nasopharyngeal tube did not significantly reduce the abnormal breathing index (48.0 [33.8, 64.4] h^{-1} *vs.* 50.5 [36.4, 63.9] h^{-1}, difference: −2.0 [95% CI, −15.2 to 11.2], $P = 0.846$), not supporting the secondary hypothesis.

Conclusions: Patients under sedation for dental procedure frequently encounter obstructive apnea/hypopnea events. The majority of the obstructive apnea/hypopnea events were not detectable by pulse oximetry. The effectiveness of a small-diameter nasopharyngeal tube to mitigate the events is limited.

(ANESTHESIOLOGY 2019; 130:946–57)

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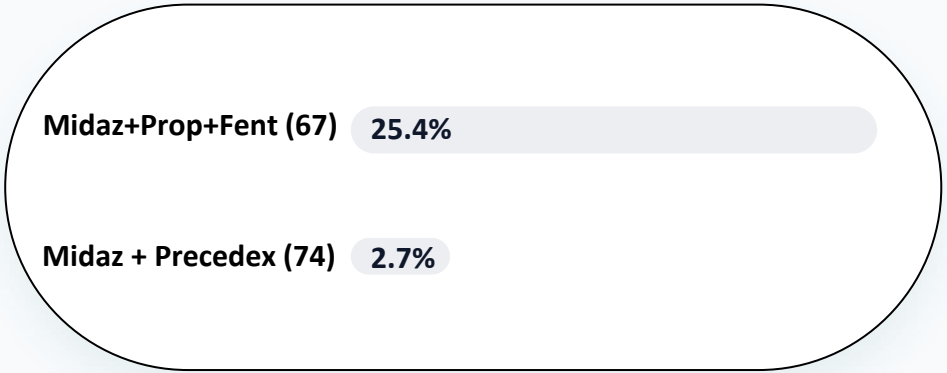
Airway safety outcomes



Nolan et al. found significantly fewer respiratory events requiring deliberate intervention with the dexmedetomidine regimen, without prolonging ambulation or discharge. Similar findings (36.7 vs 3.3%) were reported by Sriganesh *et al*. during cerebral angiography for SAH diagnosis requiring less airway maneuvers to allow better ventilation

Dexmedetomidine Provides Fewer Respiratory Events Compared With Propofol and Fentanyl During Third Molar Surgery: A Randomized Clinical Trial

Patrick J. Nolan, DDS, Jeffrey A. Delgadillo, DDS,† Joseph M. Youssef, DDS,‡ Katherine Freeman, DrPH,§ Jennifer L. Jones, DMD,‖ and Arian Chebrehsa, DDS¶*

Purpose: Propofol and fentanyl can cause airway obstruction and respiratory depression when used together for intravenous sedation. This study investigated whether dexmedetomidine and midazolam would decrease respiratory events requiring intervention during deep sedation compared with propofol, fentanyl, and midazolam.

Patients and Methods: A prospective, randomized, double-blinded, controlled trial was designed to assess 2 intravenous treatment groups during third molar surgery. Patients were randomized into 2 groups. The control group (group P) received 0.8 μg/kg of fentanyl followed by propofol infusion at 125 μg/kg per minute over a 10-minute period with intraoperative boluses of 0.1 μg/kg. The study group (group D) received dexmedetomidine bolus infusion of 1 μg/kg over a 10-minute period followed by maintenance infusion at 0.5 μg/kg per hour. Both groups were given 0.03 mg/kg of midazolam before infusion. Scorers, masked to group, viewed the procedure remotely and evaluated the primary outcome variable of respiratory events requiring intervention. Secondary outcome variables evaluated by the scorers included the Behavioral Pain Scale for non-intubated patients at initial injection, cooperation score at 5 and 15 minutes, and time to ambulation and discharge. Patient satisfaction and hemodynamic stability were measured. The difference between groups regarding the occurrence of respiratory events was tested using the Fisher exact test, and mixed-effects models were used to compare repeated vital signs.

Results: The sample was composed of 141 patients randomly assigned to either group P (n = 67) or group D (n = 74). No statistically significant differences in the distribution of study variables were found between groups at baseline. A statistically significant difference in respiratory events requiring deliberate intervention existed between group P (25.4%) and group D (2.7%) ($P < .0001$). No statistically significant difference was found between groups for Behavioral Pain Scale score, cooperation score, time to ambulation or discharge, and patient satisfaction.

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Mechanism highlights

Locus coeruleus

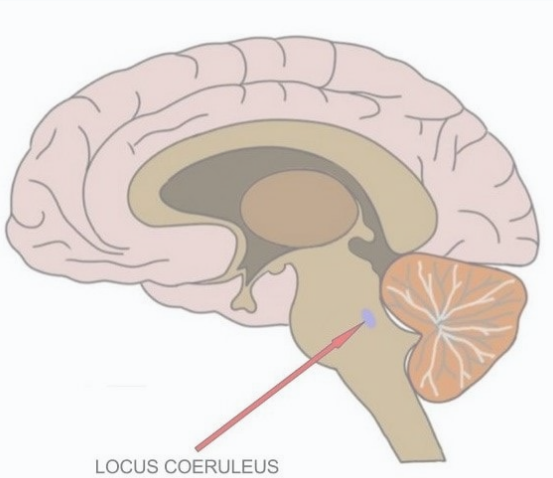
Sedation is mediated through alpha-2 signaling in the locus coeruleus and resembles a sleep-like state more than classic GABAergic hypnosis.

Airway physiology

Spontaneous ventilation and airway reflexes are often better preserved than with propofol or benzodiazepine-heavy sedation.

Operational trade-off

Onset is slower and hemodynamic effects can be more prominent, so the technique may not suit every short office procedure.



Misconception of Sedation Dogma/Goals

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Comparison of Dexmedetomidine and Midazolam in Conscious Sedation During Dental Implant Surgery: A Randomized Clinical Trial

Ipek N. Guldiken, DDS[1]/Gokhan Gurler, DDS, PhD[1]/Cagri Delilbasi, DDS, PhD[1]

Purpose: Conscious sedation in oral surgical procedures provides comfort both for patients and practitioners. Midazolam is a sedative agent commonly used in this manner. Dexmedetomidine is also a decent sedative agent, with its analgesic and mild respiratory effects, which is usually preferred in intensive care units. Dexmedetomidine has been recently used in dental surgeries. This study aimed to investigate the analgesic and respiratory properties of midazolam and dexmedetomidine in conscious sedation during dental implant procedures and to compare these two drugs in terms of ease of use and comfort of dental implant operation. **Materials and Methods:** This study was a prospective double-blind randomized controlled study. The patients who needed dental implant placement were divided into two randomized groups for either midazolam or dexmedetomidine. The amount of sedative agent used, duration of the procedure, onset of sedation, use of additional same sedative agent, and occurrence of desaturation were recorded. Hemodynamic and respiratory variables (mean blood pressure, heart rate, oxygen saturation, and respiratory rate) were recorded every 10 minutes, starting immediately before the loading dose until the end of the procedure. Patients completed a Likert scale for their satisfaction, and patient pain was scored using the numeric rating scale postoperatively. The amount of painkiller

Comparative data

Study	Setting	Key finding
Fan et al., 2013	Dental surgery, BIS monitored, maintained 80	Dexmedetomidine performed similarly to midazolam, with better cooperation and lower heart rate and blood pressure.
Zhang et al., 2020	Meta-analysis, 5 RCTs, 420 patients	Pooled outcomes were broadly similar to midazolam for oxygen saturation and procedure variables, supporting dexmedetomidine as a reasonable alternative rather than a universal superior agent.

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Sedation efficacy

Taylor et al., 2020

- Dexmedetomidine infusion supported acceptable outpatient dentoalveolar sedation.
- 12 patients were rendered different sedation for each arch (Maxilla vs Mandible)
- Patient satisfaction was improved, although recovery was longer.
- This supports feasibility but does not remove the need to weigh workflow and hemodynamic trade-offs.

Okumura et al., 2022

- Adding continuous low-dose fentanyl to dexmedetomidine-midazolam reduced local anesthetic requirements and suppressed tachycardia.
- Respiratory rate, SpO2, and PETCO2 were not significantly different between groups.
- This finding underscores that cautious adjunct opioid use may sometimes improve procedural conditions, but it reintroduces airway trade-offs.

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Dexmedetomidine Limitations

Dexmedetomidine can produce bradycardia and and hypotension and still requires close monitoring. monitoring.

Onset is slower, often around 10 minutes for loading strategies, which may not suit short office procedures.

Analgesia may be insufficient for more painful procedures unless local anesthetic and additional multimodal adjuncts are optimized.

Cost, familiarity, workflow, and staffing patterns may influence adoption in office-based practice.

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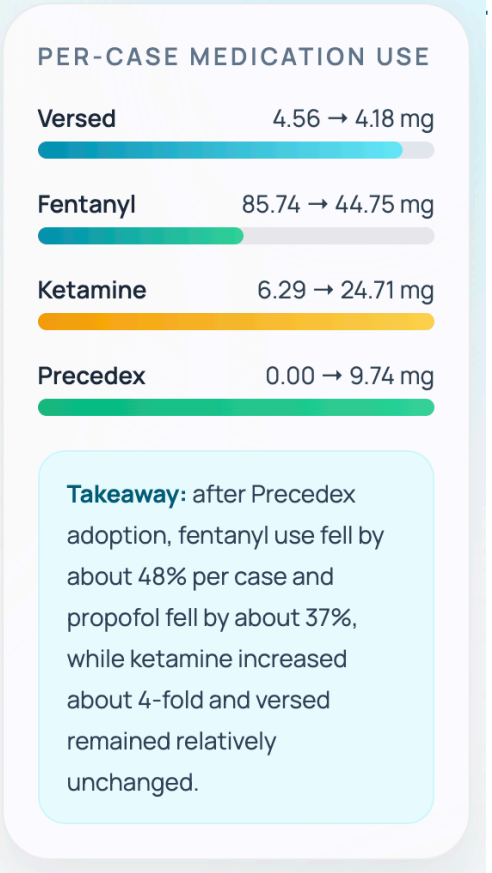
NMCSD experience and outcomes

Retrospective Analysis from Jun 2018 to Mar 2026: Reviewed institutional sedation changes upon implementation of Precedex in May 2024

- **4,775** Cases before May 24, 2024
- **1,378** cases; starting June 2024
  - fentanyl was omitted in 272 cases, or 19.7%.

Precedex adoption was associated with lower fentanyl and versed use with higher ketamine reliance to achieve depth of sedation.

The need for adjunct airway support has substantially decreased, only utilized when propofol is added for difficult sedations and rates of propofol use was similar



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Balanced perspective

What “opioid-free” should mean

A deliberate effort to minimize respiratory compromise while maintaining adequate analgesia, patient comfort, and procedural conditions.

What it should not mean

Analgesia-free practice or rigid avoidance of any opioid in every patient. Small, carefully titrated fentanyl doses may occasionally be reasonable if benefits outweigh risk.

The clinical goal is opioid-sparing, physiologically informed sedation rather than ideological elimination of a drug class.

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Clinical implications

Dexmedetomidine-based, opioid-sparing regimens appear to reduce respiratory events in outpatient oral surgery compared with propofol-opioid regimens in available data.

Avoid opioids whenever feasible, particularly when airway safety is a dominant concern and pain can be managed by multimodal approaches

Monitoring remains essential, including pulse oximetry, capnography, and disciplined real-time airway assessment; BIS may be used selectively but is NOT A SUBSTITUTE for clinical vigilance.

Summary

Respiratory events

Dexmedetomidine-based sedation can reduce respiratory events in comparative oral surgery data.

Pain control

Nonopioid multimodal analgesia can match or exceed opioid-based strategies for common dental postoperative pain.

Future model

The likely future is multi-agent, opioid-sparing outpatient anesthesia rather than simple one-drug replacement.

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