Comparing Postoperative Recovery Following Enteral Moderate Sedation and Parenteral General Anesthesia In Pediatric Dental Patients

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ABSTRACT

Purpose: To compare the postoperative recovery periods of enteral moderate sedation and parenteral general anesthesia in pediatric dentistry.

Methods: Parents of pediatric dental patients aged 2-18 years (ASA I-II) who received dental treatment under parenteral GA, consisting of intramuscular induction followed by total intravenous anesthesia, were recruited to complete a postoperative survey assessing recovery at 1, 4, 8, and 24 hours post-discharge. This survey was previously validated evaluating postoperative recovery following enteral moderate sedation. Responses from the general anesthesia cohort were compared with the existing enteral moderate sedation dataset. Fisher's exact test, chi-square analysis, and generalized linear models utilized, with P< .05 considered statistically significant.

Results: Parents of 10 patients undergoing IV-anesthesia completed the postoperative survey, compared with 100 responses from the enteral moderate sedation dataset. One hour post-discharge, the IV-anesthesia group demonstrated a higher incidence of transient neurologic/functional effects, including dizziness (40%, P=.003), trouble concentrating (40%, P=.012), and difficulty eating or drinking (30%, P=.048). These differences were not present at the 4-hour assessment. No significant differences were observed in alertness (P=.35), behavior (P=.79), or activity (P=.62).

Conclusion: Parenteral general anesthesia in pediatric dentistry was associated with a higher incidence of transient neurologic effects during the first postoperative hour compared with enteral moderate sedation. These effects were self-limited/resolved as recovery progressed. Despite the small sample size, findings support the safety of in-office parenteral general anesthesia, with preservation of alertness, behavior, and activity with no serious adverse events observed.

BACKGROUND

- Dental caries is the most prevalent childhood disease in the US; over 52% of children have had a cavity by age 8.
- Many children require pharmacologic intervention to complete comprehensive dental rehabilitation.
- When children fail moderate sedation or have extensive treatment needs, general anesthesia often allows safe, complete treatment in a single visit.
- The study protocol for in-office parenteral GA uses IM induction (ketamine + midazolam) followed by total intravenous anesthesia (propofol + remifentanil), with nasal RAE intubation.
- Despite documented safety, post-discharge recovery data comparing in-office parenteral GA to enteral moderate sedation is limited.
- The aim of this study was to characterize post-discharge events following in-office parenteral GA and compare these to a previously validated enteral sedation dataset.

METHODS

Study Design: Prospective observational study; IRB approved (HSC-DB-25-0229)

Population: Pediatric dental patients aged 3-17 years, ASA I-II, treated at UTHealth Houston School of Dentistry Postgraduate Pediatric Dental Clinic

Inclusion Criteria: Any gender; meeting clinic GA guidelines; minimum age 3 years; BMI <95th percentile, English fluency

Anesthesia Protocol: Single board-certified dentist anesthesiologist; IM ketamine (3 mg/kg) + midazolam (0.075 mg/kg), IV fentanyl, propofol, remifentanil infusion; nasal RAE intubation with spontaneous breathing

Survey Instrument: Post-Discharge 24-Hour Pediatric Survey (PDE), administered at 1, 4, 8, and 24 hours post-discharge; previously validated for enteral moderate sedation

Comparator: 100 responses from existing enteral moderate sedation dataset (HSC-SN-22-0201)

Statistical Analysis: Fisher's exact test and chi-square analysis; generalized linear models; P < .05 statistically significant; R statistical software

Discharge Criteria: PADSS score ≥ 9/10 required prior to discharge

RESULTS

Sample: n = 10 (IV-GA) vs. n = 100 (Enteral Sedation) | Mean age: 6.4 years | 5 males, 5 females | All ASA I-II

40%	40%	30%
Dizziness	Trouble Concentrating	Difficulty Eating/Drinking
P=.003	P=.012	P=.048

1-Hour Post-Discharge: Significant Findings (IV-GA vs. Enteral Sedation)

Variable (1 hr post-discharge)	Midazolam (n=39)	Midazolam + Mep. (n=61)	IV-GA (n=10)	P-value
Dizziness	3%	5%	40%	P=.003*
Trouble Concentrating	8%	7%	40%	P=.012*
Unable to Eat/Drink	8%	5%	30%	P=.048*
Mouth/Facial Swelling	10%	2%	20%	P=.029*
Inability to Support Head	18%	18%	50%	P=.073†
Nausea	3%	2%	20%	P=.073†
Agitation	18%	5%	0%	P=.081†
Awake and Alert (Alertness)	13%	13%	44%	P=.35
Normal Behavior	36%	33%	67%	P=.79
Less Active Than Usual	82%	90%	100%	P=.62

**P<.05 (significant) | †Near-significant trend | Alertness/Behavior/Activity rows show % of most common response category | All differences resolved by 4 hrs | No serious adverse events in either group*

Table 1: Alertness, Behavior & Activity at 1, 4, 8, and 24 Hours Post-Discharge (IV-GA, n=10)

	1 Hour	4 Hours	8 Hours	24 Hours
ALERTNESS				
Asleep	30%	0%	10%	0%
Asleep but easy to awaken	10%	20%	10%	10%
Awake but drowsy	40%	20%	0%	0%
Awake and alert	40%	50%	70%	50%
BEHAVIOR				
Normal	50%	70%	50%	50%
Agitated	30%	0%	10%	0%
Withdrawn	40%	10%	10%	10%
ACTIVITY				
Less active than usual	80%	10%	0%	0%
Same as usual	0%	70%	60%	50%
Hyperactive	0%	0%	20%	20%

DISCUSSION

Early transient effects: Higher dizziness, trouble concentrating, and difficulty eating/drinking at 1 hour is expected with recovery from a deeper anesthesia plane and known IM ketamine effects (Green et al., 2011).

Preserved alertness/behavior: No significant differences in alertness (P=.35), behavior (P=.79), or activity (P=.62) — functional recovery was intact despite transient neurologic symptoms.

Self-limited resolution: All significant differences resolved by 4 hours; outcomes were comparable at 8 and 24 hours. Caregiver education about expected early symptoms is recommended.

Safety confirmed: No seizures, anaphylaxis, or airway compromise in either cohort, supporting safety of in-office parenteral GA with appropriate patient selection (Spera et al., 2017).

Limitations: Small GA sample (n=10) limits statistical power. Protocol-specific (IM + TIVA + nasal RAE); findings may not generalize to mask induction or open-airway cases.

CONCLUSION

- Parenteral GA was associated with higher incidence of transient neurologic effects and functional limitations at 1 hour post-discharge compared to enteral sedation.
- All effects were self-limited; no serious adverse events were recorded in either cohort.
- Alertness, behavior, and activity were statistically comparable across modalities, affirming safety of in-office parenteral GA for appropriately selected ASA I-II patients.
- Anesthesia technique should be selected based on individual patient needs — both modalities are safe and effective with appropriate patient selection.

REFERENCES