Identifying Post-Procedural Adverse Events in Pediatric Sedation Patients

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ABSTRACT

Purpose: to identify the incidence of parental reported post-discharge events (PDEs) following moderate sedation of pediatric dentistry patients and to determine the sedation regimen and patient-specific factors that are related to the incidence of PDEs.

Methods: Pediatric patients under the age of 18 that underwent sedation from 2011-2022 at the UT Graduate Pediatric program were included in the study. Information was gathered from Electronic Patient Record. The following information was collected: age, weight, height, pre/post-op vitals, BMI, Brodsky and Mallampati scores, history of snoring/OSA/bruxism/mouth-breathing, sedation medications, medication dosages and time given, intra-operative complications, and post-op call information.

Results: Two-thousand charts selected, with parents answering the phone and data being obtained for 1076 records. Post discharge events recorded were excessive sleepiness, pain, nausea/vomiting, angry/agitated and issues with restorations. Excessive sleepiness was noted in 18% of patients and pain in 16%. Post sedation complications associated with decreased Brodsky score (*P*=.015) and increased BMI (*P*=.022). No difference based on patient factors of age (*P*=.66), gender (*P*=.38), length to discharge (*P*=.113), history of snoring (*P*=.64), mouth-breathing (*P*=1), OSA (*P*=.48), or bruxism (*P*=.17). Meperidine trended to more complications (*P*=.07), with no difference for midazolam or diazepam.

Conclusions: Increase in BMI and decrease in Brodsky are associated with an increase in post-op complications. This suggests increased screening is necessary for these patients prior to sedations.

BACKGROUND

- The AAPD lists moderate sedation as an approved pharmacologic behavior guidance technique to treat pediatric patients that are fearful/anxious, cannot cooperate, and have dental needs requiring treatment.[1]
- Contraindications to sedation include cooperative patients with minimal dental needs or patients with predisposing medical and/or physical conditions which would make sedation inadvisable. [1]
- Obstructive sleep apnea (OSA) has a prevalence of 1-5% in the pediatric population; however, the actual prevalence may be much higher, as formal diagnosis is made following the gold standard polysomnography, a procedure which is costly and not always covered by insurance. [2]
- Predictors of OSA include excessive daytime sleepiness, loud snoring, witnessed apnea, headache, attention issues, mouth breathing, and restlessness. [2]
- Several indices have been proposed to predict adult and pediatric sleep apnea, including the Pediatric Daytime Sleepiness Scale, tonsillar hypertrophy, the Friedman Tongue Classification system, the STOP-BANG questionnaire, and the Kushida Index. [2-3]

We hypothesize that the more risk factors of OSA a child has, but without formal diagnosis for OSA, the rate of post discharge events will increase when undergoing non-IV conscious sedation.

METHODS

- This study was approved by the UTHealth Houston Institutional Review Board.
- Patients aged 3-18 seen in the UT Grad Pediatric Dentistry Clinic for non-IV conscious sedation were selected were identified.
- 2000 charts were selected and the following information was obtained:
  - Age, weight, and height of patient
  - Pre/Post-op vitals, BMI, Brodsky, Mallampati
  - History of snoring, OSA, bruxism or mouth-breathing
  - Sedation medications, dosages and time given
  - Post-op call and post-op complications
- Post-discharge information was recorded by the resident or attending
- Data was collected in Microsoft Excel and analyzed using R statistical software (R Core Team 2020)

RESULTS

- 1079 records (54%) had documentation of operator/parent discussion of post-sedation events (remaining 46% documented voicemail left for guardian).
  - Table 1 provides patient-specific information in relation to post-operative complications.
- Post-operative complications were reported in 35.3% of patients.
  - Tired/drowsy (17.8% of respondents) and pain (15.6% of respondents) were the most common post-operative complications (Figure 1).
  - Parents of 39 patients (3.6%) reported more than one post-operative complication.
- Post-operative complications decreased as BMI increased (*P*=.022; Figure 2)
- Brodsky score was negatively correlated with post-operative complications (P=.015; Figure 2).
- For those patients where meperidine was used, there was a trend towards post-operative complications (*P*=.07).
- Table 2 provides patient-specific information based on sedation agent used and OSA-predictive factors.
  - Combination of midazolam and Brodsky 3 or 4 resulted in increased likelihood of post-operative complications (*P*=0.04)

Figure 1. Prevalence of Post-operative Adverse Reactions

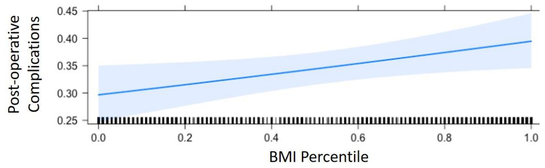

Figure 2. Incidence of post-operative complications increased as BMI increased.

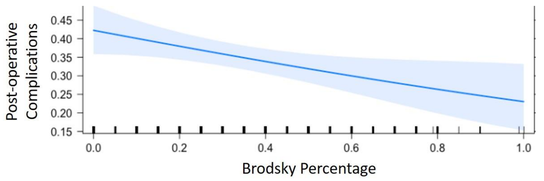

Figure 3. Incidence of post-operative complications decreased as Brodsky percentage increased.

Table 1. Patient-specific variables related to post-operative complications

	Post-Op Event			
Variable	Overall	Yes	No	p-value
Subjects	1079	382	697	
BMI % (mean, SD)	53.8 (34.4)	57.3 (34.0)	51.9 (34.5)	*0.022*
Brodsky (mean, SD)	0.57 (7.8)	0.32 (0.17)	0.71 (9.6)	*0.01504*
History of Snoring	148	49	99	*0.6387*
History of Bruxism	9	1	8	*0.2433*
History of Mouthbreathing	28	10	18	*1*
History of OSA	23	6	17	*0.4838*
Age (mean, SD)	68.1 (23.5)	67.6 (24.9)	68.3 (22.7)	*0.6565*
Gender				*0.3763*
Male	569	193	376	
Female	507	186	321	
Length to Discharge Time (mean, SD)	98.7 (29.6)	100.6 (31.5)	97.6 (29.1)	*0.113*
Meperidine	741	467	274	*0.07404*
Midazolam	526	187	339	*0.8412*
Diazepam	36	14	22	*0.7646*
Sedation Route				*0.8201*
PO	903	320	583	
PO/IM	119	44	75	
Delta Diastolic BP	7.56 (14.5)	7.86 (15.1)	7.4 (14.1)	*0.6238*
Delta Systolic BP	7.3 (16.1)	7.13 (15)	7.38 (16.7)	*0.8565*
Delta Pulse	9.3 (19.6)	9.6 (21.6)	9.14 (18.4)	*0.6789*

Table 2. Patient-specific variables based on sedation regimen used related to post-operative complications

	Post-Op Event			
Variable	Overall	Yes	No	p-value
Meperidine				
Brodsky 3 or 4	164	52	112	*0.1279*
History of OSA	12	4	8	*1*
History of Snoring	84	30	54	*0.8929*
History of Mouth Breathing	18	8	10	*0.6765*
History of Bruxism	4	0	4	*0.3092*
BMI >85%	199	83	116	*0.0971*
Midazolam				
Brodsky 3 or 4	142	40	102	*0.04053*
History of OSA	12	1	11	*0.0642*
History of Snoring	77	25	52	*0.6291*
History of Mouth Breathing	15	5	10	*1*
History of Bruxism	5	1	4	*0.7944*
BMI >85%	141	50	91	*0.9867*
Diazepam				
Brodsky 3 or 4	12	5	7	*1*
History of OSA	0	0	0	
History of Snoring	5	2	3	*1*
History of Mouth Breathing	0	0	0	
History of Bruxism	0	0	0	
BMI >85%	9	5	4	*0.4298*

CONCLUSIONS

- ***In this study, the incidence of a post-operative events increased as (1) BMI increased or (2) Brodsky percentage decreased***
- **Limitations include that p**atients seen by a variety of attendees and resident students, no set script for residents/attendees to use for parent post-op calls, and potential for inaccuracy in parent reported events
- **Further research** would benefit with a prospective study in which one practitioner makes the post-operative call to the parent with a set script of questions to ensure all post-op events and sedation risk factors are recorded.

REFERENCES

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