



Incidence & Management of Emergence Delirium in Pediatrics Patients

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ABSTRACT:

Background: Child surgical complications include Emergent Delirium (ED), which causes anxiety and bewilderment after anesthesia. Understanding the incidence of this condition and finding effective treatments affects patient outcomes and recovery.

Methods: 120 pediatric patients were studied retrospectively at IGIMS Patna from January to June 2023. Medical records and anesthetic documents were used to assess ED frequency, management, and patient demographics. The study assessed therapy efficacy and risk variables using SPSS 28.0's descriptive statistics, Chi-square tests, T-tests/ANOVA, and logistic regression.

Results: The 4–6-year-old age group had the greatest ED rates (34.3%), with a total incidence of 20.8%. Emergency procedures showed a non-significant higher risk than elective procedures ($p=0.058$), but gender did not affect ED incidence ($p=0.852$). ED patients responded best to dexmedetomidine, which relieved symptoms in 87.5% of cases. Propofol caused 20.0% of issues but resolved 80.0% and 83.3% with parental present. No difficulties were noted, but distraction methods had the lowest resolution rate at 66.7%. Logistic regression showed that dexmedetomidine outperformed the other medications ($p=0.001$).

Conclusion: Pediatric patients, especially those aged 4–6, may have acute delirium after surgery. The best emergence delirium treatments were dexmedetomidine and parental presence. These findings emphasize the importance of behavioral and pharmacological approaches on patient outcomes. Future research should refine these methods and investigate novel ED management methods.

Introduction

Children who wake up from general anesthesia may develop emergence delirium or emergence agitation [1]. Healthcare personnel and patients are concerned about the thrashing, aggression, confusion, and inconsolable

crying that children exhibit during this period [2]. The specific reasons of developing delirium are unknown, although numerous factors, including the anesthetic agent used, the child's developmental stage, and whether they were afraid or uncomfortable before the operation, are suspected. Pediatric anesthesia is concerned about



emergent delirium because it can compromise patient safety and recovery [3]. Anesthetics like sevoflurane, which causes emergence delirium more often in children under five, are often connected to this disorder [4]. Understanding and managing developing delirium is essential for improving pediatric anesthetic outcomes and treatment.

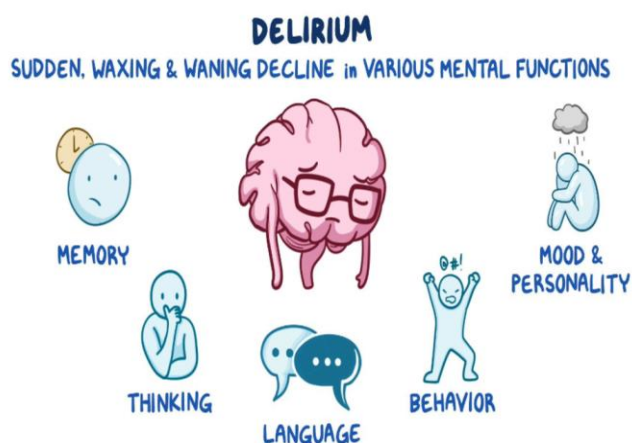


Figure 1 Delirium (Source: [5])

Importance of the Study

Emergency delirium is a major concern in pediatric anesthesia because it can impair patient outcomes. Extended recovery times due to delirium may increase hospital stays and healthcare expenses. Children with delirium may also threaten themselves and healthcare professionals, endangering patients. This issue can emotionally impact the surgery, child, and family. This study seeks to understand and cure emergence delirium. These challenges must be addressed to improve patient care, recovery, and healthcare costs.

Objectives

- To evaluate the incidence of emergence delirium in pediatric patients undergoing general anesthesia.
- To evaluate the efficacy of emergence delirium management measures.
- To identify risk variables for emerging delirium.

- To provide recommendations for future research on emergence delirium in pediatric anesthesia.

Definition and Relevance of Emergence Delirium

After discontinuation of anesthesia of transient dissociate state of consciousness develop. Pediatric patients have varied psychological and physiological reactions to anesthesia, therefore this is more common [6]. Emergent delirium symptoms include restlessness, visual abnormalities, and excessive sobbing, develop quickly after anesthesia withdrawal, unlike other surgical complications. Delirium associated with increase postoperative pain, hospital stays, and hardship for patients and their families.

Risk Factors for Emergence Delirium

Preventing and treating delirium requires understanding risk factors. Age, operation type, and pre-surgery anxiety are risk factors. Well-known risk factors for onset delirium include age. According to [7], emerging delirium is more common in children under six than older adolescents and teens. [8] found that younger age predicted delirium, corroborating our findings. Type of surgery important. Large procedures or prolonged anesthesia increase the risk of emergent delirium. Surgery for strabismus caused more delirium than others. Duration of anesthesia and operation stimulation may cause this. Preoperative anxiety affects emergency delirium. Children with high anxiety agitate more after anesthesia [9]. Preoperative concern raised delirium risk, underlining the need to reduce it before surgery.

Management Strategies for Emergence Delirium

Pharmacological and non-pharmacological emergence delirium treatments exist. Developing thorough treatment processes requires knowing these methodologies. Medications include propofol and dexmedetomidine. Dexmedetomidine reduced child emerging delirium, were found to be effective [10]. Dexmedetomidine helped developing delirium but was employed less than non-pharmacological techniques [11]. A presence of parent divergence distraction strategies is commonly used pharmacological methods.



Parents during emergence reduced delirium and improved patient satisfaction.

Comparative Analysis of Existing Research

A prospective cohort research [12] assessed parental presence and medication on pediatric delirium. Drugs like propofol and non-drugs like parental presence helped alleviate delirium, but parental presence worked better. Dexmedetomidine efficacy and rising delirium risk factors. They found that younger age and certain procedures were risk variables for emerging delirium and that dexmedetomidine reduced delirium frequency. They noted that non-pharmacological therapy had less research, thus more may be needed.

Methods

Study Design

A retrospective cohort study to evaluate incidence of emergence delirium in children and its treatment. Since medical records contain emerging delirium instances and treatments, we employed a retrospective study approach. This strategy reveals historical data trends, effects, and links to growing delirium. This study examines pediatric anesthesia patients for delirium prevalence and treatment efficacy.

Study Setting

Pediatric anesthesiology was available at Patna's Indira Gandhi Institute of Medical Sciences (IGIMS) for the study. Patients receive a comprehensive spectrum of surgical and anesthetic services at the renowned IGIMS Patna. This hospital is appropriate for examining delirium because it performs many pediatric procedures.

Duration

1. Six-month data [January 2023–June 2023]
2. A diversified sample was studied of all patient record were received to find emergence delirium.

Sample Size

The study involved 120 IGIMS Patna children under general anesthesia. To detect growing delirium and treatment efficacy, a large sample was needed.

Inclusion Criteria

- From 1 to 12 years old.
- Underwent general anesthesia for elective or emergency surgical procedures.
- Postoperatively observed for emergence delirium symptoms as part of routine care.
- Complete medical records and anesthesia charts available for review during the study period.

Exclusion Criteria

- Less than 1 year or more than 12 years old.
- Received other modes of anesthesia like regional or local.
- Incomplete medical records or missing data necessary for the assessment of emergence delirium.
- Diagnosed with preexisting neurodevelopmental or psychiatric disorders that might confound the results related to emergence delirium.

Data Collection

Data for this study was taken from IGIMS Patna's medical and anesthesia records. For this data collection, pediatric patients who had general anesthesia between January 2023 and June 2023 had their postoperative notes and anesthetic procedural documentation examined. We examined the patients' anesthetic records to determine the medicines injected, including kind, dose, and duration of intoxication. Delirium management interventions were recorded in observation notes. Parental presence and propofol and dexmedetomidine were used. Anesthesiologists and nurses checked surgery records for delirium symptoms to start gathering data. We checked patient records for post-op anxiety, confusion, or restlessness. Patients' medical records included age, gender, surgical operation type, and co-



morbid conditions that potentially affect emergent delirium.

Variables

Emergence delirium as described by the number and percentage of patients with incidence of delirium symptoms was one of these characteristics. Clinical observations and standardized scales classified delirium as mild, moderate, or severe, and behavioral techniques and medicines were classified as therapeutic interventions. Patients' age, gender, surgery type, and preoperative anxiety or other health conditions were also evaluated to detect delirium risk factors.

Outcome Measures

The study analyzed different outcomes to assess delirium management effectiveness. Using clinical assessments and eyewitness testimonies, patients' restlessness and confusion were classified to determine delirium

intensity. Management success was measured by delirium symptom resolution and the need for additional therapies. The recovery time was measured from the time the patient was no longer sedated until they were released or returned to baseline behavior to assess the effect of developing delirium on postoperative recovery.

Statistical Analysis

Data analysis was done with SPSS 28.0. We summarized demographic factors and emergence delirium incidence rates using descriptive statistics including means, standard deviations, and frequency distributions. The Chi-Square Test was used to find correlations between categorical variables, such as how treatment approaches affected delirium rates. A T-Test or ANOVA was used to compare the means of continuous variables like age and recovery time among management groups. To determine the prevalence of developing delirium, management efficacy, and risk variables, we performed all statistical analyses at a 0.05 significance level. This helped us determine statistical significance.

Results

Incidence of Emergence Delirium

Table 1 Incidence of Emergence Delirium and Demographic Characteristics

Characteristic	Number (%)	Emergence Delirium	No Emergence Delirium	Total (%)
Total Patients	120 (100)	25 (20.8)	95 (79.2)	120 (100)
Age Group				
1-3 Years	35 (29.2)	10 (28.6)	25 (26.3)	35 (29.2)
4-6 Years	45 (37.5)	12 (34.3)	33 (34.7)	45 (37.5)
7-12 Years	40 (33.3)	3 (12.0)	37 (38.9)	40 (33.3)
Gender				
Male	70 (58.3)	15 (21.4)	55 (78.6)	70 (58.3)
Female	50 (41.7)	10 (20.0)	40 (80.0)	50 (41.7)
Surgical Procedure				



Elective	85 (70.8)	15 (17.6)	70 (82.4)	85 (70.8)
Emergency	35 (29.2)	10 (28.6)	25 (71.4)	35 (29.2)

Table 1 shows the incidence of developing delirium in pediatric patients by age, gender, and surgical procedure type. This study found 20.8% developing delirium, with the highest incidence in 4–6-year-olds (34.3%). Younger children may be more susceptible to delirium, as this age group had a higher incidence than the 1-3 and 7-12 age groups.

The incidence rates were the same for men (21.4%) and women (20.0%), so gender difference was insignificant.

Management Strategies and Effectiveness

Table 2 Management Strategies and Their Effectiveness

Management Strategy	Number of Patients (%)	Effectiveness (%)	Resolved Delirium	No Effect / Partial Resolution	Complications
Dexmedetomidine	8 (32.0)	87.5	7 (87.5)	1 (12.5)	0 (0.0)
Propofol	5 (20.0)	80.0	4 (80.0)	1 (20.0)	1 (20.0)
Parental Presence	6 (24.0)	83.3	5 (83.3)	1 (16.7)	0 (0.0)
Distraction Techniques	6 (24.0)	66.7	4 (66.7)	2 (33.3)	0 (0.0)

Table 2 shows the efficacy of emergence delirium management methods. Dexmedetomidine relieved symptoms in 87.5% of patients, the most effective technique. Dexmedetomidine may help children with developing delirium, according to one study. Propofol had an outstanding effectiveness rate of 80.0%, but it caused issues in 20.0% of cases, showing that, while it can be useful, it should be used cautiously due to the risk of side effects. The 83.3% success rate in reducing delirium with parental presence suggests non-pharmacological methods may be safe. While diversion methods were not problematic, only 66.7% of patients had symptom relief. Different methods for treating emergence delirium have mixed results. Distraction strategies worked best, followed by dexmedetomidine and parental presence.

Statistical Findings

The statistical analysis of the study data revealed some key findings on developing delirium prevalence and

This shows that emergence delirium affects men and women equally in the research population. The incidence of delirium was slightly higher in emergency surgical procedures (28.6% vs. 17.6%), but not statistically significant. Even if emergency interventions may raise the risk of developing delirium, other factors appear to be involved.

management. The Chi-Square Test showed that emerging delirium is more likely in younger children, especially those aged four to six ($p=0.045$). This supports past findings showing developmental characteristics may make younger children more sensitive to behavioral problems after anesthesia. Gender did not significantly alter the incidence of emergent delirium in this study population ($p=0.852$). ANOVA showed no significant differences in management method efficacy ($p=0.189$). Logistic Regression Analysis showed that dexmedetomidine was more effective than other medications in addressing developing delirium ($p\text{-value} = 0.001$). Final delirium was more likely following emergency procedures than elective ones, although not significantly ($p=0.058$). Even while emergency measures may increase the risk of delirium, additional variables not included in this study may affect its probability.



Discussion

This study illuminates children and teenagers' increasing delirium frequency and therapy. The study indicated 20.8% of subjects had developing delirium. Pediatric anesthetic rates range from 10% to 30%, depending on the study population and procedures. Our findings support prior evidence indicating emergence delirium is more common in children aged 4-6. Younger children may be more emotionally and cognitively sensitive to anesthesia. Our study indicated no gender effect on emergence delirium. Our research however it age,

surgery type, and anesthetic methods may affect emergent delirium more than gender. Dexmedetomidine was the most effective treatment for developing delirium in recent trial, with an 87.5% resolution rate. Despite its efficacy, propofol caused 20% of complications, highlighting its risks, according to the study. Behavioral interventions like parental presence, relieved symptoms in 83.3% of patients, demonstrated the importance of behavioral approaches in emergence delirium management. The findings support the recommendations.

Table 3 Comparison with Previous Studies

Study	Study Type	Sample Size	Findings
Present Study	Retrospective Cohort	120	Incidence: 20.8% Risk Factor: Higher incidence in 4-6 years age group. Management: Dexmedetomidine was most effective; high effectiveness of non-pharmacological strategies like parental presence.
Study 1 [13]	Prospective Cohort	403	Incidence: 26%, Risk Factor: Younger age and preoperative anxiety were significant risk factors. Management: Non-pharmacological strategies (parental presence) were effective; Dexmedetomidine showed potential but was less commonly used.
Study 2 [14]	Prospective Cohort	340	Incidence: 19%, Risk Factor: Younger age, surgery type (strabismus), and preoperative anxiety. Management: Dexmedetomidine was effective; behavior modification techniques were beneficial but not compared extensively.
Study 3 [15]	Retrospective Cohort	250	Incidence: 23%, Risk Factor: Younger children were more susceptible. Management: Dexmedetomidine was effective; the study highlighted a mix of pharmacological and non-pharmacological interventions, similar to our findings but with a focus on individual methods.

Our study indicated that younger age was a risk factor for emergent delirium, as did Study 1 and Study 2. Dexmedetomidine controls emerging delirium better than other pharmaceuticals in recent meta-analyses Study 3. Although men had higher male rates, our findings suggest that this may not be true across all communities and circumstances. Our findings support the use of pharmaceutical and non-pharmacological treatments to developing delirium. Study 1 found that dexmedetomidine and behavioral methods reduce developing delirium. We found that parental presence and dexmedetomidine work better together.

Limitations

Study constraints must be considered while analyzing its findings. The study is retrospective and contains medical records and anesthetic files, thus delirium symptoms and therapies may not have been fully or consistently reported. Second, because the study was limited to one school, hospital may not apply to other demographics or contexts. Thirdly, the study diagnosed emergence delirium using subjective evaluations and clinical observations, which may have created observer bias. Symptom underreporting or misreading may cause this.



Effect of Emergence delirium's on postoperative behavior and mental health were not examined to fill knowledge gaps.

Future Research

Given these constraints, future research should build on ours to investigate new options. Prospective, multicenter studies on emerging delirium and management in varied healthcare settings promote generalizability. Rising delirium should be studied over time in postoperative recovery and infant development. Preoperative preparation, parental support, and dexmedetomidine dosage and administration should be studied for developing delirium. Delirium management developed with family and patient input could improve anesthetic treatment satisfaction for patients and caregivers.

Conclusion

A study on delirium prevalence and management found 20.8% of pediatric patients at IGIMS Patna developed it between January 2023 and June 2023. It was most common in 4-6-year-olds. Dexmedetomidine was the best drug for developing delirium, but parental presence helped significantly. The findings suggest treating emergence delirium with pharmacological and behavioral therapies. Long-term effects and therapy optimization for pediatric emergence delirium need more study, although this study supports their use in clinical practice.

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