

**THE EFFECT OF KETAMINE ON THE
INCIDENCE AND SEVERITY OF EMERGENCE
AGITATION IN CHILDREN**

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INTRODUCTION

- ❖ Emergence agitation (EA), also called emergence delirium (ED) has been a common problem faced by pediatric anesthesiologists worldwide.
- ❖ EA is a mental disturbance during the recovery from general anesthesia consisting of delusions, inconsolable crying and confusion manifested by moaning, restlessness, involuntary physical activity, and thrashing about in bed.

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- ❖ EA has been identified as a significant problem in children recovering from anesthesia with a reported incidence ranging between 10-80%.
 - ❖ Restless recovery may result in physical harm to the child and the caregivers, may decrease satisfaction and trust of parent and caregiver with the health care experience and may prolong the recovery period.
 - ❖ And this behavior may also cause disruption the surgical site and dressing, drains, or even removal or intravenous catheters.

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- ❖ Since 1960, this topic has been studied and investigated with multiple comparative studies.
 - ❖ Several medications such as propofol, fentanyl, clonidine, dexmedetomidine, ketamine and midazolam have been used in an attempt to decrease the incidence and severity of EA.

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- ❖ In Yangon Children Hospital, propofol, midazolam and fentanyl are used to treat EA.
 - ❖ These medications are expensive to a certain extent and not easily available in some district and township hospitals.
 - ❖ Ketamine is not expensive, registered and easily available in our country.



❖ The purpose of this study is to evaluate the effect of small dose of intravenous ketamine 0.25 mgkg^{-1} , 10 minutes before completion of surgery on the incidence and severity of EA in children undergoing circumcision, receiving an inhalation induction with sevoflurane followed by isoflurane maintenance with caudal anesthesia.



Methods

- ❖ 70 children (ASA I and II, age 3-7 years) who planned for circumcision were selected.
- ❖ Patients was allocated into two groups;
 - ❖ Group K (0.25 mg kg⁻¹ of ketamine 10 min before completion of surgery) and
 - ❖ Group C (Control Group) using block randomization table.

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- ❖ Induction with incremental dose of sevoflurane and 100% O₂ was given.
 - ❖ Anesthesia was maintained by age appropriate MAC of isoflurane and 50:50 of air and O₂, with spontaneous ventilation.
 - ❖ After that, caudal block was carried out to obtain the preemptive, intraoperative and postoperative analgesia.
 - ❖ Surgery was allowed 10 min after caudal block.

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- ❖ Concerning anesthesiologist gave 0.25 mg kg^{-1} of ketamine 10 min before completion of surgery.
 - ❖ At the end of operation, EA was evaluated every 5 min during first hour after awakening from anesthesia.

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- ❖ The pediatric anesthesia emergence delirium (PAED) scale was used to assess EA in both groups.
 - ❖ Patients were considered agitated if they had a score of 10/20 or higher.
 - ❖ Agitated children who had a score of 16/20 or higher will be treated with 1 mg kg⁻¹ of propofol at the discretion of the attending anesthesiologist.
 - ❖ EA was reassessed 5 minutes interval and another dose of propofol was given if recurred. The total amount of rescue propofol were recorded.

9.4 Pediatric anesthesia emergence delirium scale (PAED)

	Score
The child makes eye contact with caregiver The child's actions are purposeful The child is aware of the surroundings	4= not at all 3= just a little 2= quite a bit 1= very much 0= extremely
The child is restless The child is inconsolable	0= not at all 1= just a little 2= quite a bit 3= very much 4= extremely

- ❖ Score < 10 = absence of agitation
- ❖ Score >10 = presence of agitation



Results

- The incidence of EA was 4.56 times higher in control group than in ketamine group.
- There was no statistically significant difference in incidence of post operative complications and recovery room discharge time between the two groups.

Table 4. Incidence and severity of emergence agitation

	Group K (n=35)	Group C (n=35)
Agitation (PAED > 11)	6 (17.1%)	17 (48.6%)
No agitation (PAED < 10)	29 (82.9%)	18 (51.4%)
Mild/moderate (PAED 11-15)	0 (0%)	0 (0%)
Severe (PAED 16-20)	6 (17.1%)	17 (48.6%)

P = 0.005

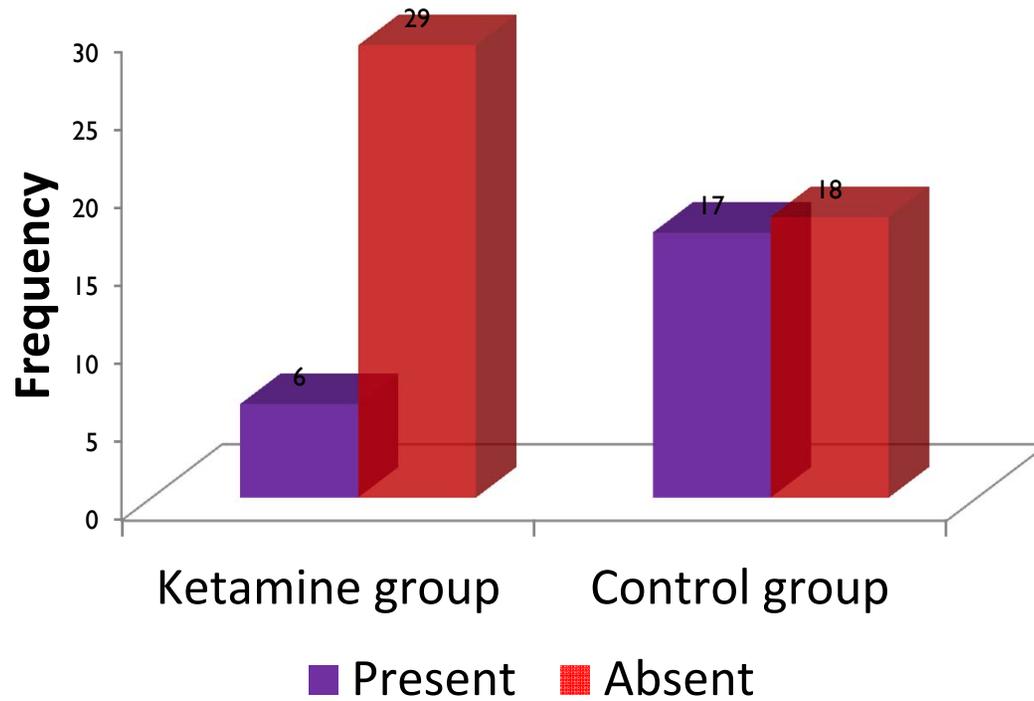


Figure 1. Comparison of incidence of emergence agitation between two study groups

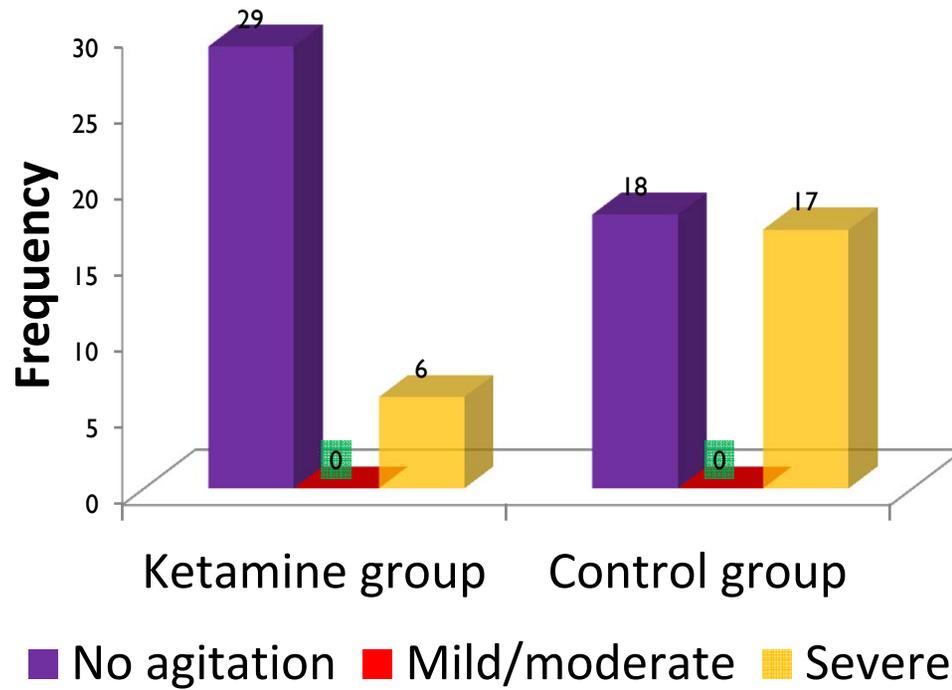


Figure 2. Comparison of severity of emergence agitation between two study groups



Discussion

- ❖ Agitation on emergence from general anesthesia is a frequent phenomenon in children.
- ❖ The choice of the anesthetic agent, type of surgery, pain, age, patient temperament and other factors can affect postoperative behavior in children.

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- ❖ Emergence agitation after inhalational anesthesia has been well described in some studies.
 - ❖ Sevoflurane is choice of anaesthetic agent for induction and maintenance of pediatric anesthesia practice. However due to its intrinsic properties, it has higher incidence of EA in preschool children.
 - ❖ Some investigators indicate an increased incidence of EA whereas others indicate no difference in the incidence of EA when sevoflurane is compared with isoflurane (Constant *et al*, 1999).

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- ❖ Surgical procedures involving the ears, eyes, tonsils, thyroid and urological surgeries have been associated with higher rates of EA.
 - ❖ A recent meta-analysis demonstrated that propofol, fentanyl, α_2 -adrenergic receptor agonist, and ketamine have a prophylactic effect to prevent EA.
 - ❖ Ketamine has sedative, amnesic and analgesic properties.
 - ❖ Many studies with different doses of ketamine have been carried out to reduce the incidence of EA after volatile anesthesia.



◆ In conclusion, the intravenous administration of 0.25 mg kg⁻¹ of ketamine 10 min before completion of surgery was effective in decreasing the incidence and severity of EA in children undergoing circumcision without delaying recovery time and discharge.



**THANK
YOU**