Chapter 6

Emergence Delirium

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A five-year-old, otherwise healthy, boy arrives to the recovery room after his adenotonsillectomy. He is thrashing, incoherent, and inconsolable. You and the recovery room nurse are unable to obtain his vital signs.

What Is Emergence Delirium (ED)?

One clinically accepted definition of ED is the "dissociated state of consciousness in which the child is irritable, uncompromising, uncooperative, incoherent, and inconsolably crying, moaning, kicking, or thrashing" (Vlajkovic et al.) This definition lends itself to understanding that emergence disorders are a clinical spectrum, ranging from irritability (emergence agitation) to frank delirium (emergence delirium). ED may cause patient or provider injury, parental and staff distress, and parental dissatisfaction with care. The incidence varies between 10–80% in the published literature.

What Are the Risk Factors for ED, and How Is ED Measured?

Risk factors for ED include:

- Children aged 6 months to 4 years
- Preexisting anxious temperament
- Parental anxiety
- Children not in school/daycare

ED generally occurs within the first 30 minutes following anesthesia. ED seems to have a predilection for males and those children with enhanced preoperative anxiety. Proposed mechanisms include increased sympathetic nervous system activity as well as alternations in frontal lobe connectivity during the indeterminate stage of emergence. A variety of different measurement scales have been described, including the Pediatric Anesthesia Emergence Delirium (PAED) scale (Table 6.1), the Watcha scale (Table 6.2), and the Cravero scale (Table 6.3).

While each of these scales has their own strengths and limitations, a recent comparative analysis between the three concluded that the Watcha scale is simpler to use in clinical practice and may have greater sensitivity and specificity.

Can Emergence Delirium Be Prevented?

Many different pharmacological agents and approaches have been used to prevent ED. They include the avoidance of an inhalational agent and use of propofol, and a variety of other IV anesthetic adjuncts, including midazolam, clonidine, ketamine, sufentanil, and dexmedetomidine. In recent years dexmedetomidine has been gaining the most popularity because of its generally good tolerance and opioid sparing properties. Non-pharmacological approaches to ED prevention include preoperative preparation to decrease parental or child anxiety, music therapy, and distraction techniques.

What Are the Long-Term Sequelae of ED?

The long-term consequences of ED remain unknown. Currently, there exists no unequivocal data that ED leads to postoperative behavioral or other long-term disturbances. This contrasts strongly with the ICU and perioperative literature in older adults, where delirium is a known risk factor for higher morbidity and mortality on a short- and long-term basis.

What Is the Treatment of ED?

Many medications including propofol, opioids, and dexmedetomidine have been used successfully to treat ED. Their use has to be balanced against airway and hemodynamic concerns.

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Table 6.1 Pediatric anesthesia emergence delirium scale (PAED)

PAED scale for evaluation of emergence delirium					
Behavior	***Not at all***	***Just a little***	***Quite a bit***	***Very much***	***Extremely***
The child makes eye contact with the caregiver	4	3	3	1	0
The child's actions are purposeful	4	3	2	1	0
The child is aware of his/her surroundings	4	3	2	1	0
The child is restless	0	1	2	3	4
The child is inconsolable	0	1	2	3	4

Scores >10 and especially >12 strongly suggest emergence delirium.

Table 6.2 Watcha scale for emergence delirium

Clinical score	Patient characteristic
1	Calm (conversation)
2	Not calm but could easily be calmed
3	Not easily calmed, moderately agitated or restless
4	Combative, excited, or disoriented

Scores >2 are suggestive of emergence agitation/delirium

Table 6.3 Cravero scale for emergence delirium

Clinical score	Patient characteristic
1	Obtunded with no response to stimulation
2	Asleep but responsive to movement or stimulation
3	Awake and responsive
4	Crying (for >3 min)
5	Thrashing behavior that requires restraint

Scores of 4 or 5 for >3 min are suggestive of emergence delirium.

Suggested Reading

Bajwa SA, et al. A comparison of emergence delirium scales following general anesthesia in children. *Paediatr Anaesth*. 2010 Aug;20(8):704–11. PMID: 20497353.

Banchs RJ, Lerman J. Preoperative anxiety management, emergence delirium, and postoperative behavior. *Anesthesiol Clin*. 2014 Mar;32(1):1–23. PMID: 24491647.

Dahmani S, Delivet H, Hilly J. Emergence delirium in children: an update. *Curr Opin Anaesthesiol*. 2014 Jun;27(3):309–15. PMID: 24784918.

Vlajkovic GP, Sindjelic RP. Emergence delirium in children: many questions, few answers. *Anesth Analg*. 2007 Jan;104(1):84–91. PMID: 17179249.

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