

## **Old and new in the management and recognition of Obstructive Sleep Apnea and post-operative apnea**

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### **The Preterm Infant.**

It is now 25 years since the association of general anesthesia and post-operative apnea was reported in infants born prematurely. During those intervening years there have been at least 75 publications seeking to further clarify this problem; unfortunately some of these papers confused the issue rather than clarifying it! There was a lack of consensus on what constituted apnea and which patients we were interested in – i.e. patients having minor surgery (Where anesthesia might be the major cause for apnea) or all preterm patients (Some of whom had many other reasons to stop breathing)! So in 25 years how far have we progressed? A few conclusions can now be fairly well accepted – For apnea after minor surgery:

- a. Infants born at less than 37 weeks gestation and presently under 44 weeks of post-conceptual age are most at risk.
- b. Infants with a history of anemia and/or apnea are more at risk.
- c. Infants on home monitoring are more at risk.
- d. Infants with chronic respiratory disease are more at risk.
- e. Infants with a complicated medical past history are more at risk.
- f. Infants managed with spinal anesthesia without sedation are less at risk.
- g. The addition of clonidine to regional analgesia may increase the risk of apnea.
- h. Administration of IV caffeine preoperatively will decrease the risk.

Apart from these general conclusions we are still unable to predict which infants will experience an apnea episode – so what to do?

First select an appropriate anesthesia technique which will, on available evidence, minimize the risk of apnea. Administration of caffeine at induction significantly reduces the risk of apnea but does not remove the need for careful postoperative monitoring. Regional analgesia (Spinal or caudal) appears to be optimal, provided anesthesia skills and surgical speed and dexterity are available, but is subject to a significant failure rate. Otherwise, selection of rapidly cleared anesthesia drugs with regional analgesia for postoperative pain may reduce risks. Precautions must be taken to ensure that apnea, if it occurs, is promptly treated and does not lead to mortality or morbidity. Preterm infants should be observed (and monitored!) postoperatively, whether they have had regional or general anesthesia, as suggested in the literature. Significant apnea in 'healthy' preterms is usually confined to those under 44 weeks PCA and occurs within 12 hours postoperatively, hence monitoring these infants overnight if they are still under 50 weeks PCA adds a margin of safety and is probably appropriate. Extremely low birth weight, anemic infants, and those with a history of apnea or other significant disease may be at risk until older PCA and must be subject to individual consideration.

### **The child with Obstructive Sleep Apnea Syndrome (OSAS).**

OSAS is a part of a spectrum of diseases now termed sleep disordered breathing (SDB) – a syndrome in which the upper airway patency is poorly maintained during sleep. This may simply lead to snoring but sometimes leads to recurrent partial or complete ventilatory obstruction(OSAS). The syndrome is most common in the pre-school and early school age child. It is often associated with obesity, (though it may be also be associated with craniofacial defects), and leads to pathophysiological changes significant to the anesthesiologist;

- a. Cognitive, learning and behavioral problems, attention deficit, and hypersomnolence.
- b. Diminished response to carbon dioxide rebreathing.
- c. Increased sensitivity to opioids.
- d. Increased blood pressure variability.
- e. Pulmonary hypertension and late cor pulmonale (If untreated)

f. Potential for perioperative complications.

In addition SDB is now recognized to be associated with generalized systemic changes indicative of a widespread inflammatory response (Increased C-reactive protein and other markers). These changes return to normal levels with successful treatment of the SDB.

The tonsils and adenoids are frequently implicated in the obstructive process and this brings many of these children to surgery. The discussion will therefore center on current approaches to managing these children for T&A. The current practice of managing many T&A patients in the day surgery unit presents a problem when dealing with OSAS patients. It must be decided which patients are safe to go home and which should be monitored for 24 hours or more in the hospital. This will be discussed.

Murphy JJ. Swanson T. Ansermino M. Milner R. The frequency of apneas in premature infants after inguinal hernia repair: do they need overnight monitoring in the intensive care unit? *Journal of Pediatric Surgery*. 43(5):865-8, 2008

Kachko L. Simhi E. Tzeitlin E. Efrat R. Tarabikin E. Peled E. Metzner I. Katz J. Spinal anesthesia in neonates and infants - a single-center experience of 505 cases. *Paediatric Anaesthesia*. 17(7):647-53, 2007

Walther-Larsen S. Rasmussen LS. The former preterm infant and risk of post-operative apnoea: recommendations for management. *Acta Anaesthesiologica Scandinavica*. 50(7):888-93, 2006

Sale SM. Read JA. Stoddart PA. Wolf AR. Prospective comparison of sevoflurane and desflurane in formerly premature infants undergoing inguinal herniotomy. *British Journal of Anaesthesia*. 96(6):774-8, 2006

Henderson-Smart DJ. Steer P. Prophylactic caffeine to prevent postoperative apnea following general anesthesia in preterm infants. *Cochrane Database of Systematic Reviews*. (4):CD000048, 2001

Fellmann C. Gerber AC. Weiss M. Apnoea in a former preterm infant after caudal bupivacaine with clonidine for inguinal herniorrhaphy. *Paediatric Anaesthesia*. 12(7):637-40, 2002

Bandla P. Brooks LJ. Trimarchi T. Helfaer M. Obstructive sleep apnea syndrome in children. *Anesthesiology Clinics of North America*. 23(3):535-49, viii, 2005

Lerman J. Unraveling the mysteries of sleep-disordered breathing in children. *Anesthesiology*. 105(4):645-7, 2006

Cox RG. Anesthetic management of pediatric adenotonsillectomy. *Canadian Journal of Anaesthesia*. 54(12):1021-5, 2007

Arai YC. Nakayama M. Kato N. Wakao Y. Ito H. Komatsu T. The effects of jaw thrust and the lateral position on heart rate variability in anesthetized children with obstructive sleep apnea syndrome. *Anesthesia & Analgesia*. 104(6):1352-5, table of contents, 2007