

Postoperative pain management in children

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Introduction:

Pain is defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage (1). The structural components necessary to perceive pain are already present at about 25 weeks gestation, while the endogenous descending inhibitory pathways remain underdeveloped till mild-infancy (2). Pediatric pain management has developed rapidly accompanying the development of new drugs but is still insufficient and opioid analgesics are used less than in adults (3,4). Pediatric patients were more likely to receive oral, non-opioid analgesia after major surgery, while adult patients were more likely to receive intravenous morphine (5,6).

Diagnosis, discerning a cause of pain and standardizing pain intensity in children are difficult tasks. Despite advances in pain management over the past decade, many anesthesiologists are often unfamiliar with children and have an unrealistic fear of cardiorespiratory depression and of other adverse drug reactions, because of their age and small size (3,4). The other problem is that doctors are uncertain about age-specific and weight-specific dosing in pediatric patients. Also, in our country, the problem is that most hospitals do not have pediatric pain service, which is the standard of pediatric care in developed countries.

Often, acute pain in pediatric surgery goes unrecognized and undiagnosed, which leads to significant suffering. In most cases, postoperative pain is severe in the first few days after the operation but gradually improves over time in the postoperative period. Insufficient pain treatment in children will cause significant stress, which will stimulate a hormonal response, neurologic, pulmonary and immunologic functions, which leads to difficulty in a child's recovery, increasing the incidence of morbidity and mortality (7-9).

Analgesics can be administered orally, intravenously, intranasally, intramuscularly, subcutaneously, transcutaneously, mucosally and rectally. Ideally, oral analgesics

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should have a flavor that is pleasant to the children, and intramuscular or subcutaneous injections should be avoided if possible.

A multimodal approach, using more than one method, increases the success rate.

Oral analgesics

This way is usually used for mild and moderate pain after peripheral surgery or following more potent opioid analgesics therapy. The drugs used orally include: paracetamol, NSAID-s (diclofenac, ibuprofen, and ketorolac), and opioids (codeine phosphate, dihydrocodeine, and morphine syrup). Paracetamol is the most common analgesic used among neonates and infants owing to its favorable safety profile and is used for mild to moderate postoperative pain. It's often combined with opioids for more severe postoperative pain (10). Oral NSAIDs have few gastrointestinal side effects but provide better analgesia compared with paracetamol.

Systemic Analgesics

Morphine has long been the opioid of choice for postoperative pain control in children. Its pharmacokinetics are well known even in premature infants (11). Many clinicians are cautious regarding the risk of respiratory depression associated with morphine administration (12). It's important to know that the lower morphine dosage did not decrease the incidence of side effects (13). Since 2001, American Pain Society and American Academy of Pediatrics recommended not to use Meperidine as an analgesic for pediatric patients (14). Intravenous fentanyl has been successfully used for postoperative analgesia in children and newborn infants (15). Intranasal fentanyl used for stable pediatric patient, who requires pain therapy for moderate to severe pain, and who does not have intravenous access. Intranasal fentanyl associated with improved timeliness and equivalent effectiveness and safety when compared to intravenous fentanyl (16).

Patent-controlled analgesia (PSA)

PSA is now widely used in children as young as 6 years (5). Theoretically, any child who understands the relationship between pressing a button and receiving analgesia can use it. Pre-determined variables are set through the PCA pump to establish the essential safety limits for analgesic medications. The variables include an initial loading dose, a demand for bolus dose, a lockout interval, background infusion rate, and 1-hour or 4-hour limits (17). Appropriate monitoring by adequately trained personnel is essential if intravenous opioids are used. It's difficult to estimate the number of adverse events associated with PCA therapy in children. Medication adverse events are grossly underreported in the pediatric population. Respiratory depression in children receiving PCA therapy alone has been reported by one reviewer to range from 0 to 1,1% (18). Naloxone and other resuscitation drugs must be available at the bedside.

Local and regional anesthesia

Regional anesthesia is most commonly used in conjunction with general anesthesia, although in certain circumstances regional anesthesia may be the sole technique. In addition to central neuraxial blocks, peripheral nerve blocks are now employed with increasing frequency, in part because of the introduction of high-resolution portable ultra-sound imaging. Regional blocks are becoming increasingly popular in pediatric anesthesia. Blockade with long-acting local anesthetics or continuous peripheral nerve blockade with an infusion of anesthetics via catheters can provide postoperative analgesia for outpatient surgery. Eliminating or reducing the need for systemic analgesics diminishes the potential adverse effect associated with their use. Regional anesthesia provides good postoperative analgesia in pediatric patients and reduces stress response (19-21). Safety aspect of pediatric regional anesthesia included a low incidence of complications especially of peripheral regional blocks (22). Ultrasonography-guided regional anesthetic techniques provide real-time visualization of anatomical structures. More rapid onset of the block using less local anesthetic solution is particularly attractive for pediatric patients. Safe dosing guidelines have greatly reduced the incidence of systemic toxicity (23,24). To prolong postoperative duration after caudal block, a lot of anesthesiologists used adjuvants as ketamine, clonidine, fentanyl, and diamorphine-without increasing side effects such as motor blockade.

Conclusion:

Prevention of pain whenever possible, using multi-modal analgesia, will significantly improve postoperative recovery in children after the operation. In particular, an individual pain management plan should be made for each child, to bring pain under control and to continue pain control after discharge from the hospital. Pediatric hospitals should develop pediatric pain services as the standard of pediatric care.

References:

1. Internacional association for study of pain. Subcommittee on Taxonomy. Pain terms: a last with definitions and notes on usage. *Pain* 1979;6:249-52.
2. Committee on Physiological Aspects of Child and Family Health, American Academy of Pediatrics; Task Force on Pain in infants, Children, and Adolescents, American Pain Society. The Assessment and management of acute pain in infants, children and adolescents. *Pediatrics* 2001;108:793-7.
3. Walter-Larsen S, Pedersen MT, Friis SM, et al. Pain prevalence in hospitalized children: a prospective cross-sectional survey in four Danish university hospitals. *Acta Anaesthesiol Scand* 2017;61:328-37.
4. Vittigoff M, Lonnqvist PA, Mosseti V, et al. Postoperative pain management in children: Guidance from the pain committee of the European Society for Paediatric Anaesthesiology (ESPA Pain Management Ladder Initiative). *Pediatric Anaesth* 2018;493-506.