CONTINUING EDUCATION

Framework to Explain the Progression of Pain in Obese or Overweight Children Undergoing Tonsillectomy

Shirley D. Martin, PhD, RN, CPN, Lauri D. John, PhD, RN, CNS

An estimated 100,000 obese (OB) and overweight (OW) children undergo tonsillectomy each year in the United States. Pain management in this population is particularly challenging because of weight-based dosing, clinician fears, potential for airway obstruction, and genetic differences. A framework is proposed to explain factors involved in the post-tonsillectomy pain (PTP) experience in OB and OW children. The tonsillectomy, the body's inflammatory state, and mechanical stressors comprise influencing factors in PTP progression. Clinician-delivered medication doses, genetic variants of drug metabolism, and soothing factors serve as mediating factors in the progression of PTP. Postanesthesia care unit (PACU) nurses may use this framework to better understand PTP progression in OB and OW children. PACU nurses may manipulate certain mediating factors discussed in this framework to moderate PTP progression in OB and OW children. Researchers may use this framework to support future research to improve PTP management in OB and OW children.

Keywords: *post-tonsillectomy pain, obese or overweight children, postanesthesia care unit, framework, pain management.*

OBJECTIVES—1. DESCRIBE WEIGHT-BASED risk factors for increased post-tonsillectomy pain (PTP) in obese (OB) or overweight (OW) children. 2. Recognize mediating factors that may reduce PTP in children. 3. Discuss how to apply knowledge of underlying theory to improve nursing practice in the treatment of PTP in OB and OW children.

The following article contains a framework that PACU nurses may use to help anticipate, explain, and treat post-tonsillectomy pain (PTP) in obese (OB) or overweight (OW) children. Researchers currently lack sufficient evidence to support the development of highly effective clinical guidelines for effective pain management in OB and OW children undergoing tonsillectomy.[1] The theoretical framework was developed and used to support a recently completed research study in which factors involved in the PTP experience of OB and OW children in the PACU post-tonsillectomy were examined.[2] OB and OW children experienced risk of prolonged moderate-to-severe pain episodes compared with their peers. Nurses and other health care providers may use this

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framework to increase understanding of the complexities of PTP in OB and OW children to help guide clinical practice. Key components of nurses' responsibilities and opportunities for improved practice as recognized in this framework are highlighted and linked to the American Society of Perianesthesia Nurses standards.[3] The framework may also be used to facilitate future research.[2] After reading this article, nurses should be able to (1) describe weight-based risk factors for increased PTP in OB and OW children, (2) recognize mediating factors that may reduce PTP in children, and (3) apply knowledge of underlying theory to improve nursing practice in the treatment of PTP in OB and OW children.

A list of framework concepts and relationships is described first, followed by a discussion of the background, framework development, and final framework product. The framework is further explained in terms of influencing factors, some of the proposed mediating factors, and the outcome of PTP.

Framework Concepts

In OB and OW children, three types of influencing factors interact with three types of mediating factors in the progression of the cognitive, sensory, and emotional experience of PTP. Variations in these factors may increase or decrease the cognitive, sensory, and emotional experience of PTP in OB and OW children.

The following theoretical propositions may be made:

Propositions

1. Influencing factors (proinflammatory state of obesity, mechanical stressors, and genetic variations) interact to modify progression of the cognitive, sensory, and emotional experience of PTP in OB and OW children.
2. The proinflammatory state of obesity may lead to an increase in the cognitive, sensory, and emotional experience of PTP in OB and OW children.
3. Mediating factors (clinician-delivered analgesics, genetic variants of drug metabolism, and soothing factors) interact to modify the cognitive, sensory, and emotional experience of PTP in OB and OW children.
4. Manipulation of one or two mediating factors (clinician-delivered analgesics and soothing factors) leads to a decrease in the cognitive, sensory, and emotional experience of PTP in OB and OW children.

Background

Pediatric Tonsillectomy in OB and OW Children

Approximately, 289,000 children younger than 15 years undergo tonsillectomy each year in the United States, making this one of the most common pediatric surgeries.[4,5] The rise in rates of obesity and OW in children since the 1970s has caused a similar shift in those rates in the pediatric tonsillectomy population. Children, defined by the National Health and Nutrition Examination Survey as between the ages of 2 to 19 years, with body mass index (BMI) scores at or above the 85th percentile are considered OW, and those at or above the 95th percentile are considered OB.[6] Reported rates of obesity and OW in children in single tonsillectomy studies range from 32.4% to 38%,[7-9] matching pediatric OB and OW trends in the United States.[6] It is difficult to estimate exactly how many OB and OW children undergo tonsillectomy each year in the United States, because the Centers for Disease Control and Prevention define children as being aged 2 to less than 20 years.[10] Based on the rates from individual studies and the tonsillectomy rates in the US children younger than 15 years, it can be estimated that over 100,000 OB and OW children younger than 15 years may undergo tonsillectomy each year in the United States. The number of OB and OW children may actually be much higher if children are defined according to the Centers for Disease Control and Prevention definition. For the purposes of this framework, children are considered to be aged between 2 and 19 years.

Pediatric tonsillectomy is one of the most persistently painful surgeries when compared with other common childhood surgeries such as orchidopexy or inguinal hernia repair.[5,11] The wound created by the tonsillectomy procedure requires 1 to 2 weeks for healing and causes acute and persistent pain in children. Pain is highest in the first few days after surgery and decreases across time, paralleling the healing process.[11,12] At least two-thirds of children report moderate-to-severe pain during their recovery period in the PACU.[13]

Defining Pain

Cohen et al[14] provided the following updated definition for pain: "Pain is a mutually recognizable somatic experience that reflects a person's apprehension of threat to their bodily or existential integrity." This definition can be applied to the acute pain experience of children undergoing tonsillectomy. According to Melzack, the pain experience has cognitive, affective, and sensory components.[15] A part of this definition that has not been well-explored is the potential for weight-based differences in children's bodies and how this might influence the pain experience of children, particularly after a painful surgery such as tonsillectomy.

Associations Between BMI and Pain

The association between high BMI and chronic pain in both adults and children has been examined in previous research,[16-19] but sparse and conflicting evidence exists to support a potential relationship between high BMI and acute pain in children, specifically postoperative pain.[2,7,20] Nafiu et al[7] found a four-fold increased risk for early PTP in OB and OW children, defined as moderate-to-severe pain occurring within the first 15 minutes of arrival to the PACU; however, Scalford et al[20] did not find weight-based differences in moderate-to-severe pain in OB and OW children. These conflicting findings could be related to many factors, including differences in methodology.

Challenges With Pain Management

PACU nurses and other health care providers are confronted with multiple dilemmas while attempting to manage PTP in OB and OW children. Pain management in this population includes potentially complicated drug dosage calculations and consideration of risks versus benefits of analgesia with the potential for postoperative obstructive sleep apnea (OSA) events.[21,22] Clinicians use weight-based calculations to determine drug dosages in children. A simple math calculation (eg, recommended drug dose in milligrams/ kilogram multiplied by child's weight in kilograms) does not work in OB and OW children, where such calculations could lead to dosages that exceed recommendations for adults. Instead, clinicians may use more involved calculations based on ideal body weight and cofactors for various medications.[20,21] They may also adjust doses up or down based on individual clinician judgment or may need to consult with a pharmacist.[23] Evidence is lacking on pharmacokinetics of medications used in OB and OW children, and specifically with the common analgesics used post-tonsillectomy.[1]

Because of their goal of ensuring that OB and OW children recover safely from tonsillectomy, health care providers might choose strategies that offer less than optimal pain control as they attempt to balance risks and benefits.[8] OB and OW children have a known increased risk for postoperative OSA events, in part because of the extrapharyngeal fat tissue in the neck region and also due to respiratory depression that may occur with opioid use for pain management.[24,25] In addition, OB children,[26] and in some studies, OB and OW children,[21] have higher rates of laryngospasm in the immediate postoperative period that may also be influenced by opioid use. Nurses and other health care providers have a moral imperative to prevent suffering; however, lack of knowledge and planning may lead to implementation of inadequate pain management strategies resulting in uncontrolled PTP.

Modern Pain Theory

Modern technology has transformed pain research in recent years. Use of specialized equipment such as functional magnetic resonance imaging has greatly increased understanding of what happens in the brain and spinal column during a painful event.[27] Melzack and Wall[28] first revolutionized pain theory in the 1960s by developing the gate control theory, which explained the transmission of pain signaling along the spinal column. Melzack[29] later developed the theory of the neuromatrix, describing a neural matrix of sensory neurons in the brain with cognitive, sensory, and affective components. Melzack found himself inspired by Selye's work on the body's stress response as he considered many potential factors that could influence a person's experience of pain[15]; however, no pain theorist has clearly described factors involved in the acute postoperative pain experience of OB and OW children.

Methods

The following framework was developed after an extensive literature search, using knowledge of Melzack's theory of the neuromatrix,[29] Selye's general adaptation syndrome,[30] and McVinnie's description of links between obesity and chronic pain in adults.[31] In addition, the authors' own combined years of practical clinical expertise influenced the development of this new model. The first author initially conducted a search for theories to explain connections between acute pain or acute PTP in OB and OW children in CINAHL, Medline, PubMed, and Google Scholar, followed by hand searches of reference lists in related research articles. Search terms used included: child*, pediatric, obes*, weight, overweight, pain, acute pain, tonsillectomy, postoperative, and post-tonsillectomy. No articles resulted from this initial comprehensive search. The first author then repeated the search, broadening it to include adults. The resulting framework was developed as part of work toward a doctoral dissertation.

The final literature search resulted in the development of one framework linking pain and obesity. There are no published theories explaining potential relationships between childhood obesity and either postoperative pain or PTP. A multifactorial model has been proposed to explain the complex relationship between obesity and chronic pain in adults.[31] Obesity-related factors that may be associated with chronic pain in adults include the proinflammatory state of obesity, genetics, the sedentary lifestyle, depression, and mechanical stresses.[31]

Some of the factors associated with chronic pain in adults may also be associated with the acute pain experience in OB and OW children undergoing tonsillectomy. Such factors include the proinflammatory state of obesity, genetics, and mechanical stresses.

In the context of pediatric tonsillectomy, additional factors might influence a child's pain experience while the child is in Phase I and Phase II PACU. Medications provided by clinicians throughout the perioperative period would mediate pain. Factors internal and external to the child that could provide a calming effect, termed *soothing factors* in this model, would also mediate pain.

Pain progression in each child can be understood in the context of Melzack's neuromatrix model.[29] Melzack considered pain to have cognitive, sensory, and emotional components. It is difficult in a fast-paced perioperative setting to have time to adequately address all these components of pain. The progression of pain was operationalized before research performed with the framework.[2] The progression of pain refers to severity and duration of PTP in Phase I and Phase II PACU, including the time from arrival into Phase I PACU until episodes of moderate-to-severe PTP occurred, and the total length of time for uncontrolled moderate-to-severe pain (with no pain scores less than 4) in either Phase I or Phase II PACU. Pain scores were obtained with one or more of the following measurement tools: the FLACC,[32] Wong-Baker FACES[33], and the verbal numeric scale.[34]

The newly developed framework was tested in a study in which weight-based risks for PTP in children were examined.[2] Findings supported the new framework. OB and OW children experienced increased risk of longer episodes of uncontrolled PTP in the PACU compared with their peers (χ^2 (1) = 8.353, P = .004), with a median of 5 minutes and an average of 16.6 minutes (OB and OW) versus 8.3 minutes (non-OB and OW). Uncontrolled PTP was the smallest period measured from the time the nurse documented a moderate-to-severe pain score (≥4 of 10) until the child sustained pain scores between 0 and 3.

Framework

The framework (illustrated in Figure 1) is a multifactorial model that explains the pain experience of OB and OW children undergoing tonsillectomy. There are multiple factors that potentially influence the relationship between obesity and pain in the framework.

The framework incorporates the concepts of influencing factors and mediating factors into an

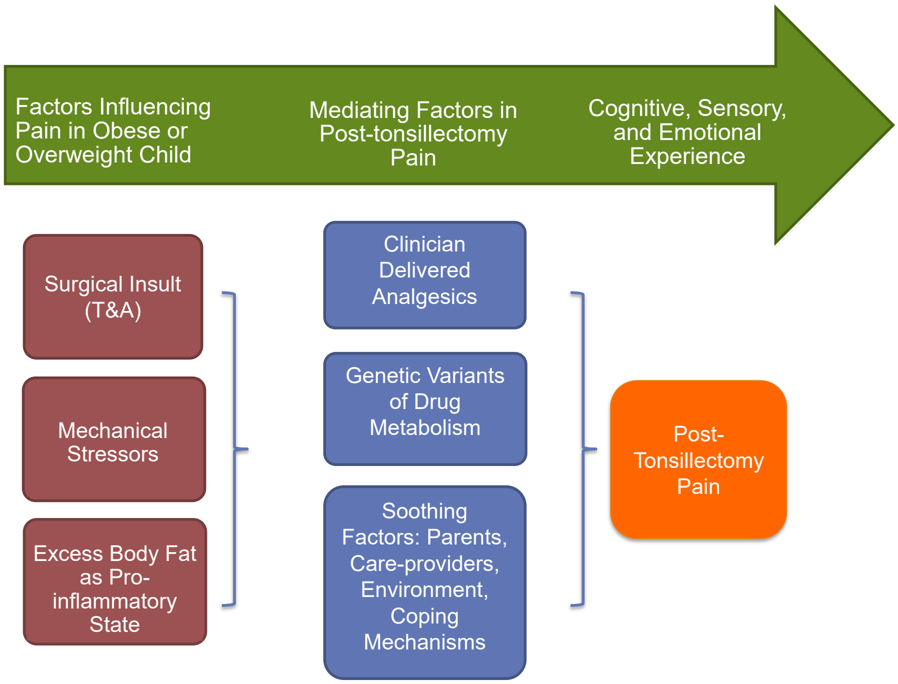

Figure 1. Framework of PTP progression in OB and OW children. PTP, post-tonsillectomy pain. This figure is available in color online at www.jopan.org.

explanation of the progression of the cognitive, sensory, and emotional experience of PTP in OB and OW children. Influencing factors that may promote pain in OB and OW children include the surgical insult of the tonsillectomy, the proinflammatory state of excess body fat, and mechanical stressors. Mediating factors include clinician-delivered analgesics, genetic variations in drug metabolism, and soothing factors. This framework illustrates how states of obesity or OW in children could produce greater or potentially more prolonged PTP than would occur in normal weight peers. The framework also includes factors that health care providers should consider to safely reduce and manage pain.

Factors Influencing PTP in OB and OW Children

The first concept in the framework of PTP progression in OB and OW children is *factors influencing PTP.* These factors include the surgical insult of the tonsillectomy, excess body fat that creates a proinflammatory state, and mechanical stressors.

Surgical Insult of the Tonsillectomy

The surgical insult of the tonsillectomy is the first influencing factor for PTP in OB and OW children undergoing tonsillectomy. Tonsillectomy requires excision of tonsil tissue and control of bleeding in surrounding areas.[12,35] Usually, the procedure is performed under anesthesia because of pain and safety issues. The surgical insult causes actual mucosal tissue damage that may take up to 2 weeks to heal.[11,12,36] Pain occurs with fibrin clot accumulation and inflammation and resolves after complete healing occurs.[11,12]

Excess Body Fat as a Proinflammatory State

Although excess body fat is not realistically modifiable in the short-term perioperative setting of tonsillectomy and management of PTP, it is important to understand its role in the progression of pain. The body normally seeks homeostasis and restoration.[37] The state of obesity disrupts normal systemic physiological processes, producing chronic inflammation in both children and adults.[38] Inflammation is the body's coordinated response to restore itself in the face of threat.

The same responses that are elicited in acute inflammatory situations occur in chronic inflammation as the body seeks protection. Chronic inflammation produces adaptive immune responses within the body, including increases in chemokines and activation of leukocytes.[38] These inflammatory mediators can override and disrupt normal regulatory responses within the body. Chronicity in this response is problematic because tissue damage may result from the prolonged activation of the immune response.

Researchers have focused on the relationship between inflammation, obesity, and pain in adults for many years, but only more recently it has been a focus of study in children.[19,31,38-42] Backed by theoretical knowledge, researchers have also investigated potential biomarkers that are influenced by obesity and may also be used to predict and treat pain. Biomarkers are proteins or enzymes in the body that can be obtained from blood or tissue and quantified for research, diagnostic, or prognostic work.[43] Cytokines are one type of biomarker used in studies of obesity and pain.[31,44] Cytokines, both inflammatory and anti-inflammatory, are small proteins secreted by cells to help with cellular communication.[45] Biomarkers of interest in pain and obesity research include C-reactive protein (CRP),[46] the cytokines interleukin 6 (IL-6), and tumor necrosis factor α (TNF-α).[31,47] Levels of these biomarkers are higher in OB persons and have thus been the focus of studies of obesity and pain.[31]

Obesity produces a proinflammatory state in the following manner. People who are OB have higher levels of inflammatory biomarkers and higher amounts of adipocytes than normal or underweight individuals.[31] Adipocytes store energy and also secrete adipocytokines including IL-6, TNF-α, and leptin. IL-6 and other inflammatory cytokines trigger release of CRP in the liver. The adipocytokine monocyte chemoattractant protein 1 (MCP-1) causes monocytes to travel to fat tissue and initiates localized release of other inflammatory cytokines, further increasing IL-6 and TNF-α, both of which have been implicated in the mechanism of increased pain.[31]

An OW status in children may also be associated with inflammatory changes.[48,49] Researchers have found higher levels of CRP and IL-6 in both OB and OW children and adolescents.[49]

Inflammation is involved in the complicated process that produces pain. Chemical mediators involved in inflammation, such as prostaglandins, kinins, and histamine, communicate with the brain and nervous system to produce pain.[31,50] An example of one mechanism that occurs is when localized inflammation creates swelling that puts pressure on local pain receptors. This process contributes to the influencing factor of mechanical stressors post-tonsillectomy.

Mechanical Stressors

Obesity can create a mechanical stressor in children undergoing tonsillectomy in the following two ways: (1) by increasing weight-associated pressure in the throat and (2) by increasing size-related surface area with pain sensing neurons. OB children tend to have a larger parapharyngeal fat pad that can cause obstruction of the airway leading to OSA.[51,52] The excess fatty tissue places mechanical pressure on pain receptors in the swollen pharyngeal tissue after surgery. OB children also have potentially more pharyngeal surface area traumatized during the tonsillectomy, leading to a larger surface area involved in the mechanical stressors of chewing and swallowing after surgery. OB and OW children may endure higher numbers of stimulated nerve endings with an increased activation of the pain response. These mechanical stressors of increased pressure and increased traumatized surface area could potentially contribute to increased PTP.

Mediating Factors in PTP in OB and OW Children

The second concept in the framework of PTP progression in OB and OW children is *mediating factors*. There are a variety of mediating factors that might influence the progression of PTP in OB and OW children, either increasing or decreasing the pain. These factors can be grouped into the following three large categories: clinician-delivered analgesics, genetic variants of drug metabolism, and soothing factors.

Clinician-Delivered Analgesics

Clinicians' decisions about dosages, type, and timing of analgesics may influence pain outcomes dramatically. Initial pain management may include a combination of intravenous analgesics such as morphine, fentanyl, and acetaminophen.[12,53,54] The steroid dexamethasone is useful in reducing both pain and nausea.[55] Anesthesia providers may use physiological parameters such as heart rate, respiratory rate, and oxygen saturation to determine how much analgesic to give anesthetized children. When children arrive in the PACU, nurses provide additional titrated doses of rescue opioids based on assessments of each child's pain levels, combined with knowledge of heart rate, respiratory rate, and oxygen saturation rate.[20,53,54,] Nurses may use either observational or self-report pain scales, depending on each child's developmental age and level of consciousness. Nurses may assume that pain is present in children after tonsillectomy even when children are unable to self-report.[56] Multimodal analgesic management (eg, combination of morphine along with acetaminophen), rather than use of one analgesic alone, is commonly used in the PACU to manage PTP as children are transitioned from intravenous pain management to oral pain management.[20]

Analgesic dose calculations are complicated in OB and OW children.[23] Clinicians primarily determine medication dosages in children based on weight for children up to 40 or 50 kg; however, there is little evidence to support safe dosage calculations in OB and OW children.[1,8,23,57-60] PACU nurses and other clinicians, lacking clear guidelines, face risks of providing nontherapeutic doses of analgesics in OB and OW children.[7,8,53,58,61] For example, a PACU nurse may provide opioid doses in Phase I PACU for an OB and OW child based on a sliding scale order from the anesthesia provider. The nurse may not control the pain if the sliding scale is inadequate to manage that OB and OW child's pain. This may cause a delay in PTP management if the nurse must call for additional orders. Alternatively, for some OB children recovering in Phase I and Phase II PACU, there exists a narrow therapeutic range for rescue opioids, and even if the child rouses to report severe pain, additional opioids may lead to airway obstruction, causing the nurse to withhold additional titrated doses.

Genetic Variants of Drug Metabolism

Genetic variations in drug metabolism influence pain responses, but some genetic variations, or gene expressions, may be related to obesity. Geneticists use the term epigenetics when referring to this process.[62] The gene expression process may be promoted or reversed. Gene expression is influenced by many factors, including environment and numerous host factors (eg, age, gender, weight). Researchers have found a specific polymorphism (genetic variation) influencing morphine metabolism that occurs more frequently in OB people than normal weight people.[63,64] This polymorphism is associated with a decrease in pain relief from morphine and resultant need for increased morphine and fentanyl for pain relief. Fatty liver disease that can occur with obesity can also affect drug metabolism by altering expression of genes, down-regulating certain enzymes and up-regulating other enzymes that are important in the process of drug metabolism.[64] Epigenetic changes related to obesity may either increase or decrease effectiveness of pain medications; in most cases, these changes decrease effectiveness and increase the experience of PTP.

Children with unknown genetic background may be susceptible to variations in metabolism of codeine and other opioids related to codeine (eg, hydrocodone); these risks may be higher in OB children.[12,60,62,65] In 2013, there were three OB children who died from codeine toxicity after surgery.[66] Genetically poor metabolizers of codeine may get no benefit at all from codeine, whereas those termed intermediate metabolizers have impaired drug oxidation and are at risk of receiving toxic doses.[12,59,62] Codeine is no longer recommended for this population.[67-69]

Soothing Factors

Soothing factors are factors internal and external to children that mediate the progression of PTP. Soothing factors are a broad category of factors that may also be termed biobehavioral, nonpharmacologic, or psychological interventions. Davidson et al[70] found that psychological interventions such as distraction and imagery significantly reduced short-term pain within the first 24 hours after surgery, whereas education and patient

Box 1. Discussion of Related ASPAN Standards, Practice Recommendations, and Position Statements[3]

PRACTICE RECOMMENDATION 2. Components of Assessment and Management for the Perianesthesia Patient

The perioperative nurse is reminded to consider important aspects to gathering of the health history before surgery. Although OB/OW is not specifically listed in this section, the nurse may consider the additional adipose tissue carried by the child and how this may affect the child's progression through surgery and recovery. The nurse is encouraged to make an individualized plan before surgery that will enhance comfort in the child and reduce risks related to OSA.

ASPAN STANDARD VI. Nursing Process

The nurse considers factors related to OB/OW in assessment and planning and to gather phase-specific components of assessment throughout the child's perioperative experience. The nurse is also guided to consider items from Practice Recommendation 2.

ASPAN STANDARD II. Environment of Care

The nurse may reduce noise and distraction to a minimum to reduce stress and anxiety for the child and parents during the perioperative experience.

PRACTICE RECOMMENDATION 9. Family Presence in the Perianesthesia Setting

Parental presence in the postoperative areas may reduce the amount of anxiolytic and pain medication required, increasing both comfort and reducing risk for side effects from medications. The nurse is encouraged to include at least one parent in the postoperative care of the child as soon as feasible and safe.

POSITION STATEMENT 15. A Position Statement on Opioid Stewardship in Perianesthesia Practice

The nurse is encouraged to provide a holistic improvement of pain management and advocate for multimodal pain management. Biobehavioral (nonpharmacologic) methods to increase comfort are recommended.

preparation did not. Patient education and preparation could be considered a soothing factor when tailored to each child and family. Fortier et al[71] found that most children, and particularly the most anxious children aged 7-17 years, preferred comprehensive perioperative education about pain management. Other examples of soothing factors shown to reduce postoperative pain in children include parental presence, therapeutic suggestion under anesthesia, and music therapy.[20,72,73] A calm, quiet environment with reduced stimulation and soft music is more calming than a noisy environment.[74-76] Soothing factors also include interventions such as use of human touch, manipulation of environmental factors (ie, music, dim lights, soft bedding), and the analgesic response to eating and drinking that can be used to comfort children and reduce their pain.[70] It could also be soothing to apply heat or cold when appropriate to promote comfort.[69]

Food as analgesia is complicated by potential differences between OB and OW children and normal weight children, the location of PTP (throat), and the high likelihood of postoperative nausea. In rats and humans, researchers have demonstrated that pleasurable food and drink elicit analgesia and reduce pain.[77-79] There may be physiological differences in children who use food as analgesia as a routine coping mechanism. It might be suspected that OB and OW children would have more benefit from using food as analgesia; however, normal weight children experience better analgesia with a sucrose solution than OW children.[79] Post-tonsillectomy ingestion of food to provide analgesia would be difficult during the early recovery period for many reasons including postoperative nausea, the location of the surgical site, and the risk of surgical site bleeding[12,35,53]; however, it is common to offer frozen Popsicles to children after tonsillectomy to sooth the

Table 1. Potential Soothing Factors to Reduce PTP in Children

Emotional support soothing factors[20,69,71]
- Patient/Family education about pain management
- Parental presence

Physical sensory soothing factors[36,69,82]
- Human touch
- Massage
- Cold/Heat
  - Cold pack to neck and jaw
  - Heating pad for ear pain
- Calm, quiet environment with reduced stimulation
- Dim lights
- Soft bedding
- Soft music

Guided verbal soothing factors[69,70,73,83]
- Therapeutic suggestion under anesthesia
- Relaxation
- Imagery

Deliberate use of distraction as soothing factor[69,80]
- Interactive video games
- Reading
- Playing favorite toys/games
- Watching television

Oral soothing factors[36,69]
- Eating
- Drinking
- Chewing gum (at home)

PTP, posttonsillectomy pain.

throat and reduce inflammation. The effect of these potential differences between OB and OW children and normal or underweight children with regard to eating as analgesia is unknown.

It is likely that soothing factors interact with other mediating factors. For example, a child sitting in a parent's lap after surgery might require less analgesic than a child resting on a hard stretcher with minimal parental touch.[73] It could be possible that certain soothing factors could be combined for greater effect. An example of this is use of video games for distraction during acute pain. Developmentally appropriate interactive video games involve more of the senses and provide better acute pain control in children than passive videos.[80]

Cognitive, Sensory, and Emotional Experience of PTP in OB and OW Children

The final concept in the framework of PTP progression in OB and OW children is the *cognitive, sensory, and emotional experience* of PTP. Cognitive, sensory, and emotional components of pain are parts of the neural signaling in the brain and body.[15] Cognitive signaling includes what children remember about previous painful experiences and what children think about the current surgical experience. Sensory experiences of pain are the sensations felt in the physical body. The emotional experiences involved in PTP include many feelings, including anxiety, reduced motivation, stress, anger, or sadness.[81]

Implications

Although the influencing factors of the proinflammatory state, mechanical stressors, and the surgical insult are mostly unmodifiable during the acute insult of tonsillectomy, nurses need to be aware of the effect of these factors on pain progression in OB and OW children. PACU nurses may manipulate modifiable mediating factors, such as medications and soothing factors, to positively influence OB and OW children's cognitive, sensory, and emotional responses to surgery and thus decrease their pain progression. This process does not originate in the PACU. In fact, the American Society of Perianesthesia Nurses standards include many related practice recommendations that begin in the preoperative setting and continue throughout children's perioperative experiences (Box 1).[3] Nurses may discuss potential soothing factors with parents during the preoperative period to form an individualized plan of care that will be helpful throughout the surgical experience. Soothing factors include, but are not limited to, such interventions as music, parental presence in the PACU, therapeutic suggestion, or therapeutic touch. Soothing factors could also potentially be combined if desired by families and children. See Table 1 for additional strategies. A consideration of the timing and amounts of analgesics delivered in the operating room and any history of OSA or signs of excessive drowsiness can help PACU nurses determine safe dosing with additional opioid analgesics and progression to nonopioid analgesic medications. PACU nurses, acutely aware of potential for OSA in this population, may monitor OB and OW children with extra care, continuing to monitor oxygen saturations closely when children sleep in Phase II PACU before discharge. OB children may have planned inpatient admissions after surgery,[69] and PACU nurses can play an instrumental part in providing preemptive pain control in these children. A patient-specific combination of soothing factors with multimodal pain management strategies will produce the best pain outcomes in OB and OW children while reducing the need for rescue opioids.

Although sensitivities to both pain and analgesics are genetically mediated, clinician decision-making based on genetic differences is not currently commonplace.[59] In the future, perhaps genetic knowledge may guide clinical decisions related to pain management in OB and OW children, but present scientific support remains sparse. In the meantime, clinicians may continue to expand their knowledge of the processes involved in drug metabolism in OB and OW children to better inform their decisions about pain management.

Conclusion

Clinicians may use this framework to gain a better understanding of the pain experience of OB and OW children after tonsillectomy. Researchers may use this framework to support future research to further understanding of pain in this population and develop better pain management strategies. Further research is needed to determine if OB and OW children undergoing tonsillectomy are at risk of prolonged or uncontrolled pain and to better understand best pain management practices in this population.

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