ORIGINAL ARTICLE

Pediatric Tonsillectomy and Ketorolac

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Background: *The use of ketorolac in children undergoing tonsillectomy remains limited because of the concern about postoperative bleeding.*
Methods: *A search was performed addressing the question: For patients undergoing a surgical tonsillectomy, does a weight-appropriate single dose of intravenous ketorolac affect the incidence of postoperative hemorrhage?*
Results: *Five systematic reviews met the inclusion criteria. A Cochrane Review included 15 studies with 1,101 pediatric subjects and focused on perioperative bleeding requiring intervention. Many of the systematic reviews appraised the same studies. Subgroup analysis often allowed assessment of the effects of ketorolac administration.*
Finding: *There was no consensus on the increased risk of bleeding when nonsteriodal anti-inflammatory drugs such as ketorolac are given to pediatric patients undergoing tonsillectomy. The conclusions varied from ketorolac should not be used to it is safe to use with these patients.*
Conclusions: *The perianesthesia team must carefully weigh the risks and benefits before deciding to use ketorolac with this subset of patients.*

Keywords: *ketorolac, pediatric, tonsillectomy.*

TONSILLECTOMY IS ONE OF THE MOST commonly performed pediatric surgical procedures in the United States with more than 500,000 operations performed annually. Tonsillectomy is often regarded as a relatively low-risk operation yielding excellent results in the management of obstructive tonsillar hypertrophy, peritonsillar abscess, and recurrent tonsillitis. Unanticipated complications associated with tonsillectomy include postoperative hemorrhage, airway obstruction, infection, nausea, vomiting, dehydration, adverse reaction to anesthesia, and unexpected admission to the hospital. Postoperative pain is an expected complication that frequently occurs and is challenging to manage.[1]

Postoperative pain is managed in a variety of ways, including the intraoperative injection of long-acting local anesthetics and the perioperative use of acetaminophen. Parenteral and oral opioids are also commonly used for the management of pain after a tonsillectomy. Opioids have the potential to cause respiratory depression, nausea, and vomiting. Ketorolac is an example of a nonsteroidal anti-inflammatory drug (NSAID). It is a potent analgesic that blocks the complex formation and production of prostaglandins. It has no sedative or anxiolytic activity and is available in oral and parenteral forms.[2] The use of ketorolac in the tonsillectomy patient remains limited because of concerns of increased hemorrhage postoperatively from its administration during the perianesthesia period.[3]

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History

Tonsillectomy has been performed for centuries, both with and without the benefit of anesthesia. The earliest reference to a tonsillectomy was recorded in Hindu medicine approximately 1,000 BC.[4] Breathing obstruction and recurrent throat infections are among the most common indications for a tonsillectomy. Tonsillectomy involves the removal of the tonsil and its capsule by dissection between the tonsillar capsule and the muscular wall. Post-tonsillectomy bleeding is categorized as primary or secondary. Primary hemorrhage is defined as bleeding that occurs within the first 24 hours after surgery and is generally attributed to the surgical technique[1] or a reactionary process.[5] Incidence of primary hemorrhages range from 0.2% to 2.2%.[1] Secondary hemorrhage occurs beyond the first postoperative day as a result of sloughing of the primary eschar at the tonsil bed.[1] Secondary hemorrhage typically occurs 5 to 10 days after tonsillectomy at a rate of 0.1% to 3%.[1]

Postsurgical pain after tonsillectomy is a major concern for anesthesia providers. Ketorolac is indicated for the short-term management of mild to moderate pain and can provide analgesia comparable to morphine.[6] Ketorolac does not cause respiratory or central nervous system depression. When used with an opioid, synergistic opioid-sparing effects can be appreciated.[7] The anti-inflammatory effects of ketorolac help to decrease the sensitivity of tissue nociceptors that generally occur with surgery.[7]

Ketorolac causes a reversible inhibition of cyclooxygenase, which interferes with thromboxane synthesis, resulting in an antiplatelet effect. Bleeding time may increase, but it typically remains within the normal value range.[7] Anesthesia providers and surgeons have been reluctant to use ketorolac in patients undergoing tonsillectomy, arguing that ketorolac causes an increased potential for postoperative bleeding secondary to an alteration in the normal clotting mechanism through inhibition of platelet aggregation.

This evidence-based article examines the use of ketorolac with pediatric patients undergoing tonsillectomy.

The PICO Question

The patient, intervention, comparison, and outcome (PICO) format provides an explicit process in evidence-based practice to guide in the search for the best supporting evidence to address a problem.[8] The PICO question guiding the literature search for the best current evidence was "For patients undergoing a surgical tonsillectomy (patient), does a weight-appropriate single dose of intravenous ketorolac (intervention), compared to no ketorolac (comparison), affect the incidence of postoperative hemorrhage (outcome)?" Evidence was sought including subjects of any age because of the suspicion of the paucity of studies including only children and the likelihood of knowledge transfer from studies including adults.

The Search for Evidence

Search Strategy

The search for evidence was conducted using PubMed, SUMSearch, Cochrane Central Register of Controlled Trials, and the Cochrane Database of Systematic Reviews databases. Sources were included if published from 1989 to 2014. Specific search terms, used alone or in combination, included tonsillectomy, adenotonsillectomy, ketorolac, non-steroidal anti-inflammatory, bleeding, and hemorrhage. Wildcards were used with appropriate terms. The search was limited to full-text systematic reviews (SRs) with and without meta-analysis and randomized controlled clinical trials (RCTs) available in full-text and published in peer-reviewed English language journals.

Web sites of professional (American Association of Nurse Anesthetists and American Society of Anesthesiologists) and governmental (Agency for Healthcare Research and Quality) organizations were examined, and discussion of the topic with subject matter experts was conducted to identify additional evidence sources. PubMed's "related citations" section and the reference lists of all relevant articles were scrutinized for additional relevant evidence.

In an effort to locate all available evidence, the search included sources comparing the incidence of postoperative hemorrhage after surgical tonsillectomy in persons of any age receiving an NSAID