Perioperative Pain Management Following Otologic Surgery

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KEYWORDS

• Otology • Pain • Perioperative • Nonsteroidal anti-inflammatory drug • Narcotics
• Acoustic neuroma • Skull base

KEY POINTS

- Pain in bilateral myringotomy with tubes is self-limited and best treated with acetaminophen and nonsteroidal anti-inflammatory drugs. This treatment may be performed in an in-office setting in selected patients.
- Multimodal pain therapy with emphasis on local analgesia and non-nonsteroidal anti-inflammatories anti-inflammatory drugs is critical in avoiding postoperative opioid use.
- Although opioids such as patient-controlled analgesia pumps are generally indicated postoperatively for skull base surgeries, these can be minimized with an appropriate multimodal pain regimen.

OVERVIEW

Postoperative pain control is an important and controversial issue in all surgical specialties. As a result of overprescription and subsequent overuse of narcotic medication, many providers are more conscious of the amount of narcotic pain medications they are providing at the time of surgery. Roughly 10% of all narcotic prescriptions written in the United States are written by a surgeon, and about 36% of all prescriptions written by surgeons are narcotics.[1] Data show that if opioid-naive patients are prescribed narcotics at the time of surgery, they are significantly more likely to still be prescribed narcotics a full calendar year later than patients who were not initially prescribed narcotics.[2] The onus thus lies on the surgical community to treat pain effectively while minimizing the amount of potentially addictive opioids prescribed. This article discusses pain management after various forms of otologic surgery, with a particular focus on strategies to avoid opioid overprescription.

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PREOPERATIVE COUNSELING

Adequate preoperative counseling is critical to establish realistic expectations on behalf of the patient. Goals of postoperative pain control should be clear and mutually understood by both parties. The goal of pain management postoperatively is not to eliminate pain but to decrease pain to an acceptable level. As the surgeons counsel patients on the risks and benefits of the procedures, so they must discuss risks and benefits of opioid pain medication. In the case of elective outpatient surgery, many patients decline a postoperative narcotic prescription after appropriate counseling.[3] Most otologic procedures are in this category, and many patients undergoing routine middle ear or tympanomastoid surgery do not require postoperative opioid medication for optimal pain control.

MYRINGOTOMY TUBES

One of the most common procedures performed in the United States, bilateral myringotomy with tympanostomy tube placement (BMT), is not traditionally associated with high levels of postoperative pain. Almost all of these procedures are done in the pediatric population. BMT-associated pain is generally thought to be brief and self-limited; the need for any postoperative analgesics has been debated in the literature.

In adults, the procedure may be done in the office with local analgesia, traditionally phenol, although use of eutectic mixture of local anesthetics (EMLA) and tetracaine has also been reported. Although questions have been raised about the caustic nature of phenol and the risk of long-term detriment to the tympanic membrane, animal studies do not support this.[4] Adults should be counseled to take ibuprofen and acetaminophen as tolerated for discomfort.

In the pediatric population, BMT is often performed in the operating room with mask anesthesia and a volatile agent, usually eliminating the need for peripheral intravenous (IV) line placement. Administration of ketorolac preoperatively has been associated with improved pain scores postoperatively in children undergoing BMT, but there is likely a poor cost/benefit ratio.[5,6] Furthermore, although immediate postoperative pain scores with ketorolac were superior to acetaminophen and placebo, there was no difference in pain scores at the time of discharge or postdischarge analgesia requirement.[5] A recently performed randomized controlled trial (RCT) does not support the use of nonnarcotic preoperative analgesia in pediatric patients undergoing BMT.[7] A study conducted by Voronov and colleagues[8] showed efficacy of intraoperative block of Arnold nerve via injection along the posterior aspect of the tragus with 0.25% bupivacaine in controlling postoperative pain. Postoperatively, pain can be controlled with oral or rectal acetaminophen or ibuprofen. Topical anesthetic drops, such as 4% lidocaine, may also be considered in select cases and may be added to routine antibiotic drops.[9]

In pediatric patients whose caregivers are concerned about long-term effects of general anesthesia, 1 article advocated the insertion of tympanostomy tubes in the office on select children.[10] A full discussion on the developmental effects of general anesthesia on pediatric patients is beyond the scope of this article. However, there is a strong body of evidence that limited exposure to general anesthesia in children is not associated with adverse neurodevelopmental consequences.[11]

MIDDLE EAR AND MASTOID SURGERY

Tympanomastoid surgery in some form is a staple procedure for general otolaryngologists and otologists alike. The surgery may be done for chronic otologic infections,

cholesteatoma, cochlear implantation, and so forth. Almost all of these procedures are done under general endotracheal anesthesia (GETA) and are outpatient surgeries. It is rare for patients, even pediatric patients, to require unplanned postoperative admission because of pain. A review of 662 patients undergoing otologic surgery found a 3.9% unplanned admission rate, which was primarily caused by refractory nausea and vomiting.[12] Transcanal middle ear surgery is not traditionally viewed as a particularly painful procedure. Many surgeons advocate for cases such as stapedectomy to be done under local anesthesia with a mild sedative administered by anesthesia.

In children, paracetamol and nonsteroidal anti-inflammatory drugs have been shown to reduce opioid requirement postoperatively.[13] In a large series of children undergoing cochlear implantation in India, no children required opioid medications after discharge from the postanesthesia care unit (PACU). These patients received scheduled IV paracetamol and IV morphine for breakthrough pain, and in the PACU and were routinely admitted postoperatively for monitoring.

A study in Turkey compared patients receiving IV infusions of dexmedetomidine during surgery versus saline infusions and found a decreased need for postoperative tramadol in the dexmedetomidine group. There was no effect on extubation times. The study did not examine narcotic use after discharge.[14] Total intravenous anesthesia with propofol and remifentanil resulted in less postoperative nausea and vomiting compared with sevoflurane and remifentanil.[15] Although pain scores were equivalent in this series between the 2 groups, postoperative nausea should also be considered in perioperative management given the significant patient discomfort it entails. Intraoperative steroids are given in many cases and are thought to improve immediate postoperative pain and nausea. An RCT conducted by Ahn and colleagues[16] examined intraoperative dexamethasone infusion and found significant improvement in postoperative dizziness and nausea but no improvement in postoperative pain. Intraoperative and postoperative steroids must be prescribed with caution because of the significant side effect profile and the patient's medical history must be thoroughly reviewed for contraindications.

Local anesthetic is routinely used in tympanomastoid surgery to assist in analgesia during the procedure and also for its hemostatic effect. Various studies have investigated different techniques and medications for local infiltration during surgery to improve postoperative analgesia. An RCT in India found that a combination of fentanyl and bupivacaine injected at the surgical site had a dose-dependent improvement in postoperative pain control in patients undergoing radical mastoidectomy.[17]

Suresh and colleagues[18] found that there was no significant improvement in postoperative pain scores in pediatric patients undergoing mastoid surgery with preincisional great auricular nerve (GAN) block (0.25% bupivacaine with 1:100,000 epinephrine) versus sham injection. However, they did theorize that the injection reduced the need for volatile anesthetics during the procedure, although there were no data to support this claim. A separate study did show decreased postoperative nausea with GAN block versus morphine injection.[19] Another RCT in India compared pain scores in adults after IV morphine (0.1 mg/kg) compared with a GAN block and an auriculotemporal nerve block with 0.25% bupivacaine and found that the nerve block group had lower pain scores and less nausea in the first 4 hours after tympanomastoidectomy.[20] One recent, small RCT in Turkey compared posttympanomastoidectomy pain scores in patients receiving ultrasonography-guided GAN or superficial cervical plexus (SCP) block with 0.25% bupivacaine. Patients were then given IV tramadol patient-controlled analgesia (PCA), and opioids were not administered. Both were effective pain control regimens up to 24 hours postoperatively without any adverse

effects. There was no significant difference between the 2 groups, but there was significantly less tramadol used in the SCP group, which the investigators theorized may be caused by contributions of the lesser occipital nerve.[21] Overall, more data are needed to confirm the consistent efficacy of nerve blocks in otologic surgery, but they do offer promise as a means to reduce opioid use.

Although most otologic surgeons use high-speed drill systems for dissection, other devices are available and deserve mention. A study by Crippa and colleagues[22] examined the use of a piezoelectric device for performing intact canal-wall mastoidectomy compared with the use of a traditional drill, and found significantly improved subjective pain scores on both postoperative day 1 and postoperative day 3. The investigators theorized that the lower amount of heat generation and increased tissue selectivity lead to decreased collateral soft tissue damage compared with the high-speed drill. This technique is not widely used in the United States because of cost and lack of familiarity.[23]

Although, traditionally, otologic surgery using a postauricular incision is most commonly performed using GETA, there is precedent for performing this under local anesthetic. Sarmento and Tomita[24] performed a prospective study of 83 postauricular approaches for primarily tympanoplasty, although mastoidectomies were included. They used 2% lidocaine with 1:100,000 epinephrine for injection in the postauricular region and in a V shape around the inferior portion of the pinna. They also injected the 4 quadrants of the external auditory canal. Patients were interviewed on postoperative day 1 and generally reported good pain control. The most severe complaint was of discomfort in body position (rated as 1.5 on a 1–4 scale). Eighty-two percent of patients reported that they would undergo a second otologic surgery under local anesthetic if there was a need.[24] Yung[25] surveyed patients who underwent middle ear surgery under local anesthesia, including stapes surgery, ossiculoplasty, myringoplasty, and mastoidectomy. These patients reported that the most common discomforts with surgery were noise (29.6% of patients) and anxiety (24% of patients). Even with these discomforts, 89% of patients surveyed still preferred local anesthesia to GETA.[25]

MICROTIA REPAIR

Although most of the components of staged microtia repair surgery are similar in location and tissue manipulation to other postauricular otologic procedures, special consideration must be given to the costal cartilage donor site, which is the primary source of postoperative pain and usually necessitates overnight admission for pain control. Although a multimodal approach with anti-inflammatory agents should be considered to minimize opioid use, several RCTs have explored the efficacy of intercostal nerve blocks (ICNBs) and catheter-based continuous infusion of anesthetic to the wound.[26,27] Both studies found ICNBs with continuous catheter ropivacaine infusion to costal graft harvest site to be safe and effective, with reduced need for other analgesics[26] and superior pain control to IV analgesics alone.[27] Of note, the use of continuous catheter infusion to the wound was superior to ICNB without continuous infusion.[26]

SKULL BASE SURGERY

Postoperative pain after skull base surgery is complex, variable, and remains poorly characterized.[28] Although immediate postoperative pain is expected, persistent postoperative headache lasting weeks to months after surgery is an unpredictable but incapacitating morbidity. Data support a variable incidence of persistent

postoperative headache depending on surgical approach. One study found postoperative pain to be severe in 67% of patients on whom a posterior fossa approach was used to resect acoustic neuroma, possibly caused by nuchal dissection and related traction on the dura.[29] Multiple studies have shown increased pain following the suboccipital approach compared with translabyrinthine or other lateral approaches.[28,30–32] Overall, the literature supports that postoperative pain is often undertreated with traditional analgesic regimens, likely in part because of the concern of masking neurologic changes or depressing respiratory drive.[28,33]

In general, the use of postoperative narcotic pain medications after neurotologic skull base surgery is indicated and supported. Although various protocols exist, multiple studies support the use of PCA in the immediate postoperative period. PCA has been shown to effectively control pain, including the psychological stress of pain, with overall lower total doses of opioid used.[28,34] An RCT using 1.5 mg/dose morphine PCA with 8-minute lock-out time and maximum dose of 40 mg of morphine in 4 hours supported all of these findings without any instances of respiratory depression requiring reintubation.[34]

A multimodal approach to postoperative pain is recommended to adequately control pain and minimize opioid use. Local injection of the incision site with lidocaine 2% and epinephrine 1:200,000 is common and known to prolong analgesic half-life. Given the inherent musculoskeletal trauma of many of the skull base approaches, anti-inflammatory agents such as ketorolac or indomethacin should be considered. The evidence does not support an increased risk of postoperative intracranial hemorrhage with these agents.[35,36] In addition, in patients undergoing skull base surgery, nausea and vomiting exacerbate pain and heighten its perception but may also cause increased intracranial pressures, cerebrospinal fluid leaks, and other complications. As such, diligent treatment of nausea and emesis is recommended, also with a multimodal approach.[28,37] Droperidol, ondansetron, and dexamethasone have all been shown to be effective.[38–40] However, given the potential for extrapyramidal side effects and synergistic sedation with opioids, droperidol may be used with caution,[39] and an alternative regimen of preoperative oral ondansetron with intraoperative IV ondansetron and IV dexamethasone has been shown to be effective.[40]

SUMMARY

Perioperative analgesia in otologic surgery involves a broad range of procedures, from the outpatient placement of tympanostomy tubes to extensive skull base surgery for tumor removal. In general, postoperative pain from most otologic surgeries can be managed with little to no opioids, and surgeons should make a concerted effort to minimize narcotic prescriptions in the midst of the opioid crisis. Multimodal pain regimens, local anesthesia, and alternative approaches have shown promise in accomplishing this goal, and should be considered. Preoperative counseling to appropriately manage expectations and goals is imperative to patient satisfaction and safety.

DISCLOSURE

The authors have nothing to disclose.

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