

Anesthesia and Analgesia Management Profile for Otologic Surgery at Dr. Soetomo Hospital Surabaya

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Abstract

Many ear-nose-throat (ENT) diseases can be found around us. There are 90 patients with ENT surgery at RSUP Kandou Manado from 2010 – 2012, with nine patients with otologic surgery. General anesthesia (GA) offers comfort to the patient and ease to the surgeon, but GA could make worsening of hearing also. Pain also make patients uncomfortable even for otologic surgery. That is why determine anesthetic procedure and pain management are important. This was a retrospective descriptive study, conducted in a referral hospital over a period of one year. Subjects were those who underwent otologic surgery. Data were taken from the medical record of the Integrated Surgery Center of the Dr. Soetomo Hospital Surabaya recorded from January to December 2021, then processed descriptively using the SPSS application and presented in the form of tables. Complete data records from 69 patients were available for analysis. Maximum numbers of patients were in age group 20 – 44 (36.2%). Women were higher from men (60.9%). Most patients were ≥ 20 years old were in normal nutritional status (58.5%). Most surgeries need more than 240 minutes (43.5%). Most induction agent was propofol (53.6%), with isoflurane as the most frequently inhalation agent (91.3%). Metamizole (52.2%) was the most postoperative analgesic. Chronic Suppurative Otitis Media (CSOM) were the most diagnostic (87.0%) and the most common surgical procedures were canal wall up tympanoplasty (47.9%). General anesthesia still the most choice for otologic surgery. Propofol and isoflurane were the most anesthetic agents for induction and inhalation, and metamizole is the most common used analgesic.

Keywords: ENT; otologic surgery; anesthesia; analgesic

INTRODUCTION

Many ear-nose-throat (ENT) diseases can be found around us, such as sudden deafness, acute otitis media, nasal polyps, allergic rhinitis, sinusitis, epistaxis, pharyngitis, tonsillitis, and nasopharyngeal carcinoma. Some diseases described above require operative or surgical treatment. There are a wide variety of existing ENT cases. Otologic surgery is one of ENT procedure that progress in huge way lately.

There are 90 patients with ENT surgery at RSUP Kandou Manado from 2010 – 2012. Nine patients (10%) from it had otologic surgery (Ramschie et al., 2015). Kulkarni et al., 2014 found that CSOM affected female more than male.

General anesthesia (GA) offers comfort to the patient and ease to the surgeon, especially for patients who cannot tolerate the procedures under local anesthesia (LA) (El Bergemy et al., 2016). But GA could have negative impact either. Pandey et al., 2022 found that GA could make worsening of hearing after mastoidectomy cortical and tympanoplasty procedure. Good cooperation and communication between the operator and the anesthesiologist are important for achieving patient safety and recovery.

Perioperative acetaminophen was reported to have the fewest adverse drug reactions for otologic surgery, but did not reduce pain scores as much as other modalities, such as nonsteroidal anti-inflammatory drugs

(NSAIDs) or combination analgesics (Campbell et al., 2019). In addition, pain management during surgery and patient comfort after a surgical procedure is a challenge for an anesthesiologist to be carried out properly.

This study aims to determine anesthetic and pain management in otologic surgery at RSUD Dr. Soetomo, Surabaya.

MATERIAL AND METHODS

This is a retrospective descriptive study. All the patients who underwent otologic surgery were included. Data on age, gender, nutritional status, disease, treatment, analgetic and anesthetic agents were collected.

Patient data were taken from the medical record of the Integrated Surgery Center of Dr. Soetomo Hospital Surabaya recorded from January to December 2021. The data were then processed descriptively using the SPSS application.

RESULTS

Patient's Basic Characteristics

There were 69 patients for otologic surgery. Female patients (60.9%) were higher than male patients. The most age group is 20 – 44 years (36.2%). The majority of patient's nutritional status was within normal limits.

Table 1. Characteristics of Patients

Characteristics	n = 69 (%)
Gender	
Man	27 (39.1)
Woman	42 (60.9)
Age Group	
0 – 5 years old	6 (8.7)
6 – 19 years old	22 (31.9)
20 – 44 years old	25 (36.2)
45 – 65 years old	15 (21.7)
> 65 years old	1 (1.5)
Nutritional Status by Age Group	
0 – 5 years old	
Severe thinness (<- 3SD)	1 (16.7)
Thinness (-2SD - - 3SD)	1 (16.7)
Normal (+2SD - -2SD)	4 (66.6)
Overweight (>+2SD - +3SD)	0 (0)
Obesity (>+3SD)	0 (0)
6 – 19 years old	
Severe thinness (<-3SD)	1 (4.6)
Thinness (-2SD - - 3SD)	1 (4.6)
Normal (+2SD - - 2SD)	14 (63.6)
Overweight (>+2SD - +3SD)	3 (13.6)
Obesity (>+3SD)	3 (13.6)
≥ 20 years old	
Underweight (<18.5)	5 (12.2)
Normal (18.5 – 24.9)	24 (58.5)
Overweight (25 – 29.9)	9 (21.9)
Obesity Class I (30 – 34.9)	3 (7.4)
Obesity Class II (35 – 39.9)	0 (0)
Obesity Class III (≥40)	0 (0)

Diagnosis

The most diagnosis was chronic suppurative otitis media dextra (49.4%), and the second was chronic suppurative otitis media sinistra (37.6%). Generally, chronic suppurative otitis media was the common diagnosis (87.0%).

Table 2. Patients Diagnosis

Diagnosis	n (%)
CAE Granulation	3 (4.4)
Mass CAE Dextra	1 (1.4)
Meatal Stenosis	1 (1.4)
CSOM Dextra	34 (49.4)
CSOM Sinistra	26 (37.6)
Dextra Temporal Osteoma	1 (1.4)
Profound Hearing Loss	3 (4.4)

Surgery

The most surgery type was canal wall up tympanoplasty (47.9%).

Table 3. Type of Surgery

Action	n (%)
Canal Wall Down	11 (15.9)
Canal Wall Down Tympanoplasty	9 (13.0)
Canal Wall Up	2 (2.9)
Canal Wall Up Tympanoplasty	33 (47.9)
Cochlear Implant	5 (7.3)
Dextra Temporal Osteoma Excision	1 (1.4)
Extraction Granulation CAE Dextra	3 (4.5)
CAE Dextra MassaMass Extraction	1 (1.4)
Gormet Insertion	2 (2.9)
Meatoplasty	1 (1.4)
Myringoplasty	1 (1.4)

Operation Duration

Most operations needed more than 240 minutes (43.5%)

Table 4. Duration of Operations

Operation Duration	n (%)
< 60 minutes	2 (2.9)
61 – 119 minutes	6 (8.7)
120 – 179 minutes	9 (13.0)
180 – 239 minutes	22 (31.9)
> 240 minutes	30 (43.5)

Induction and Inhalation Agent

The most used induction agent was propofol alone (53.6%) and the most inhalation agents was isoflurane (91.3%).

Table 5. Induction and Inhalation Agent

Agent	n (%)
Induction	
Propofol	37 (53.6)
Fentanyl	1 (1.5)
Ketamine	1 (1.5)
Propofol and Fentanyl	2 (2.9)
Propofol, Fentanyl and Rocuronium	13 (18.8)
Propofol, Fentanyl and Atracurium	14 (20.2)
Propofol, Fentanyl and Ketamine	1 (1.5)
Inhalation	
Isoflurane	63 (91.3)
Sevoflurane	6 (8.4)

Postoperative Analgesia

Metamizole i.v is the most analgetic option (52.2%). The second choice was a combination between paracetamol and metamizole (34.8%).

Table 6. Analgesia Postoperative

Analgesic	n 69 (%)
Paracetamol	6 (8.7)
Metamizole	36 (52.2)
Ketorolac	3 (4.3)
Paracetamol and Metamizole	24 (34.8)

DISCUSSION

Our study found that maximum numbers of patients were in age group between 20 – 44 years. It's almost the same with Kulkarni et.al., 2014 that found the most CSOM patients in the age between 21 – 40 years, and the reason could be that this age group is socially active and health conscious. A study from Pandey et al., 2022 found that women patients for middle ear surgery were higher than men. In our study we found that woman patient higher than men for otologic surgery. It is interesting that most of our patients have a normal limit nutritional status.

The most common diagnosis in our study is CSOM. It is different from Ramschick et al., 2015 who found tumor larynx is the most case for ENT surgery, they also had patients for otologic surgery but only a little. Marchoni et al., 2018 investigated the effect of endoscopy technique in almost all cases of COM with tympanoplasty as the most surgery. He found that endoscopy technique also safe for the otologic surgery. In our hospital, we found that canal wall up tympanoplasty was the most surgery, but we did it with microscopic surgery.

The duration of surgery time is suggested as an independent risk factor and a potentially modifiable risk factor for complications (Cheng et al., 2017). Extended operation duration is one of the top 3 risk factors for surgery-related complications (Visser et al., 2015). The likelihood of complications increased with increasing operating time, i.e., increased by 1% for every 1 minute, 4% for every 10 minutes, 14% for every 30 minutes, and 21% for every 60 minutes of increasing time (Cheng et al., 2017).

Prolonged duration of surgery is associated with infection at the surgical site due to prolonged microbial exposure, reduced efficacy of antimicrobial prophylaxis, and increased chances of non-sterile procedures (Korol et al., 2013). The increased risk of venous thromboembolism due to the prolonged duration of surgery is associated with increased coagulation, blood stasis, and endothelial damage due to prolonged procedures (Kim et al., 2015). Prolonged duration of surgery also causes increased fatigue in the surgical team and prolonged duration of anesthesia, increasing the risk of various types of complications (Cheng et al., 2017). The duration of anesthesia, which is more than 120 minutes, can also be a risk factor for the increased of postoperative nausea and vomiting. There are several things that surgeons, surgical staff, hospitals, and policymakers can do to reduce operating time, such as improving the skills of surgeons and surgical staff (e.g., mentoring programs), effective communication, and increased supervision of surgical trainees.

Propofol is a widely used induction agent (Folino et al., 2022). The main advantages of propofol are its rapid induction, rapid recovery, anti-nausea effect, anti-vomiting effect, and amnesic and antiepileptic properties, making it a potent anesthetic agent (Aboeldahab et al., 2011; Lee et al., 2016). The anti-nausea and vomiting effect is very beneficial because ENT surgery, especially ear surgery, is often associated with a high incidence of PONV (Liang and Irwin, 2010). The main disadvantages of propofol are the incidence of dose-dependent respiratory depression, dose-dependent hypotension, and poor analgesic properties (Aboeldahab et al., 2011; Amornyotin, 2014). Ketamine is an intravenous anesthetic that causes dissociative anesthesia. Some of advantages of ketamine are amnesic and analgesic effects, maintenance of muscle tone, protection airway reflexes, and spontaneous breathing. However, ketamine has many side effects that limit its use as an anesthetic (Aboeldahab et al., 2011). These side effects include nausea, vomiting, hallucinations, increased blood pressure and heart rate due to sympathomimetic effects, and increased intracranial pressure (Butterworth et al., 2018). Opioids are primarily used as analgesia but can also be used for sedation when given in a large doses. Rapid administration of large doses of opioids (particularly fentanyl, sufentanil, remifentanyl, and alfentanil) can cause chest wall stiffness severe enough to make ventilation with BVM nearly impossible.

Ketamine or fentanyl is combined with propofol to achieve balanced anesthesia with reduced side effects (Azeem et al., 2020). The study's main finding of Aboeldahab et al., 2011 stated that when a mixture of ketofol was used as an induction agent, it exhibited an intermediate hypnotic initiation relative to its two components, providing hemodynamic stability and a lower incidence of complications. In addition, BIS readings in the ketofol group showed intermediate values relative to the other two groups when correlated with the clinical endpoint of hypnosis. The combination of propofol and fentanyl shows a better sedative effect, reduces the incidence of respiratory depression, and provides hemodynamic stability compared to propofol alone (Chang and Yang, 2021). Azeem et al., 2020 reported that the combination of fentanyl and propofol.

Otologic surgery should keep the intratympanic pressure from increasing. Therefore, anesthetic agents that cause a minimal increase in intratympanic pressure are preferred to avoid adverse effects, including changes in middle ear condition, hemotympanum, serous otitis, temporary or permanent hearing loss, tympanic membrane graft dislocation, or ossicular chain deformation (Ozcan et al., 2018). Previous studies have favored isoflurane over sevoflurane concerning increasing middle ear pressure and decreasing platelet aggregation effect. In the study, El Azab et al., 2015 stated that sevoflurane increased middle ear pressure higher than isoflurane. This increase may occur because sevoflurane has a lower solubility than isoflurane (El Azab et al., 2015). Volatile anesthetics can decrease platelet aggregation in vivo and in vitro (Bozdogan et al., 2005). Sevoflurane prolongs bleeding time, while isoflurane does not (Bozdogan et al., 2005). A study conducted by El Azab et al. (2015) stated that inhalation anesthetic are inexpensive, easy to use and provide intraoperative conditions comparable to intravenous anesthetic techniques.

This study showed that metamizole became the leading choice in ear operation procedures. Research on the use of non-opioid analgesia after middle ear surgery has not been found (Dahm et al., 2021). Metamizole is recommended as a basic drug for postoperative pain relief after tonsilectomy. Metamizole effectively relieves moderate to severe postoperative pain (Gostian et al., 2020). There are two differences of opinion as to which is better between metamizole and ibuprofen for postoperative pain relief. Opioid use was lower in patients taking metamizole after tonsilectomy compared to ibuprofen (Gostian et al., 2020). Meanwhile, other studies have stated

that ibuprofen is a safe and efficacious NSAID compared to other NSAIDs (Nguyen et al., 2019; Ong et al., 2010). Metamizole should be used with caution because it can cause agranulocytosis. Metamizole was discontinued in North America in the 1970s because of its fatal agranulocytosis effect (Dahm et al., 2021). However, other studies suggest that agranulocytosis induced by other non-steroidal analgesics (Misiolek et al., 2018). Metamizole is often combined with NSAIDs for acute pain (Dahm et al., 2021).

The combination of metamizole and paracetamol was also frequently used in this study result. Several studies support the data. Multimodal pain regimens often use paracetamol as one of the drugs because paracetamol is not an NSAIDs and does not have anti-inflammatory properties (Cramer et al., 2021). Paracetamol with NSAIDs may provide better analgesia than single analgesics. However, the combination of paracetamol and NSAIDs still has drawbacks, such as increasing the incidence of side effects, and fixed-dose combination can reduce flexibility in dose titration (Ong et al., 2010).

The opioid epidemic is becoming a public health crisis, increasing overdose-related deaths (Stigerwald et al., 2021). In 2016, more than 100 americans died from opioid overdose, which is five times higher than in 1999 (Rudd et al., 2016). The use of NSAIDs alone or in combination with paracetamol or opioids with NSAIDs may reduce opioid use associated with the opioid epidemic. NSAIDs alone or combined with paracetamol is more likely to reduce acute postoperative pain than standard opioid regimens (Cramer et al., 2021). The combination of opioids with ibuprofen can reduce the amount of opioid use (Nguyen et al., 2019). Previous studies have shown that postoperative pain regimens should initially be started with non-opioid analgesics and subsequently increased to opioid analgesics in individual cases; this could reduce opioids and residual pills that are the source of illicit opioids in society (Steigerwald et al., 2021).

CONCLUSION

Most otologic surgery in this study take a long time, which is > 240 minutes. the most induction agent that is often used is propofol, with isoflurane for the inhalation agent. Metamizole is the primary postoperative analgesic of choice. The most common diagnosis is chronic suppurative otitis media, with the most common surgical procedures was canal wall-up and tympanoplasty.

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