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Original Research Article

ANESTHESIA AND ANALGESIA MANAGEMENT PROFILE FOR AIRWAY SURGERIES AT DR. SOETOMO GENERAL ACADEMIC HOSPITAL SURABAYA

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ABSTRACT

Introduction: Ear, Nose, and Throat (ENT) surgeries are commonly performed and very often require the surgeon and anesthesiologist to share the same workspace. Over the years, ENT surgery techniques have evolved from conventional methods to computer-assisted intraoperative navigation. In contrast to the past, a minimally invasive approach to paranasal sinus and petrous bone surgery is now preferred. Bleeding, postoperative nausea, and vomiting are complications often encountered in ENT surgery. In addition, pain management during surgery and patient comfort after a surgical procedure is a challenge for anesthesiologists. Therefore, the choice of anesthetic drugs is important. **Objective:** This study aims to determine the action profile, anesthetic management, and pain management in ENT surgery at Dr. Soetomo General Academic Hospital Surabaya. **Methods:** This is a retrospective descriptive study. A total of 177 patients underwent airway surgery. Data were obtained from the Medical Records of the Integrated Surgery Center of Dr. Soetomo General Academic Hospital recorded from January to December 2021. **Results:** Most of the patients were in the age group of 45 - 65 years (40.1%) and a majority were men (65.5%). Most patients who were ≥ 20 years old had a normal nutritional status (54.2%). The most frequent diagnosis was laryngeal cancer (23%), with micro laryngeal surgery being the most frequently performed (35.8%). Most surgeries also needed less than 60 minutes followed by 60 to 119 minutes (27.1%). The most frequently used induction agents were a combination of propofol, fentanyl, and rocuronium (39.5%), with isoflurane as the most frequent inhalation agent (91.3%). Metamizole (70.1%) was the most postoperative analgesic. **Conclusion:** In general, intravenous agents were used for anesthesia induction. A combination of different induction agents brings synergistic benefits.

Keywords: Airway; Analgesic; Anesthesia; ENT Surgery; Good Health

ABSTRAK

Pendahuluan: Pembedahan telinga, hidung, dan tenggorokan (THT) merupakan salah satu tindakan pembedahan yang paling seringkali dilakukan dan seringkali mengharuskan ahli bedah dan tim anestesi berbagi area kerja yang sama. Teknik pembedahan THT sekarang telah banyak berkembang mulai dari teknik konvensional hingga penggunaan bantuan komputer dalam pelaksanaan operasi. Berbeda dengan masa lalu, saat ini tindakan invasif minimal pada operasi sinus paranasal dan tulang petrosa lebih disukai. Adanya perdarahan serta terjadinya mual muntah pasca operasi adalah komplikasi yang sering terjadi pada operasi THT. Karena itu, sangatlah diperlukan pemilihan obat anestesi yang tepat. Sebagai tambahan, tata laksana nyeri selama operasi dan kenyamanan pasien setelah operasi adalah tantangan bagi ahli anetsi. **Tujuan:** Penelitian ini bertujuan untuk mengetahui Profil Tindakan, manajemen anestesi dan manajemen nyeri pada Operasti THT di RSUD Dr. Soetomo Surabaya. **Metode:** Penelitian ini merupakan penelitian deskriptif retrospektif. Sejumlah 177 pasien menjalani operasi jalan nafas. Data diperoleh dari rekam medis pada pembedahan pusat terpadu RSUD Dr. Soetomo, diambil bulan Januari – Desember 2021 dan dianalisis dengan aplikasi SPSS. **Hasil:** Jumlah pasien terbanyak berasal dari kelompok umur 45 – 65 tahun (40,1%). Penderita laki – laki lebih banyak dibandingkan penderita wanita (65,5%). Kebanyakan pasien berusa lebih dari 20 tahun berada dalam status nutrisi normal (54,2%). Diagnosa terbanyak adalah kanker laring (23%), dengan tindakan pembedahan paling banyak pembedahan bedah mikro laring (BLM) (35,8%). Sebagian besar pembedahan membutuhkan waktu kurang dari 60 menit dan diantara 60 – 119 menit (27,1%). Obat induksi terbanyak adalah kombinasi dari propofol, fenatnil, dan rokuronium (39,5%), dan obat inhalasi terbanyak adalah isofluran (91,3%). Analgetik pasca operasi paling banyak menggunakan metamizol (70,1%).

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Kesimpulan: Induksi anestesi umumnya secara intravena. Adanya kombinasi obat induksi memberikan keuntungan secara sinergis.

Kata Kunci: Jalan Napas; Analgesik; Anestesi; Operasi THT; Kesehatan

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INTRODUCTION

A total of 210 patients underwent rhinoplasty between June 2017 and December 2017 at the Konyang University Hospital, Daejon, Korea (1). Meanwhile, at the Santo Spirito Hospital, Casale Monferrato, Italy, 1321 patients underwent ENT surgery between January 2002 and December 2004. In addition, 1133 (85.7%) of them underwent airway surgery (2).

Ear, Nose, and Throat (ENT) surgery is the most common surgery performed and very often requires the surgeon and anesthesiologist to share the same workspace (3). There is a wide variety of existing ENT cases in various parts of the world with varying incidences.

ENT surgery techniques have evolved from conventional methods to computer-assisted intraoperative navigation. In conventional surgeries, the surgeon must apply his anatomical knowledge and experience to map the patient during surgery. Therefore, the radiological image must remain in the sight of the surgeon to help them determine the exact location of the surgical instrument. This is done through distorted endoscopic images, with the possibility of bleeding and other significant changes in the patient's anatomy during the surgery. In contrast to the past, a minimally invasive approach to the paranasal sinus and petrous bone surgery is now preferred due to the length of stay and patient compliance (4).

Bleeding is a significant complication of ENT surgery, especially in oral and nasal interventions. Tonsillectomies in particular have the potential for life-threatening bleeding. Bleeding during ENT surgery can interfere with the operative field of view and the airway, increase technical difficulties, as well as increase the operating time (5). In addition, Postoperative Nausea Vomiting (PONV) occurs in 70% of patients who underwent ENT surgery (6). PONV can cause psychological effects, airway obstruction, prolongation of hospitalization, and increased costs (6,7). Therefore, choosing the right anesthetic drug is important.

Ear-nose-throat (ENT) and head and neck surgical procedures are unique because the anesthesiologist and operator share an airway. Anesthesia management in the patient is centered on the airway. Good cooperation and communication between the operator and the anesthesiologist are also important for achieving patient safety and recovery. In addition, pain management during surgery and patient comfort after a surgical procedure is a challenge for anesthesiologists.

This study aims to determine the action profile, anesthetic management, and pain management during ENT surgeries at Dr. Soetomo General Academic Hospital, Surabaya.

METHODS

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

Patient data were taken from the Medical Records of the Integrated Surgery Center of Dr. Soetomo General Academic Hospital, Surabaya recorded from January to December 2021. The data were then processed

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descriptively using the SPSS application to obtain the frequency and percentage of the data.

RESULTS AND DISCUSSION

Patients' Basic Characteristics

A total of 177 patients underwent airway surgery. There were more male patients (65.5%) than female patients. A majority of the patients were within the 45-65 years (40.1%) age group. Most patients' nutritional status was also within normal limits for ≥ 20 years

Table 1. Patients' Characteristics

Characteristics	N (%)
Gender	
Man	116 (65.5)
Woman	61 (34.5)
Age Group	
0 – 5 years	2 (1.1)
6 – 19 years	25 (14.1)
20 – 44 years	63 (35.6)
45 – 65 years	71 (40.1)
>65 years	16 (9.1)
Nutritional Status by Age Group	
0 – 5 years	
Severe thinness (<-3SD)	0 (0)
Thinness (-2SD - -3SD)	0 (0)
Normal (+2SD - -2SD)	0 (0)
Overweight (>+2SD - +3SD)	1(0.6)
Obesity (>+3SD)	1(0.6)
6 – 19 years	
Severe thinness (<-3SD)	1 (0.6)
Thinness (-2SD - -3SD)	5 (2.8)
Normal (+2SD - -2SD)	22 (12.4)
Overweight (>+2SD - +3SD)	3 (1.7)
Obesity (>+3SD)	3 (1.7)
≥ 20 years	
Underweight (<18.5)	2 (1.1)
Normal (18.5 – 24.9)	96 (54.2)
Overweight (25 – 29.9)	31 (17.5)
Obesity Class I (30 – 34.9)	10 (5.7)
Obesity Class II (35 – 39.9)	2 (1.1)
Obesity Class III (≥ 40)	0 (0)

Diagnosis

The most common diagnosis found in patients with airway procedures was laryngeal cancer (23%).

Table 2. The Most Common Patient Diagnosis

Diagnosis	N	%
Juvenile Nasopharyngeal Angiofibroma	8	4.5
Laryngeal Cancer	41	23
Sinonasal Cancer	12	6.7
Midline paralysis + post tracheotomy	8	4.5
SSR without polyps + deviated septum	10	5.6
Oropharyngeal tumor + impending UAO	9	5

Surgery

The most frequent procedure was micro-laryngeal surgery (24%), followed by Functional Endoscopic Sinus Surgery (FESS) at 17.0%.

Table 3. The Most Frequent Surgeries

Surgeries	N	%
Micro Laryngeal	42	24
Extirpation	9	5
FESS	30	17
MM – RL	10	5.6
Total Laryngectomy	15	8.5

Operation Duration

The duration of most airway operations is under 60 minutes and between 60 to 119 minutes (27.1%).

Table 4. Duration of Operations

Operation Duration	N (%)
<60 minutes	48 (27.1)
69 – 119 minutes	48 (27.1)
120 – 179 minutes	40 (22.6)
180 – 239 minutes	23 (13.0)
>240 minutes	18 (10.2)

Induction and Inhalation Agent

The most frequently used induction agent was a combination of propofol, fentanyl, and rocuronium (39.6%), followed by a combination of propofol, fentanyl, and atracurium (37.8%). The most used inhalation agent was isoflurane (96%).

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Table 5. Induction and Inhalation Agent

Agent	N (%)
Induction	
Propofol	1 (0.6)
Fentanyl	2 (1)
Ketamine	0 (0)
Propofol and Fentanyl	30 (17)
Propofol and Ketamine	1 (0.6)
Propofol, Fentanyl and Rocuronium	70 (39.6)
Propofol, Fentanyl and Atracurium	67 (37.8)
Propofol, Fentanyl, and Lidocaine	4 (2.2)
Propofol, Fentanyl, and Pethidine	1 (0.6)
Propofol, Fentanyl, and Morphine	1 (0.6)
Propofol, Fentanyl and Ketamine	0 (0)
Inhalation	
Isoflurane	170 (96)
Sevoflurane	7 (4)

Postoperative Analgesic Use

Metamizole injection was the most frequently used analgesic option (70.1%), followed by a combination of paracetamol and ketorolac.

Table 6. Analgesia Postoperative

Analgesic	N (%)
Paracetamol	15 (8.5)
Metamizole	124 (70.1)
Ketorolac	11 (6.3)
Paracetamol dan Ketorolac	4 (2.2)
Paracetamol dan Metamizole	15 (8.5)
Paracetamol dan Fentanyl	1 (0.6)
Metamizole dan Ketorolac	3 (1.6)
Metamizole dan Tramadol	3 (1.6)
Ketorolac dan Tramadol	1 (0.6)

This study found that most patients belonged to the age group between 45-65 years, and the majority were men. This result is similar to Nocini et al., 2020 who found that the incidence of laryngeal carcinoma increased steadily after the age of 35 years (8). The incidence of laryngeal carcinoma peaks after 65 years but then decreases gradually. Men are also more likely to develop laryngeal carcinoma as it is associated with smoking and alcohol consumption (8,9). This study showed that most patients had normal nutritional status. This result is similar to te Riele et al., 2018 who found that most patients with laryngeal squamous cell carcinoma had a normal nutritional status even after weight loss (10).

Laryngeal carcinoma was the most frequent diagnosis in our study. This result is in line with a previous study that described laryngeal tumors as the most common laryngeal cancer (11). In our study, we explained that micro-laryngeal surgery is a common procedure. Micro laryngeal surgery is a minimally invasive procedure often performed in head and neck surgeries for the diagnosis and therapy of pathological conditions of the larynx (12,13). Micro laryngeal surgery is usually safe. However, as with other operations, micro laryngeal surgery has the following risks: tongue damage, tooth damage, lip damage, and temporary hypoglossal nerve paralysis due to laryngoscope compression. Moreover, tracheostomy devices must be available in the operating room during the surgery (13).

Anesthesia induction can generally use inhalation or intravenous agents. Intravenous agents are the most commonly used induction agents. Propofol, etomidate, and ketamine are the most commonly used intravenous agents (14). While opioids can also be used for induction, they are more often used for other purposes. Inhalation agents are also commonly used for induction in children (15).

Each anesthetic agent has its advantages and disadvantages, and none is superior to the other (16). Propofol is highly lipid-soluble, has a fast induction time, and short duration due to rapid redistribution (14). However, propofol is very painful when injected (14), causes dose-dependent respiratory depression and hypotension, and has poor analgesic properties

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(17). Ketamine has sedative and analgesic properties due to its favorable hemodynamic profile (17,18). It also protects airway reflexes and spontaneous breathing (17). Although it is classified as an induction agent, it does not achieve anesthesia in the arm-brain circulation (14).

Etomidate, as a sedative and hypnotic drug, has a good hemodynamic profile but is associated with suppressing adrenocortical function (14,19). Opioids with high doses can also be used for sedation, but this is associated with chest wall stiffness (20). Inhaled anesthetics can be used as induction agents, but their effectiveness is strongly influenced by cardiac output, alveolar ventilation, inspired volatile agent concentrations, and gas partition coefficient (14).

Most common anesthetics use a combination of different drugs that work synergistically with one another. Recent anesthetic strategies have prioritized the use of these synergistic drugs to reduce the dose and dose-dependent side effects of single substances (21). Previous studies have also shown that using a mixture of "Ketofol" as an induction agent provides hemodynamic stability and BIS assessment between propofol and ketamine (17). Likewise, the combination of propofol and fentanyl shows a better sedative effect, reduces the incidence of respiratory depression, and provides hemodynamic stability (22). Furthermore, according to research conducted by Azeem et al., 2020 the combination of ketamine and propofol is better in maintaining hemodynamic stability than fentanyl and propofol (23). Meanwhile, the vital capacity induction technique with sevoflurane provides the same intubation and induction conditions as the standard intravenous induction technique with propofol, fentanyl, and rocuronium. However, it provides a longer induction time (18).

Propofol and volatile anesthetic agents are an important part of modern general anesthesia and provide many benefits in clinical anesthetic practice and perioperative medicine (24). The use of inhalation agents to maintain general anesthesia was chosen in this study. The researchers found different results in previous studies. Several studies have shown that TIVA reduces PONV, the emergence of agitation, and blood loss while having high surgeon satisfaction compared to volatile anesthetic agents to maintain general anesthesia (25,26). However, volatile anesthetics still have the advantage that tracheal extubation and respiratory recovery are significantly faster (25). The use of low-flow anesthetics has many advantages in reducing atmospheric pollution, cost effects, and efficient maintenance of airway temperature and humidity (27). Several studies have also shown that the hemodynamic instability between the two techniques is not much different (25,26).

General anesthetic techniques are used in a wide variety of surgeries. General anesthesia has obvious advantages, such as an immovable surgical field to perform a more precise surgical operation, effective respiratory tract protection, adequate analgesia, and ventilation (28). However, one of the effects of isoflurane and sevoflurane, a commonly used inhalation anesthetic, is bleeding. Researchers have differences of opinion regarding the use of isoflurane with sevoflurane. Isoflurane provides a better surgical outlook than sevoflurane in adenotonsillectomy surgery due to the lower amount of bleeding in isoflurane (29). Whereas sevoflurane has an inhibitory effect on coagulation and platelet aggregation (30). In addition, in previous studies, platelet aggregation induced by ADP, epinephrine, arachidonic acid, prostaglandin G2, and thromboxane A2 receptor agonists were suppressed by sevoflurane (31). However,

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isoflurane does not inhibit the platelet aggregation induced by ADP (32). Research conducted by Özkiris et al., 2013 concluded that sevoflurane reduces the amount of intraoperative bleeding in nasal septal surgery, this is because isoflurane can increase the perfusion of the nasal mucous membrane and surgical bleeding (28).

The management of postoperative pain management in this study mostly used NSAIDs alone. Metamizole is the most frequently used NSAID. In our study, the most common procedures were minor procedures that did not damage a lot of tissue (i.e., 35.8% were micro-laryngeal surgery, followed by 15% were Functional Endoscopic Sinus Surgery (FESS)). Most studies showed that postoperative pain after a FESS is generally mild to moderate (33–35). A study conducted by Bianchini et al. (2016) also showed that minor surgeries (i.e., tracheotomies) require sufficient NSAIDs as effective pain medication (36).

The use of metamizole as a basic drug after tonsillectomy surgery showed lower maximal pain, lower use of additional opioids, and lower need for increased analgesic treatment (37). Likewise, in septorhinoplasty surgeries, metamizole consumption was significantly decreased for three postoperative days compared to ibuprofen (38). Unfortunately, metamizole is associated with agranulocytosis (39,40). However, agranulocytosis caused by metamizole is rare (40).

The use of opioids should be reduced to avoid the potential dangers of excessive narcotic drugs (41). NSAIDs are safe analgesics, provide adequate pain control during septoplasty/rhinoplasty, are inexpensive, and reduce postoperative rescue analgesia (opioids) (42). Several guidelines recommend postoperative multimodal analgesia and strongly recommend postoperative non-opioid analgesia unless contraindicated (43,44).

Furthermore, the use of NSAIDs is not indicated in coagulopathy, renal failure, or the risk of bleeding (36). Research by Nguyen et al. (2019) described no significant bleeding events following the perioperative administration of NSAIDs and supported their use as an effective non-opioid alternative (42).

CONCLUSION

General anesthetic techniques are often used for airway surgeries. The induction technique generally uses intravenous agents. Each intravenous agent has its advantages and disadvantages. A combination of different induction agents provides synergistic benefits by reducing the dose-dependent side effects of a single intravenous agent. In this study, isoflurane was the most common agent used. Isoflurane provides a better surgical field for airway surgery and reduces postoperative complications. This advantage is obtained because the amount of bleeding is lower with isoflurane. Metamizole is the most commonly used analgesic agent. In addition, the use of NSAIDs can reduce opioid use and reduce the harmful effects of opioids. Most airway surgeries in this study took less than 60 minutes. The most common diagnosis was laryngeal carcinoma, with micro-laryngeal surgeries being the most common surgical procedure.

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Conflict of Interest
All authors stated there is no conflict of interest in this study.

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Authors' Contributors

All authors have contributed to all process in this research.

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