PAIN, ANAESTHESIA & INTENSIVE CARE N 4 2019

УДК: 616.24-089.5-031.81-073.756.8-039.71-053.2
DOI: https://doi.org/10.25284/2519-2078.4(89).2019.187801

Albokrinov Andrew A.[1],.
Perova-Sharonova Valentyna M.[1],
Fesenko Ulbolhan A.[2],
Svyatoslav I. Stepanyshyn [3]

LATERAL POSITION IN CHILDREN DURING HEAD MRI UNDER GENERAL ANESTHESIA FOR PREVENTION OF UPPER AIRWAY COMPLICATIONS

[1] Lviv Regional Children's Clinic Hospital, Lviv, Ukraine
[2] Danylo Halytsky Lviv National Medical University, Lviv, Ukraine
[3] St. Paraskeva Medical Center, Lviv Ukraine

Background: Magnetic resonance imaging is essential investigation method for central nervous system lesions. Closed space and loud noise inside magnetic resonance machine can cause sense of fear in children, so it is common practice to use sedation or general anesthesia in children undergoing magnetic resonance imaging. For safe general anesthesia management endotracheal intubation or laryngeal mask airway placement are recommended. However not all magnetic resonance imaging offices are supplied with compatible equipment and often general anesthesia is provided on spontaneous breathing through natural airways. In emergency medicine lateral position can prevent upper airway complications such as obstruction, aspiration, cough and laryngospasm. The aim of our study was to compare incidence of upper airway complications in children in supine and lateral position undergoing head magnetic resonance imaging under general anesthesia.

Materials and methods: Forty-one children undergoing elective head magnetic resonance imaging under general anesthesia were randomized into 2 groups: "Supine" and "Lateral". Children under general anesthesia were left breathing spontaneously in supine or right lateral decubitus position with slight head and neck extension. Vital signs monitoring included ECG, SpO_2, blood pressure and sidestream capnography. Episodes of desaturation, obstruction, apnea, need for airway manipulations such as Guedel airway or laryngeal mask airway placement, suctioning and manual ventilation were registered. **Results:** Incidence of upper airway complications and need for airway manipulations were significantly lower in "Lateral" group. Number of patients with no complications was significantly higher in "Lateral" group. Mean number of any complication per one patient in "Lateral" and "Supine" groups was 0.1 and 2.4 respectively. Number needed to treat of lateral position for total absence of complications was 1.3 and risk reduction of having any complication was 75.8%.

Conclusion: Lateral position is simple maneuver that allows to decrease number of upper airway complications, upper airway manipulations and to increase safety of children undergoing head magnetic resonance imaging under general anesthesia on spontaneous breathing through natural airways.

Keywords: Magnetic resonance imaging, children, general anesthesia, upper airway complications, respiratory complications.

BACKGROUND

Nowadays magnetic resonance imaging (MRI) is essential investigation method, especially in diagnosing of central nervous system, spine, soft tissue and major joints lesions [1]. In some people (such as children and individuals with claustrophobia) closed space and loud sounds inside MRI machine can cause strong sense of fear [2, 3, 4]. Besides, child in stress cannot be immobile during investigation and this can lead to reduction of images quality [5], at the same time mechanical immobilization without anesthesia or sedation can lead to additional stress [6]. Neonates and younger children require deeper level of anesthesia or sedation compared to older children and adults that can cause upper airway and respiratory complications linked to general anesthesia when airways are not secured [5].

Modern scientific data says that general anesthesia or sedation in children should not be avoided if it is necessary for surgical, interventional or diagnostic procedures [7].

Endotracheal intubation or laryngeal mask airway (LMA) placement and mechanical ventilation are recommended for safe anesthesia management as general anesthesia agents can cause upper airway obstruction and/or respiratory depression [5, 8]. However, general anesthesia or sedation with natural airways and spontaneous breathing are often employed outside operating theatre [9, 10]. It is also known that not many MRI offices are equipped with special MRI compatible (non-magnetic) monitors, suctions, infusion pumps, laryngoscopes and anesthesia stations, especially in low income countries. One of the surveys showed that spontaneous breathing with or without Guedel airway in children undergoing MRI under general anesthesia is the most common approach [11]. Else, it may be difficult in MRI office to ensure full spectrum anesthetic management including airway management and mechanical ventilation. That's why we consider that alternative ways to ensure patients' safety may be useful in the settings of insufficiently equipped area where general anesthesia is carried out.

It is known that unconscious patient in supine position can suffer from upper airway obstruction due to decreased tongue and laryngeal muscle tone [12, 13] and gastric/oral contents aspiration due to reduced protective upper airway reflexes such as cough reflex, expiration and laryngospasm [14]. If upper airway reflexes are even preserved under "light" anesthesia, laryngospasm can cause hypoxia and both laryngospasm and coughing can lead to patient movements, need for airway management maneuvers and hence to reduction of MRI scans quality or MRI study delays or abortion.

"Recovery position" is recommended by European Resuscitation Council in unconscious persons or in persons immediately after successful resuscitation [15, 16, 17]. If patient is turned on his side into recovery position elimination of mechanical obstruction with the tongue and fluid drainage from the mouth and airway due to gravity occurs. So, recovery position can prevent upper airway complications in unconscious adults and children and our hypothesis was that it can prevent such ones in the anesthetized children who undergoing elective head MRI.

We named the studied position "lateral" as it is not exactly "recovery position". Lateral position in our study involved the presence of pillow but not hand under the head to ensure its neutral position, besides both knees and both hips were flexed.

Lateral position for prevention of upper airway complications in anesthetized children in MRI office is not described in literature.

OBJECTIVE

To find out if lateral position in children undergoing head MRI under general anesthesia with spontaneous breathing reduces the incidence of upper airway complications.

MATERIALS AND METHODS

Before beginning of the study radiologists were asked if it is possible to obtain quality scans in lateral position and then rotate them by 90 degrees, and their permission was obtained. The study was approved by the St. Paraskeva Medical Center Ethics Committee (Protocol #3, dated September 4, 2017, chairperson Z. Stadnyk, MD). Before inclusion informed consent for study participation was obtained from patients' parents. Inclusion criteria were as follows: (1) elective head MRI, (2) 1 to 3 ASA physical status, and (3) parental informed consent for study participation. Patients who needed endotracheal intubation due to medical condition or presumed difficult airways were not included in the study. After enrollment children were randomized for inclusion to "Supine" or "Lateral" group using RANDBETWEEN(1;2) function in Microsoft Excel 2016 software (generated random numbers "1" or "2" corresponded to "Supine" or "Lateral" group respectively). A total of 41 children were enrolled. Children in two groups did not differ significantly. Demographic and clinical data of enrolled children is shown in Table 1.

Table 1. *Demographic and clinical data of enrolled patients.*

	Supine (n= 22)	Lateral (n= 19)
Age, months (median (25; 75 quartile))	34.5 (23; 56.5)	34 (25; 49.5)
Male/female, n/n	9/13	8/11
Body weight, kg (median (25; 75 quartile))	13.15 (11.1; 21.4)	14 (10.5; 23.5)
Diagnosis, n (%)		
– Cerebral palsy	12 (54.5)	11 (57.9)
– Hydrocephaly	2 (9.0)	3 (15.8)
– Callosal agenesis	1 (4.5)	2 (10.5)
– Retinoblastoma	1 (4.5)	0 (0)
– Cerebral tumor	4 (18)	2 (10.5)
– Cerebral echinococcus	1 (4.5)	0 (0)
– Optic nerve tumor	1 (4.5)	1 (5.3)
Study time, minutes (median (25; 75 quartile)	34.0 (31.3; 40.5)	25.0 (22.0; 28.5)
Total propofol dose, mg/kg*h (M±SD)	5,79±1.36	4.64±0.64

Study protocol

Induction of general anesthesia (propofol bolus 2-2.5 mg/kg) was performed in supine position in both groups. After induction of general anesthesia propofol infusion was set to 6 mg/kg*h and patients

were positioned according to study group: patients in "Supine" group were positioned supine with slight head and neck extension and roll under their shoulders; patients in "Lateral" group were turned in right lateral decubitus position with slight head and neck extension and a pillow under the head to ensure its neutral position. Patients were left on spontaneous breathing with 2 l/min oxygen flow through nasal cannulas.

Vital signs monitoring included ECG, SpO_2, noninvasive blood pressure and sidestream capnography with gas sampling from mouth [18]. Upper airway obstruction or apnea were defined when capnography curve disappeared. Upper airway obstruction was verified if after jaw-thrust maneuver capnography curve appeared again. Upper airway obstruction primarily was treated with Guedel oropharyngeal airway insertion. If second episode of obstruction in one patient was registered, general anesthesia was deepened and LMA was inserted. In case of cough upper airway suctioning with or without anesthesia deepening was carried out. In case of apnea, if LMA was not already in place anesthesia was deepened, LMA was inserted and manual ventilation with Jackson-Rees circuit was accomplished.

SpO_2 was registered every minute. Number of desaturation (SpO_2 < 90%), obstruction and cough episodes were also registered. Number of manipulations on airway such as Guedel airway or LMA placement, airway suction and manual ventilation were registered as well.

Statistical analysis

Statistical analysis was performed using STATISTICA 8.0 software. Data with normal distribution was presented as mean and standard deviation (SD) and the significance of the differences between mean values was estimated using Student's *t* test. Data with non-normal distribution was presented as median and 25 and 75 quartile and the significance of differences between medians was estimated by Mann-Whitney *U* test. Categorical data was presented with 95% confidence interval and the significance of differences between values was estimated by chi-squared test. The significance of differences was shown as *t*-value, *U*-value and χ^2-value, respectively. Differences were considered significant if P value was lower than 0.05. Number needed to treat (NNT) was calculated using MedCalc online software (https://www.medcalc.org/calc/relative_risk.php). Post hoc power analysis of the study was performed using ClinCalc online software (http://clincalc.com/stats/power.aspx).

RESULTS

Mean SpO2 was higher in "Lateral" group. The difference reached statistical but not clinical significance. Number of desaturation episodes, episodes of upper airway obstruction, cough episodes, apnea episodes and general number of complications was significantly lower in "Lateral" group compared to "Supine" group. The same trend was observed with number of patients having corresponding episodes of complications. Number of patients who had no complications was significantly higher in "Lateral" group.

Need for additional airway management during MRI such as Guedel airway insertion, LMA insertion, upper airway suction and manual

Table 2. *Mean SpO_2, incidence of desaturation and other upper airway complications.*

	Supine (n=22)	Lateral (n=19)	P
SpO2 (%, M±SD)	94.04±2.89	96.9±1.59	*t*=-16.27882 P<0.0001
SpO2 < 90%, number of episodes median (25; 75 quartile)	16 0.5 (0; 1)	0 0 (0; 0)	*U*=313.5 P=0.0004
SpO2 < 90%, number of patients % (95% CI)	11 50 (28.2-71.8)	0 0 (0-17.6)	χ^2=1 2.414 P=0.0004
SpO2 < 90% episode duration, minutes (M±SD)	1.62±0.96	-	
Upper airway obstruction, number of episodes median (25; 75 quartile)	21 1 (0.25; 1)	1 0 (0; 0)	*U*=352.5 P<0.0001
Upper airway obstruction, number of patients % (95% CI)	16 72.7 (49.8-89.3)	1 5.3 (0.1-26.0)	χ^2=19.118 P<0.0001
Cough, number of episodes median (25; 75 quartile)	11 0 (0; 1)	1 0 (0; 0)	*U*=293.5 P=0.0042
Cough, number of patients % (95% CI)	10 45.5 (24.4-67.8)	1 5.3 (0.1-26.0)	χ^2= 8.389 P= 0.0038
Apnea, number of episodes median (25; 75 quartile)	5 0 (0; 0)	0 0 (0; 0)	*U*=256.2 P=0.028
Apnea, number of patients % (95% CI)	5 22.7 (7.8-45.4)	0 0 (0-17.6)	χ^2= 4.675 P= 0.0306
Apnea episode duration, minutes (M±SD)	4.33 ± 3.51	-	
No complications, number of patients % (95% CI)	3 13.6 (2.9-34.9)	17 89.5 (66.9-98.7)	χ^2= 25.859 P< 0.0001

ventilation was lower in "Lateral" group. Differences were statistically significant for all kinds of airway management.

Main study results are summarized in Table 2 and 3.

Mean number of any complication per one patient in "Lateral" and "Supine" groups was 0.1 (95% CI 0.05-0.3) and 2.4 (95% CI 1.8-3.0) respectively. The difference between these values was statistically significant (U=412, P<0.0001).

There were no other upper airway and respiratory complications (such as vomiting, aspiration, stridor, laryngospasm) which are described in literature [19].

Number needed to treat (NNT) analysis showed that NNT of lateral position for absence of complications was 1.3 (95% CI 1.0-1.8) and general risk reduction of having any complication was 75.8% (95% CI 55.9-95.7%). That means that about one in every 1.3 patients benefited from lateral position in head MRI under general anesthesia.

Post hoc power analysis showed that power of the study (1 – b-error probability) reached 61.6-100% for specific complications and airway manipulations, and 100% for total absence of complications.

DISCUSSION

Difference in mean SpO_2 was clinically insignificant probably because of prompt anesthesiologist's response on airway obstruction or apnea and hence short periods of these events. On the other hand, desaturation due to airway obstruction or apnea nevertheless occurred, probably because of low functional residual capacity in small children [20].

Incidence of complications in "Supine" group in our study is close to Tith's et al. data. The authors report airway obstruction in 30.9-42.7%, desaturation in 45.7-59.4% and cough in 16.8-21.7% of children undergoing head and spine MRI under general anesthesia with spontaneous breathing through natural airways [21]. However, there is information about much lower or even zero upper airway and respiratory complications in similar setting [10, 19]. Relatively large number of these complications in supine patients in our study can be explained by large proportion of patients with cerebral palsy who have depressed upper airway reflexes and upper airway hypotonia [22] and, possibly, by small number of patients in our study.

We cannot compare incidence of complications in "Lateral" group with that shown in literature because lateral position for head MRI under general anesthesia is not described.

Significantly lower incidence of desaturation in "Lateral" group is explained by lower incidence of airway obstruction in this group.

Lower incidence of airway obstruction and in accordance airway manipulations in "Lateral" group was probably due to gravity-caused dislocation of tongue and soft palate from the pharynx.

Higher number of cough and suction episodes in "Supine" group was probably caused by mouth secretions which did not get into the larynx in "Lateral" group due to gravity.

Lower incidence of apnea and manual ventilation in "Lateral" group can be explained by lower number of airway manipulations and hence lower number of general anesthesia deepening and lower total propofol dose in this group.

Higher total Propofol dose in "Supine" group was due to more frequent need for additional boluses for anesthesia deepening for Guedel airway and LMA insertion in this group.

Tend to higher MRI duration in "Supine" group was due to delays and pauses in the procedure for airway manipulations in children of this group.

CONCLUSION

Lateral position is simple and easy to accomplish maneuver that allows to decrease number of upper airway complications, upper airway manipulations and to increase safety of children undergoing head MRI under general anesthesia on spontaneous breathing through natural airways.

Table 3. *Need for additional airway management.*

	Supine (n=22)	Lateral (n=19)	P
Guedel airway insertion, number of patients % (95% CI)	16 72.7 (49.8-89.3)	1 5.3 (0.1-26.0)	χ^2= 19.118 P< 0.0001
LMA insertion, number of patients % (95% CI)	10 45.5 (24.4-67.8)	0 0 (0-17.6)	χ^2= 11.422 P= 0.0007
Upper airway suction, number of episodes median (25; 75 quartile)	11 0 (0; 1)	1 0 (0; 0)	U=284 P= 0.0278
Upper airway suction, number of patients % (95% CI)	10 45.5 (24.4-67.8)	2 10.5 (1.3-33.1)	χ^2= 6.008 P= 0.0142
Manual ventilation, number of episodes median (25; 75 quartile)	5 0 (0; 0)	0 0 (0; 0)	U=256.5 P= 0.028
Manual ventilation, number of patients % (95% CI)	5 22.7 (7.8-45.4)	0 0 (0-17.6)	χ^2= 4.675 P= 0.0306
Manual ventilation episode duration, minutes (M±SD)	4.33 ± 3.51	-	

LIMITATIONS OF THE STUDY

Small sample size. Investigators were not blinded to patient's position.

DISCLOSURES

Conflicts of interest: Authors have no conflicts of interest to declare.

Funding: None.

Presentation: None.

Assistance with the article: None.

Acknowledgments: None.

Конфлікт інтересів: відсутній.
Conflicts of interest: authors have no conflict of interest to declare.
Надійшла до редакції / Received: 22.08.2019
Після доопрацювання / Revised: 04.09.2019
Прийнято до друку / Accepted: 18.09.2019

REFERENCES

1. *Anderson RE. Magnetic resonance imaging versus computed tomography—which one? Postgrad Med. 1989;85(3):79-87.*
2. *Thorpe S, Salkovskis PM, Dittner A. Claustrophobia in MRI: the role of cognitions. Magn Reson Imaging. 2008;26(8):1081-1088.*
3. *Viggiano MP, Giganti F, Rossi A, Di Feo D, Vagnoli L, Calcagno G, Defilippi C. Impact of psychological interventions on reducing anxiety, fear and the need for sedation in children undergoing magnetic resonance imaging. Pediatr Rep. 2015;7(1):5682.*
4. *Melündez JC, McCrank E. Anxiety-related reactions associated with magnetic resonance imaging examinations. JAMA. 1993;270(6):745-747.*
5. *Funk W, Hцrauf K, Held P, Taeger K. [Anesthesia for magnetic resonance tomography in neonates, infants and young children]. Radiologe. 1997;37(2):159-164.*
6. *Brenner M. Child restraint in the acute setting of pediatric nursing: an extraordinarily stressful event. Issues Compr Pediatr Nurs. 2007;30(1-2):29-37.*
7. *Becke K, Eich C, Juhr M, Machotta A, Schreiber M, Sьtpelmann R. Choosing Wisely in pediatric anesthesia: An interpretation from the German Scientific Working Group of Paediatric Anaesthesia (WAKKA). Paediatr Anaesth. 2018;28(7):588-596.*
8. *Peden CJ, Menon DK, Hall AS, Sargentoni J, Whitwam JG. Magnetic resonance for the anaesthetist. Part II: Anaesthesia and monitoring in MR units. Anaesthesia. 1992;47(6):508-517.*
9. *Mandel JE. Recent advances in respiratory monitory in nonoperating room anesthesia. Curr Opin Anaesthesiol. 2018;31(4):448-452.*
10. *Hasan RA, Shayevitz JR, Patel V. Deep sedation with propofol for children undergoing ambulatory magnetic resonance imaging of the brain: experience from a pediatric intensive care unit. Pediatr Crit Care Med. 2003;4(4):454-458.*
11. *Kumba C, Ripart J. A Survey of Pediatric Anesthesia Practice for Magnetic Resonance Imaging in French Hospitals. J Clin Res Anesthesiol. 2018;1(1):1-6.*
12. *Safar P, Escarraga LA, Chang F. Upper airway obstruction in the unconscious patient. J Appl Physiol. 1959;14:760-764.*
13. *Boidin MP. Airway patency in the unconscious patient. Br J Anaesth. 1985;57(3):306-310.*
14. *Ng A, Smith G. Gastroesophageal reflux and aspiration of gastric contents in anesthetic practice. Anesth Analg. 2001;93(2):494-513.*
15. *Nolan JP, Hazinski MF, Aickin R, Bhanji F, Billi JE, Callaway CW, Castren M, de Caen AR, Ferrer JM, Finn JC, Gent LM, Griffin RE, Iverson S, Lang E, Lim SH, Maconochie IK, Montgomery WH, Morley PT, Nadkarni VM, Neumar RW, Nikolaou NI, Perkins GD, Perlman JM, Singletary EM, Soar J, Travers AH, Welsford M, Wyllie J, Zideman DA. Part 1: Executive summary: 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. Resuscitation. 2015;95:e1-31.*
16. *Perkins G, Colquhoun M, Deakin C, Handley A, Smith C, Smyth M. Adult basic life support and automated external defibrillation. Available at https://www.resus.org.uk/resuscitation-guidelines/adult-basic-life-support-and-automated-external-defibrillation/*
17. *Maconochie I, Bingham B, Skellett S. Paediatric basic life support. Available at https://www.resus.org.uk/resuscitation-guidelines/paediatric-basic-life-support/*
18. *Teng WN, Ting CK, Wang YT, et al. Oral capnography is more effective than nasal capnography during sedative upper gastrointestinal endoscopy. J Clin Monit Comput. 2018;32(2):321-326.*
19. *Cravero JP, Beach ML, Blike GT, Gallagher SM, Hertzog JH; Pediatric Sedation Research Consortium. The incidence and nature of adverse events during pediatric sedation/anesthesia with propofol for procedures outside the operating room: a report from the Pediatric Sedation Research Consortium. Anesth Analg. 2009;108(3):795-804.*
20. *Lum S, Stocks J, Stanojevic S, Wade A, Robinson P, Gustafsson P, Brown M, Aurora P, Subbarao P, Hoo AF, Sonnappa S. Age and height dependence of lung clearance index and functional residual capacity. Eur Respir J. 2013;41(6):1371-1377.*
21. *Tith S, Lalwani K, Fu R. Complications of three deep sedation methods for magnetic resonance imaging. J Anaesthesiol Clin Pharmacol. 2012;28(2):178-184.*
22. *Wass CT, Warner ME, Worrell GA, Castagno JA, Howe M, Kerber KA, Palzkill JM, Schroeder DR, Cascino GD. Effect of general anesthesia in patients with cerebral palsy at the turn of the new millennium: a population-based study evaluating perioperative outcome and brief overview of anesthetic implications of this coexisting disease. J Child Neurol. 2012;27(7):859-866.*

АЛЬБОКРІНОВ А. А., ФЕСЕНКО У. А., ПЕРОВА-ШАРОНОВА В. М., СТЕПАНИШИН С. І.

БОКОВЕ ПОЛОЖЕННЯ ПІД ЧАС ПРОВЕДЕННЯ МРТ ГОЛОВИ У ДІТЕЙ ПІД ЗАГАЛЬНОЮ АНЕСТЕЗІЄЮ ДЛЯ ПРОФІЛАКТИКИ УСКЛАДНЕНЬ З ВЕРХНІХ ДИХАЛЬНИХ ШЛЯХІВ

Вступ. Магнітно-резонансна томографія (МРТ) є важливим методом діагностики уражень центральної нервової системи. Закритий простір та інтенсивний шум в середині апарату МРТ можуть викликати відчуття страху у дітей, тому загальною практикою у даної категорії пацієнтів є проведення седації або загальної анестезії. З метою безпеки при проведенні загальної анестезії рекомендується використовувати ендотрахеальну інтубацію або встановлення ларингеальної маски. Проте не всі кабінети МРТ забезпечені сумісним з МРТ обладнанням, тому часто загальна анестезія проводиться на спонтанному диханні та без захисту дихальних шляхів. В медицині невідкладних станів положення пацієнта на боці дозволяє запобігти ускладнень з верхніх дихальних шляхів таких як обструкція, аспірація, кашель та ларингоспазм. Метою дослідження було порівняти частоту виникнення ускладнень з верхніх дихальних шляхів під час проведення МРТ голови під загальною анестезією у дітей в положенні на спині та на боці.

Матеріали та методи. Діти, яким проводилась планова МРТ голови під загальною анестезією, були рандомізовані на 2 групи: «Положення на спині» та «Положення на боці». Загальна анестезія проводилась із збереженням спонтанного дихання на спині або в положенні на правом боці з незначним розгинанням голови та шиї. Моніторинг пацієнта включав ЕКГ, SpO_2, вимірювання артеріального тиску та капнографію. Реєструвались епізоди десатурації, обструкції, апное, потреби в маніпуляціях на дихальних шляхах (встановлення повітроводу або ларингеальної маски), відсмоктування секрету та вентиляції мішком.

Результати. Частота розвитку ускладнень з верхніх дихальних шляхів та потреба в маніпуляціях на верхніх дихальних шляхах були значно нижчими в групі «Положення на боці». Кількість пацієнтів без ускладнень була значно більшою в групі «Положення на боці». Середнє число всіх ускладнень на одного пацієнта в групах «Положення на боці» та «Положення на спині» складало 0.1 та 2.4 відповідно. NNT латерального положення для запобігання всіх ускладнень склало 1.3, а зниження ризику мати будь-яке ускладнення склало 75.8%.

Висновок. Положення на боці є простим маневром, який дозволяє знизити кількість ускладнень з верхніх дихальних шляхів, кількість маніпуляцій на верхніх дихальних шляхах та підвищити безпеку дітей, яким проводиться МРТ голови під загальною анестезією на спонтанному диханні.

Ключові слова: Магнітно-резонансна томографія, діти, загальна анестезія, ускладнення з верхніх дихальних шляхів, респіраторні ускладнення.