

ORIGINAL ARTICLE

Post-Anesthesia recovery time in children undergoing hypospadias correction with general anesthesia in bandung

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ABSTRACT

Anesthesia is defined as the loss of pain sensation, with or without the loss of consciousness. After the anesthetic is discontinued and surgery is completed, the patient is routinely managed in the recovery room, also known as the Post Anesthesia Care Unit (PACU). One of the primary goals of PACU is to monitor and document the recovery time before the patient is transferred to a general ward or an intensive care unit. One of the post-operative complications in pediatric patients is delayed emergence from anesthesia. This is defined as the failure to regain consciousness within 30–60 minutes after discontinuation of anesthesia. Delayed emergence is often a residual effect of anesthetic, sedative, and analgesic drugs. Hypospadias is one of the various surgical conditions among pediatric patients. Indonesia reports a relatively high incidence of hypospadias. This study aimed to determine the postoperative anesthesia recovery time following hypospadias correction in children with ASA physical status I and II at Bandung City Hospital from 2017 to 2020. This cross-sectional study utilized secondary data from medical records, with a sample of 69 people meeting the inclusion criteria. The results showed a mean recovery time of 59.70 minutes, with the shortest recovery time being 45 minutes and the longest 135 minutes. Regarding operative duration, 89.9% of cases (62 people) were completed within ≤ 75 minutes, while 10.1% (7 people) required > 75 minutes.

Keyword: ASA, Hypospadias, Post Anesthesia, Recovery, General Anesthesia

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INTRODUCTION

Anesthesia is defined as the loss of pain sensation, which may or may not be accompanied by loss of consciousness.¹ It is categorized into three types: general, local, and regional anesthesia.² General anesthesia involves a state in which there is an absence of sensation throughout the entire body, associated with a reversible state of consciousness. It is the most commonly utilized anesthesia technique for all types of surgeries, including those in pediatric surgeries. During this procedure, the patient remains unconscious, and motor function can be affected. General anesthesia can be administered through three techniques: inhalation, total intravenous anesthesia (TIVA), or a balanced technique combining both inhalation agents and TIVA). Literature indicates that general anesthesia can also result in the loss of protective airways reflexes and the inability to maintain a patent airway.³ Recovery time in surgical context refers to the duration required for a patient to recuperate following a surgical procedure. This period is divided into three phases: early, intermediate, and late recovery.^{4,5} Ideally, the return of consciousness following general anesthesia should be smooth and gradual, occurring in a controlled environment without complications. However, in practice, various postoperative or post-anesthesia complications are frequently observed, including nausea, vomiting, shivering, respiratory disturbances, agitation, pain, cardiovascular disturbances, and bleeding.⁴

One of the post-anesthesia complications in pediatric patients is delayed recovery of consciousness, which occurs when the patient fails to regain consciousness within 30-60 minutes after anesthesia. This delay typically results from the residual effect of anesthetic, sedative, and analgesic agents. Studies have shown that the duration of anesthesia significantly influences postoperative recovery time. Additional etiologies for delayed recovery include hypothermia,

perioperative stroke, and severe metabolic disorders. Prolonged unconsciousness is clinically defined as lasting more than 15 minutes.⁶ Among various pediatric surgical cases, hypospadias is a notable congenital anomaly. This condition, which occurs predominantly in males, develops during the embryonic stage due to defects in genital development. It is often associated with disorders of reproductive organ formation, maturation and can lead to sexual activity disorders in adulthood.⁵ The precise national prevalence of hypospadias in Indonesia is poorly documented; however, several regional studies have reported cases. For instance, a study at Dr. Cipto Mangunkusumo General Hospital in Jakarta identified 124 cases between 2002 and 2014. Globally, the incidence rate is approximately 0.26 per 1000 live births. Based on available data, hypospadias appears to be relatively rare condition, and consequently, it has not been as extensively researched as other more common pediatric surgical conditions.⁵

According to various studies, different types of urethral opening variations are found in Indonesia, with the penile type being the most common form of hypospadias.⁵ The potential complications associated with hypospadias necessitate corrective surgery as part of the management strategy. In complex and severe cases, multiple corrective surgery may be required. The most frequently performed procedure is urethroplasty. Other techniques are also employed, including orthoplasty (chordee correction via chordectomy), glansplasty for glans reconstructing, and preputioplasty for prepuce correction.⁵

METHODS AND SUBJECT

This study employed a descriptive, cross-sectional design. The research subjects consisted of medical records from the post-anesthesia recovery room for children underwent hypospadias correction surgery under general anesthesia with an ASA physical status of II at Bandung City General Hospital (RSUD Kota Bandung) between 2017 and 2020.

The inclusion criteria were pediatric patients with hypospadias and as ASA PS II classification whose medical records comprehensively documented recovery time, age, duration of surgery, and anesthesia duration. The exclusion criteria included patients who experienced intraoperative complications, specifically hemorrhagic shock or anesthesia-related adverse events such as allergic reactions and malignant hyperthermia.

The research procedure began with a preparatory phase. This involved consultations with research supervisors and conducting a preliminary study at RSUD Ujung Berung. Preparatory activities included finalizing and submitting the research proposal, defining the subject population and inclusion/exclusion criteria, and obtaining ethical approval. Ethical clearance was formally secured from the Health Research Ethics Committee of the Faculty of Medicine, Universitas Padjadjaran. Following the granting of ethical approval, subjects were selected

based on the predefined research criteria.

The study was conducted at RSUD Ujung Berung from June 2020 to February 2021. This study protocol was reviewed and approved by the Health Research Ethics Committee of the Faculty of Medicine, Universitas Padjadjaran (FK Unpad), under approval number **397/UN6.KEP/EC/2021**.

RESULTS AND DISCUSSION

This study was conducted to determine the recovery time duration for pediatric patients with ASA II physical status following hypospadias correction surgery, measured from the cessation of anesthesia until discharge criteria were met for transfer to the recovery room. A total of 69 case that met the inclusion criteria were included in this study. The following section provides an overview of the subject characteristics and postoperative recovery time. The demographic and clinical characteristics of the research subjects are presented in Table.

Table 1. Characteristics of Research Subjects

Characteristic	Number (n)	Percentage (%)
Age		
0-5 years	28	40.6
6-11 years	33	47.8
12-16 years	6	8.7
17-25 years	2	2.9
Anesthesia Duration		
60 minutes	48	69.9
60-120 minutes	21	30.4
Surgery Duration		
≤ 75 minutes	62	89.9
> 75 minutes	7	10.1
ASA		
II	69	100

The distribution of subjects by age group, anesthesia duration, and surgical duration is summarized below. The majority of pediatric patients with ASA II physical status at RSUD Ujung Berung Bandung underwent surgery between the ages of 6 and 11 years (n=33, 47.8%), followed by 0-5 years (n=28, 40.6%), 12-16 years (n=6, 8.7%), and 17-25 years (n=2, 2.9%).

Regarding anesthesia durations, the majority of procedures (n=48, 69.9%) lasted 60 minutes or less, while 21 cases (30.4%) had a durations between 60 and 120 minutes.

Most surgeries (n=62, 89.9%) were completed within ≤ 75 minutes, and minority (n=7, 10.1%) required > 75 minutes. All subjects in the study were classified as ASA II status (n=69, 100%).

Table 2. Age and Surgery Duration

Age Group (years)	Surgery Duration ≤ 75 minutes	
	(n)	Percentage (%)
0-5	27	43.5
6-11	27	43.5
12-16	6	9.7
17-25	2	3.3
Total	62	100

The relationship between patient age and surgical duration is presented in Table 2. The overall surgical duration was ≤ 75 minutes for the majority of cases (n=62, 89.9%), while a minority of surgeries (n=7, 10.1%) lasted > 75 minutes.

As detailed in Table 2, among the surgeries completed within ≤ 75 minutes, 27 patients (43.5%) were in the 0-5-year age group, and 27 patients (43.5%) were in the 6-11-year age group. The 12-16-year age group accounted for 6 patients (9.7%) and the 17-25 years group accounted for 2 patients (3.2%).

Among the surgeries lasting >75 minutes, one patient (14.3%) was in the 0-5 years group, and six patients (85.7%) were in the 6-11 years group. No patients from the 12-16 or 17-25 year age groups underwent procedure exceeding 75 minutes in duration.

Patient age can influence surgical duration; older patients may have a higher likelihood of intraoperative complications,

which can prolong the procedure. Although hypospadias correction can be performed at any age, the American Academy of Pediatrics (AAP) and numerous authors recommend early surgical intervention between 6 and 18 months of age. This recommendation is based on associated lower complication rates and various physical and psychological benefits for the patient.⁷⁻⁹

This study categorized pediatric patients into four age groups: toddlers (0-5 years), children (6-11 years), early adolescents (12-16 years), and late adolescents (17-25 years). The results align with the literature, showing that the majority of surgeries were completed within ≤ 75 minutes. This was most prevalent in the 0-5 years (n=27) and 6-11 years (n=27) groups, totaling 54 patients (87% of all surgeries in this duration category). The 12-16 years group comprised six patients (9.7%), and the 17-25 years comprised two patients (3.3%).

Surgeries lasting > 75 minutes involved one patient in the 0-5 years group and six patients in the 6-11 years group. This disparity occur possibly due to different surgical techniques or complications during surgery.

However, the specific causes for prolonged surgical durations could not be further investigated, as the medical records lacked detailed documentation regarding surgical techniques or complication events.

Table 3. Post-Anesthesia Recovery Time, Length of anesthesia, and Length of surgery

Variable	Mean (minutes)	Minimum (minutes)	Maximum (minutes)	Standard Deviation
Recovery Time	59.70	45	135	12.149

The recovery times for patients following anesthesia are presented in Table 3. The mean recovery time was 59.70 minutes, with the fastest recovery being 45 minutes and the longest recovery being 135 minutes, with a standard deviation of 12.149. These results indicate that the average recovery time observed in this study (59.70 minutes) was slightly faster than the average of 60 minutes reported in the literature. Several factors can influence the recovery time, including the type of surgery, type of anesthesia, and the patient's physical status. Major or minor surgery types can affect surgery duration; longer surgeries require more anesthesia, increasing the clearance time and extending recovery. The type of anesthesia affects the agent's solubility, average drug concentration, exposure duration, and dose, all influencing recovery time. The patient's pre-operative physical status also affects recovery time; higher physical status increases the risk of complications, prolonging recovery room stay.¹⁰⁻¹²

In this study, all patients underwent the same type of surgery (hypospadias correction) under the same anesthetic type and shared an identical ASA physical status (II). Consequently, the observed variations in recovery time was likely influenced by differences in recovery time. However, the exact causes cannot be further discussed as the medical records did

not specify surgical techniques. A study by Defri Ayu at RS Dr. Hasan Sadikin Bandung on pediatric patients under general anesthesia. That study found delayed recovery as a common occurrence among children. The results align with the present study's finding of a prolonged recovery time up to 135 minutes. Delayed recovery is clinically defined as a failure to regain consciousness within 30-60 minutes post anesthesia, with prolonged unconsciousness defines as lasting beyond 15 minutes from 60 minutes.⁶

However, the attributed causes differed. Defri Ayu's study associated delayed recovery with high-dose fentanyl administration (>5mcg/Kg/BW) and hypothermia. In contrast, the medical records in the present study did not document specific anesthetic agents, their doses, or post-anesthesia complications. Therefore, the exact causes of delayed recovery observed here remain unknown. It is possible that the patients' ASA PS II classification and prolonged surgical duration were contributing factors.

CONCLUSION

This study found that the duration of surgery was predominantly less than or equal to 75 minutes, comprising 62 cases (89.9% of the total sample). The mean postoperative recovery time was 59.70 minutes, with a range from 45 minutes (shortest) to 135 minutes (longest).

RECOMMENDATIONS

Further research is recommended to incorporate additional variables, such as patient age and more specific surgical procedure classification. Future studies should also investigate the types of dosages of anesthetic agents administered, their specific influence on recovery duration, and the incidence of post-anesthesia complications.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this scientific article.

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