



SURGICAL MUSCLE RELAXATION; TO STUDY THE ADEQUACY IN PAEDIATRIC PATIENTS SCHEDULED FOR ELECTIVE GROIN SURGERIES UNDER GENERAL ANESTHESIA USING SEVOFLURANE WITHOUT NEUROMUSCULAR BLOCKING AGENTS.

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ABSTRACT: In Anesthesia practice neuromuscular blocking agents (muscle relaxants) are used for intubation and surgical muscle relaxation. The use of modern inhalational anesthetics like sevoflurane is commonly practiced in paediatric anesthesia for induction and endotracheal intubation. LMA (Laryngeal Mask Airway) is alternative to endotracheal intubation. It is commonly used supraglottic device for the elective surgical procedures in adults and paediatric population. We conducted this study to see whether sevoflurane produces enough surgical muscle relaxation so that the use of neuromuscular blocking agents can be avoided. **Study Design:** Observational study. **Setting:** King Khalid Hospital (KSA). **Period:** April 2013 to February 2014. **Material and Methods:** 84 paediatric patients posted for elective surgical procedure were included. Regarding the adequacy of surgical muscle relaxation. Induction of anesthesia was done with propofol 2mg/kg and Fentanyl 2 mcg/kg. Airway was maintained with LMA. Anesthesia was maintained by sevoflurane in oxygen and air. Blood pressure and Heart rate was kept with 20 % of baseline reading. Adequacy of surgical muscle relaxation was asked by the surgeon during surgery and was graded as good, fair or poor. **Results:** Mean age of the patients was 2.4 year. There were 76 male and 8 female patients. 47 patients were operated for inguinal herniotomy, 32 for orchidopexy and 5 for umbilical herniotomy. Surgical muscle relaxation was good in all of the patients and none of them required use of muscle relaxants. Recovery of all patients was smooth. **Discussion:** Adequate surgical muscle relaxation is important to facilitate surgery. In paediatric population sevoflurane produces enough muscle relaxation for intubation and surgical muscle relaxation. Monitoring of muscle relaxation can be clinical as well as through muscle twitches. **Conclusion:** Our study showed that in paediatric population the elective surgical procedures of groin region can be done without using muscle relaxants.

Key words: Paediatric anesthesia, LMA, neuromuscular blocking agents, surgical muscle relaxation.

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INTRODUCTION

Muscle relaxants were introduced in anesthesia practice to facilitate the anesthetist for endotracheal intubations and for surgeons through operative site muscle relaxation.¹ Muscle relaxants prevent patient's movements during surgery. Their use avoid overdose of anesthetic drugs that is particularly risky in sick patients and commonly results in delayed recovery.

Use of LMA in anesthesia has revolutionized the practice of anesthesia for elective ambulatory and non-ambulatory surgeries. Use of LMA has replaced the need of intubation.² Its use is safe

and secure.³ It can be used in adult and paediatric patients. Its use is comparable with face mask anesthesia for short procedures.⁴

Sevoflurane is commonly used inhalational agent in modern paediatric anesthesia practice. It is safe and effective for the inhalational induction and maintenance of anesthesia.⁵ Sevoflurane produces enough muscle relaxation that is required for paediatric intubation.⁶ It produces rapid awakening and early recovery from anesthesia.

So we conducted this study to find out whether

sevoflurane alone produces enough surgical muscle relaxation or not?

MATERIAL AND METHODS

We conducted this study after getting institutional permission and patients consent from the parents or guardians. This observational study was conducted in King Khalid Hospital (KSA) from April 2013 to February 2014.

Inclusion criteria

1. ASA 1 and 2 paediatric patients coming for elective groin surgeries.
2. All patients undergoing anesthesia by using LMA.

Exclusion criteria

1. Patients having ASA status more than 2.
2. Patients coming for emergency surgeries.
3. Surgeries other than groin region.
4. Patients requiring endotracheal intubations.
5. Patients requiring muscle relaxants.

Base line reading of the blood pressure and heart rate was noted. Induction of anesthesia was done by using propofol 2 mg/kg and Fentanyl 2 mcg/kg. Maintenance of anesthesia was by using sevoflurane in oxygen and air. LMA was inserted to maintain the airway. Blood pressure and heart rate were kept within 20% of the baseline reading by titrating sevoflurane and intravenous fluids

Variable measured

Primary variable was adequacy of surgical muscle relaxation. It was asked from surgeons during the procedures as follow;

Good: Adequate surgical muscle relaxation

Fair: Less adequate surgical muscle relaxation but no need of muscle relaxant

Poor: Inadequate surgical muscle relaxation requiring muscle relaxant.

Other variable measured was recovery of the patients. It was noted as smooth or delay.

All the patients were shifted to the recovery room at the end of anesthesia and discharged today surgery unit or ward upon satisfactory recovery.

STATISTICAL ANALYSIS

All the data (age, sex, type of surgery, adequacy of muscle relaxation and recovery status) was analyzed by using SPSS 16 to find out the outcomes. Numerical variables are represented in terms of mean and standard deviation. Qualitative variables are represented as frequencies and percentages.

Age		
Mean	N	Std. Deviation
2.401	84	2.1788
Age of the patients.		

RESULTS

Mean age of the patients was 2.4 year. There were 76 male and 8 female patients. 47 patients were operated for inguinal herniotomy, 32 for

Sex					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	76	90.5	90.5	90.5
	Female	8	9.5	9.5	100.0
Total		84	100.0	100.0	
Gender of the patients.					

Surgeries					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Inguinal Hernia	47	56.0	56.0	56.0
	Orchepexy	32	38.1	38.1	94.0
	Umbilical hernia	5	6.0	6.0	100.0
Total		84	100.0	100.0	
Types of the surgical procedures					

Surgical Muscle Relaxation					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Good	84	100.0	100.0	100.0
Adequacy of surgical relaxation					
Recovery status					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Normal	84	100.0	100.0	100.0
Recovery status of the patients.					

orchidopexy and 5 for umbilical herniotomy. Surgical relaxation was good in all of the patients and none of them required muscle relaxant. Recovery of all the patients was smooth.

DISCUSSION

Our study showed that in paediatric groin surgeries, sevoflurane produced enough surgical muscle relaxation and there was no need of additional muscle relaxants.

Muscle relaxants were introduced in anesthesia practice in 1942⁷. Alan Stead summarized the main advantages of muscle relaxants in paediatric anaesthesia as follows⁸:

1. They provide a means of effecting [tracheal intubation] and maintaining control of respiration throughout the operation.
2. The patient is completely relaxed and the work of the surgeon is facilitated.
3. The quantity of toxic anaesthetic agents is greatly reduced.

Over dose of muscle relaxants results in delayed recovery and residual neuromuscular blockade resulting in deleterious after effects. Patient has adequate surgical muscle relaxation or not, is variable from surgeon to surgeon and between surgeon and anesthetist.⁹ Muscle relaxation is monitored clinically by surgeons from tense muscles or by anesthetist from patient's breathing activity. It can be monitored by using gadgets with facial or thumb muscle twitches. New computer based automatic methods uses this muscle twitches and automatically deliver the required dose of muscle relaxants.¹⁰

Depth of muscle relaxation required for surgical

procedures is comparable with laryngeal muscle relaxation required for endotracheal intubation. Sevoflurane is most common anesthetic agent used for intubations without muscle relaxants and intubations without muscle relaxants is preferred by > one third pediatric anaesthesiologists.¹¹ Awad MT¹² found that sevoflurane with propofol produces rapid induction. Another studies depicted that propofol 2mg/kg was better than 1 mg/kg with sevoflurane for excellent intubation condition.¹³ Blair JM¹⁴ showed that sevoflurane is better than propofol and suxamethonium in children intubations. Sevoflurane is very popular in pediatric anesthesia because of its favorable properties. It produces satisfactory induction and intubation condition. It can be used for ambulatory and non-ambulatory paediatric surgeries.¹⁵ Gas induction has been safely used even in pyloromyotomy.¹⁶ Aqil M¹⁷ found that sevoflurane with Fentanyl was supportive for intubation in adults. Shah TH¹⁸ also found it possible to intubate children without neuromuscular block.

Rapid emergence properties of sevoflurane are comparable with desflurane.¹⁹ But the problem of post anesthesia excitement is very common with sevoflurane in pediatric patients.²⁰ Also there is risk of nephrotoxicity with sevoflurane.

So if we have the modern volatile anaesthetic agents like sevoflurane then in pediatric population endotracheal intubation and surgical muscle relaxation can be safely achieved from it.

CONCLUSION

Our study concluded that in pediatric population the elective surgical procedures of groin region can be safely preceded alone with sevoflurane without using additional muscle relaxants.

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“The best way to find happiness is not to search for it but create it. ”

Unknown

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Dr. M. Ahmad Khan	Primary researcher and data collection	
2	Dr. Syed Sajjad Raza Kazmi	Data analysis and compiling results	
3	Dr. Shakeel Ahmad	Reviewing manuscript of editing	