Comparison of Vecuronium and Suxamethonium for Rapid Sequence Induction of General Anaesthesia

Abdul Jalil Wafa,* Ahmed Aburwais,*

Abstract:

Background: Rapid sequence induction of anaesthesia is mandatory in patient with full stomach. Suxamethonium is still the drug of choice, because of it's rapid onset. At the same time suxamethonium associates with multiple complications. This study was designed to compare the tracheal intubating conditions with another safer alternative (vecuronium) given in large doses.

Patients and methods: This prospective study was done on 90 patients aged 18-70 years with an ASA I and II. All were subjected to elective surgery. Patients with anticipated difficult intubation were excluded. The patients were classified randomly in to 3 groups - Group A- myoplegy by scoline followed by laryngoscopy in 60 sec; Group B myoplegy by vecuronium followed by laryngoscopy in 60 sec; Group C myoplegy by vecuronium followed by laryngoscopy in 75 sec. All patients received a standard anaesthesia. The anaesthetist performing the laryngoscopy was blinded from the drug given to the patients .The intubation was assessed according to the three point scoring system that was graded as excellent, good or poor, the first two being considered as clinically acceptable.

Results: the frequency of excellent and good intubation after 60 seconds of myoplegic administration was significantly higher in the scoline group comparative to vecuronium group ($P<0.05$). Furthermore, the frequency of excellent conditions was significantly higher in group A than in group C. However, the frequency of clinically acceptable intubation (excellent plus good) was similar in group A and C.

Conclusion: Vecuronium is a reasonable alternative to suxamethonium provided 75 sec is allowed before the direct laryngoscopy. However, if an excellent intubating condition within short time is considered very important, suxamethonium should be used.

Key Words: Tracheal Intubation, Rapid sequence induction, Vecuronium, Suxamethonium (scoline).

Introduction:

The aim of rapid sequence induction is to secure the patient's airway as quickly as possible, minimizing the chances of regurgitation and aspiration of gastric contents. The rapid sequence induction technique is indicated in the presence of a full stomach, in emergency setting and in other situations where there is an increased risk of aspiration. Because of its rapid onset of action, suxamethonium has been shown to be the neuromuscular blocking drug of choice for rapid paralysis of the patient. The use of suxamethonium has been associated with dangerous side effects and complications including muscle pain, bradycardia, increase of plasma potassium concentration, rise of intraocular, intracranial and intraabdominal pressures.

Suxamethonium may also act as a trigger of malignant hyperpyrexia. It is contraindicated in many conditions such as burn and certain neurological diseases. Amongst the available alternatives to suxamethonium for rapid sequence induction of anaesthesia is the use of combination of non-depolarized muscle relaxant,[8] others have used nondepolarized muscle relaxant in increased doses, for example vecuronium 0.2-0.3 mg / kg has been shown relatively of short onset of action of about 75-90 sec for complete neuromuscular block.[1,2] Vecuronium is an intermediate acting steroidal neuromuscular relaxant without cardiovascular effects and with no histamine release.[2,3]

The aim of this prospective study was to compare the onset of complete myoplegy and the intubating conditions using standard doses of suxamethonium and vecuronium in increased doses.

*) Department of Anaesthesia, Tripoli Central hospital, Tripoli, Libya.

Patients and Methods:
The study was approved by the Tripoli Central Hospital administration and written informed consent was obtained from the patients. Totally 90 patients aged 18-70 years classified as ASA I-II were included in the study all of them were subjected to elective surgery requiring endotracheal general anaesthesia . Patients with renal or hepatic disease, obese, pregnant, receiving medication interacting with muscle relaxants, those with anticipated difficult intubation were excluded. The patients were randomly(envelop method) allocated among 3 groups: group A (N = 30) myoplegy by suxamethonium followed by laryngoscopy in 60 seconds ; group B (N = 30) myoplegy by vecuronium followed by laryngoscopy in 60 seconds; group C (N = 30) myoplegy by vecuronium followed by laryngoscopy in 75 seconds .Preoxygenation was started in all patients 5 minutes before the myoplegy by 100% oxygen inhalation then 4 minutes after the preoxygenation onset fentanyl 1 mcg/kg was given followed by thiopentone 5 mg/ kg administered over 20-30 seconds. Cricoid pressure was applied after the loss of consciousness. The neuromuscular blocking drug was given at the same time as the cricoid pressure has been applied.

Suxamethonium was administered at a dose of 1 mg/kg, and vecuronium at a dose 0.25 mg /kg. Laryngoscopy was carried out by standard Mackintosh 3 or 4 blade 60 seconds after the end of injection of the neuromuscular blocker in group A, B and 75 seconds in group C. The anaesthetist performing the laryngoscopy did not know the drug administered to the patient. The intubation was assessed using a standard three point scoring system and was graded as excellent ,good or poor , the first two being considered clinically acceptable.(Table: 1).

Anaesthesia was continued in the standard way once intubating conditions had been evaluated. If the intubation was unsuccessful, an another attempt was made but the recorded assessment was based only on the first attempt at intubation.
A Chi-square test was applied for the drug comparison .Statistical significance was accepted at the probability value of less than 0.05.

Table 1: Grading system for intubation (after Viby-Mogensen et al.)

The test	Excellent	Good	Poor
Laryngoscopy **Jaw relaxation** **Resistance to blade**	Relaxed No resistance	Relaxed Slight resistance	Poor relaxation Active resistance
Vocal cord **Position** **Movement**	Abducted None	Intermediate Moving	Closed Closing
Reaction to intubation **Limb movement** **Coughing**	None None	Slight Diaphragm	Vigorous Sustained(>10sec)

Results:
Of the total 90 patients enrolled in the study 2 were excluded because of unanticipated difficult intubation for anatomical reasons (one in group A and one in group C).All three groups did not differ statistically in age, weight, height, and ASA grade (Table 2). Intubating conditions in patients of all three groups are presented in (Table 3) and (figure 1). It is clear that after 60 seconds after myoplegic administration the frequency of excellent and good intubating conditions was significantly higher in group A compared group B ($P< 0.05$). Statistical comparison of intubating conditions in groups A and C showed that frequency of excellent conditions was significantly higher in group A 86.2% versus 69 % in group C ($P<0.05$). However, frequency of clinically acceptable intubating conditions (excellent or good) was similar in group A and group C (96.5%). There were no side effects registered related to myoplegics administration.

Table 2: Demographic data. Values are given in mean and standard deviation.

	Group A	Group B	Group C
Number	29	30	29
Age (Year)	43 (+-15)	41 (+-15)	45 (+-17)
Sex (M / F)	11/18	14/16	13/16
Weight (kg)	76 (+-13)	79 (+-16)	72 (+-12)
Height (cm)	165 (+-9)	162 (+-12)	171 (+-15)
ASA			
I	10	7	11
II	19	23	18

Table 3: Intubating conditions in group A, B and C.

GROUP	A	B	C
NUMBER	29	30	29
EXCELLENT	25 (86%)	9 (30%)	20 (69%)
GOOD	3 (10.3%)	13 (43.3%)	8 (27.5%)
POOR	1 (3.5%)	8 (26.7%)	1 (3.5%)

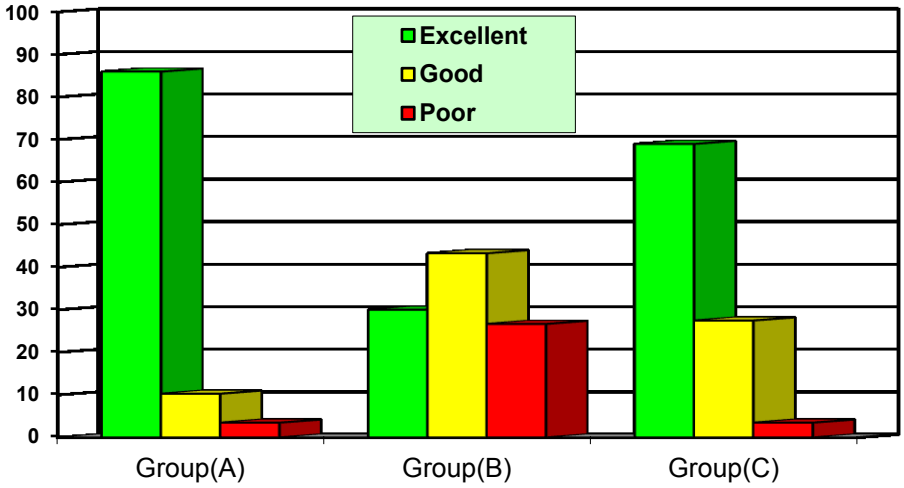


Figure 1: Intubating conditions in group A, B and C.

Discussion:

The above presented results showed that for the purpose of rapid sequence induction of general anaesthesia, intubating conditions at 60 seconds after the myoplegic drug administration were clinically acceptable (excellent and good) in 96.5% patients after suxamethonium and in 73.3% patients after vecuronium, but after 75 seconds the frequency of clinically acceptable conditions for intubation after vecuronium was the same as in suxamethonium group after after 60 seconds. A previous study of the use of vecuronium 0.25 mg/kg for rapid sequence induction[6] showed that the intubationg conditions were similar in suxamethonium and vecuronium groups. Some improvement in the intubating conditions has been reported, using propofol and fentanyl to induce anaesthesia.[7] In our study, we used thiopentone and a small dose of fentanyl to compare independently the role of vecuronium as an alternative myoplegic drug for rapid sequence induction.

Few papers reported that intubating conditions at 60 seconds may be improved by using vecuronium in large doses 0.3-0.4,but this was associated with significant increase of duration of myoplegy which may be inappropriate in certain situations.[7] The priming technique has been shown to accelerate the onset of action of vecuronium and improve the intubating conditions(8).Vecuronium as a choice is absolutely not recommended if there is any doubt in the airway securing after the loss of consciousness.

Conclusion:

In situations such as head injury or open eye injury when suxamethonium is associated with undesirable effects, vecuronium may be a reasonable alternative provided 75 seconds of time is allowed before the direct laryngoscopy. However, if an excellent intubating condition within short time is considered very important, suxamethonium should be chosen as a muscle relaxant for tracheal intubations. Assessment of the airway carefully before the administration of vecuronium in an increased dose is very essential, as duration of action is prolonged.

References:

1. Waud BE, Waud DR. Vecuronium as drug for emergency anaesthesia. Anaesthesiology, 1995; 63:4-14.
2. Lebovic PW. Neuromuscular block, comparative study of vecuronium. Europian Journal of Anaestesiology, 1996; 2:29-37.
3. Black TE, Healy TJ. The onset and duration of neuromuscular blocking agent. Anaesthesia and intensive care, 1997; 19:96-100.
4. Van Der Spak. AFL interaction of vecuroniuman and propofol during induction of anaesthesia, 1998; 16:23-30.
5. Cooper R. Comparison of intubating conditions after administration of vecuronium and suxamethonium. British Journal of Anaesthesia, 1997; 69:269-273.
6. Spart HJ. Comparison of intubating conditions in rapid sequence induction in elective cases. Acta Anaesthesiologica Sc.1997; 40:425-30.
7. Vibi-Mogensen J. Good clinical research practice in pharmacodynamics studies of neuromuscular agents.Acta Anaesthesiologica Sc.1996; 40:59-74.
8. Naquib M, Samarkandi AH, Ammar A, Turkistani A. Synergestic effect of combined muscle relaxant.Br J. Anaesth. 2006 Sep:97(3):424-5.