

COMBINATION OF ROCURONIUM WITH PROPOFOL TO AID ENDOTRACHEAL INTUBATION IN EMERGENCY CESAREAN SECTION

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Abstract

This study aimed to verify that rocuronium can be used as an alternative to succinylcholine for rapid sequence intubation in emergency cesarean section. A study conducted on 300 ladies in Al-Basrah Maternity and Childbirth Hospital between February 2013 to November 2014. Assessment of the effectiveness of rocuronium 0.6 mg/kg with propofol as an intubating dose for emergency caesarean section. The intubation conditions of rocuronium was compared with succinylcholine 1mg/kg as standard muscle relaxant of choice.

Rocuronium 0.6 mg/kg with propofol resulted in 94% clinically acceptable (good to excellent) intubation conditions but for succinylcholine it was 95-97%.

In conclusion, although succinylcholine creates excellent intubation conditions in emergency caesarean section, rocuronium proved its efficacy as a good alternative choice for succinylcholine.

Introduction

The standard of safety and care for tracheal intubation in the emergency caesarean section requires rapid sequence intubation (RSI) technique to facilitate intubation and to protect against aspiration of gastric contents. Rapid sequence intubation means rapid administration of induction anesthetic drugs and muscle relaxant followed by endotracheal intubation within one minute¹.

Two methods of paralysis are available for RSI in the emergency department; depolarizing agents such as succinylcholine, and non-depolarizing drugs such as rocuronium. Rocuronium is a useful alternative when succinylcholine is contraindicated. Succinylcholine (scoline) is the most common agent used in emergency settings² due to its rapid onset of action (40 to 60 seconds) and short duration of action, lasting only 6 to 10 minutes³. Succinylcholine is contraindicated in patients with major

burn beyond 48 hours, major crush injuries beyond 48 hours, severe abdominal sepsis, denervation syndrome, and major nerve or spinal cord injuries due to the risk of hyperkalaemia as a result of its depolarizing action, possibly leading to fatal cardiac arrhythmia^{3,4}. It is also contraindicated in patients with a history of malignant hyperthermia or previous allergic reaction to succinylcholine⁵. For these reasons, in 1994, Organon introduce steroid based non-depolarizing muscle relaxant (rocuronium) which has been proposed for creating intubation condition similar to those of succinylcholine⁶.

The only absolute contraindication to rocuronium is allergy. Caution should be taken during the use of rocuronium in renal dysfunction and hepatic disease.

It is known that one of the most challenging points for the anesthesiologist during general anesthesia in emergency

caesarian section is endotracheal intubation and securing upper airway of the patient. In addition all cases are not well prepared regarding fasting conditions for two reasons: firstly because they are emergency cases, secondly in late pregnancy as a normal physiology there will be delay in gastric emptying.

There have been many studies looking at the equivalence of rocuronium and succinylcholine regarding the intubation conditions, with conflicting outcomes. Different doses of rocuronium ranging from 0.45 mg/kg to 1.2 mg/kg for endotracheal intubation were used. In this study we use a small dose of rocuronium (0.6 mg/kg) in combination with propofol. Others have used another combination such as Crul et al used 0.9 mg⁷, Abu-Halweh et al used 1mg/kg⁸ and Magorian et al used 0.9-1.2mg/kg⁹.

It has been suggested that the type of induction agents used during intubation may have accounted for these differences. Skinner et al studied etomidate and rocuronium for rapid sequence induction and they found that combination cannot be used alone in these conditions¹⁰. In another study, Abouleish et al increase the dose of thiopentone to 6mg/kg with 0.6 mg/kg rocuronium, which result in 90% excellent to good intubation condition but with 80 seconds intubation time¹¹.

The main aim of this study is to determine whether rocuronium has similar intubating conditions of succinylcholine during rapid sequence intubation and whether rocuronium is considered as a good alternative choice for succinylcholine in the emergency cesarean sections.

Patients & methods

This prospective study was carried out in AL-Basrah Maternity and Childbirth Hospital between February 2013 and November 2014.

After taking the approval of Basra Medical College Committee Research Institute and putting in mind all ethical

consideration, informed consent were taken from 300 patients underwent emergency caesarean section under general anesthesia using propofol 2 mg/kg i.v bolus dose as a sole induction agent with rocuronium 0.6 mg/kg i.v bolus dose as a muscle relaxant preceded by preoxygenation by face mask for 3 minutes.

All patients according to the American Society of Anesthesiologist (ASA) were class I (healthy and no any associated chronic illnesses) & II (associated with controlled chronic illnesses) and patients who have history of neuromuscular disease like myasthenia gravis or receiving drugs that interfere with the effects of muscle relaxant like anticonvulsant drug were excluded.

In addition, modified Mallampati test was performed for all patients and anyone who expected to have difficulty to intubation i.e Mallampati Grade IV (Figure 1) was excluded.

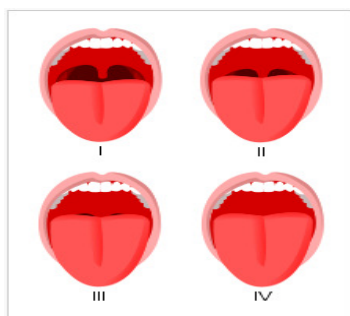
Intravenous 18 gauge cannula in the dorsum of the hand with good hydration by ringer lactate and standard vital signs monitoring including noninvasive blood pressure, heart rates, ECG, end tidal CO₂ capnography and O₂ saturation by pulse oxymetry was done for every patient. Induction of anesthesia by propofol followed by muscle relaxant with rocuronium and intubation by cuffed ETT size 7 latex free after 60 seconds. Sellick maneuver by applying cricoid pressure by fingers was recommended for all cases.

Intubation conditions were recorded and scored using Goldberg's scale. This is a widely used scale that allocates a score for each of: ease of intubation, vocal cord movement and patient response to intubation (diaphragmatic movement, coughing or bucking)¹². It is ranging from excellent, good, poor and impossible conditions. Excellent conditions defined as clear vocal cords, easy tube insertion, and no reflexes while good intubation condition same as before but with some sort of diaphragmatic movement in

response to tracheal intubation. On the other side, the poor intubation condition characterized by difficult laryngoscopy with movement in the vocal cords and coughing. Lastly, impossible conditions in which laryngoscopy are very difficult with closed vocal cord and sever coughing as

shown in table I. Intubation conditions then divided again into two main subgroups either clinically acceptable scores (excellent, good) or clinically not acceptable scores (poor, impossible) as demonstrated in table II.

Figure 1: Modified Mallampati classification



Class I: Soft palate, fauces, uvula, pillars visible (easy intubation)
 Class II: Soft palate, fauces, uvula visible

Class III: Soft palate, base of uvula visible
 Class IV: Soft palate not visible at all (more difficult intubation)

Table I: Goldberg Intubation conditions

Score	Ease of laryngoscopy	Vocal cords	Intubation response
(1) Excellent	Good	Open	None
(2) Good	Fair	Open	Diaphragmatic movement
(3) Poor	Difficult	Movement	Moderate coughing
(4) Impossible	Poor	Closed	Sever coughing or bucking

Table II: Modified Goldberg intubation conditions

Score	Ease of intubation	Vocal cords	Intubation response
Clinically acceptable scores	Good	Open	Non
Clinically not acceptable scores	Difficult-poor	Movement-closed	Moderate-sever coughing

For qualitative variables, frequency data were summarized as percentage. Statistical analysis was done using SPSS program for window (version 15) and P value determined by Fishers exact test, P value of <0.05 was considered to be significant.

Results

The age of the studied cases who admitted to the hospital for emergency

caesarian section ranged between 14-43 years. The mean weight, height and body mass index (BMI) were 73 kg, 162cm, 27.8 respectively. Few cases were obesity grade IV excluded from this study for safety care standard.

The ASA of studied population was either ASA-I or ASA-II or the associated controlled illnesses were antipartem haemorrhage (APH), preeclampsia (PE), diabetic mellitus (D.M) and other illness

like urinary tract infection, bronchial asthma and sickle cell anemia (SCA). PE and APH were the most common associated medical problems as demonstrated in table III, in which 24 cases were associated with PET and 15 cases associated with APH. It is known

that there are kind of intubation difficulties associated with PET due to laryngeal edema, but this was of no significance in this study.

Regarding ASA classification, most cases were ASA I which represent 84%, while ASA II was only 16%.

Table III: Demographic characteristics of patients participating in this study

Characteristics	
Age	14-43 yrs
Mean weight	73 kg
Mean height	162 cm
Mean BMI	27.8 (overweight)
Associated controlled disease	PET 24 (8%)
	APH 15 (5%)
	D.M 6 (2%)
	Others 3 (1%)
ASA I	252 (84%)
ASA II	48 (16%)

In Table IV, according to the intubation condition criteria, the majority of cases were in the good group and represents about 192 of the cases which is equal to 64%, while those with excellent intubation criteria were 90 cases (30%). Poor intubation conditions were only found in 18 cases (6%) and no recorded cases of impossible intubation condition because any patient expected to have difficulty in

intubation (i.e Mallampati Grade IV) have been excluded from this study.

In Table V, both excellent and good groups were categorized as clinically acceptable intubation conditions and they were 282 cases (94%). In the other hand, poor and impossible groups were considered as clinically not acceptable intubation conditions and were equal to 18 cases (6%) only.

Table IV: The result of intubation condition in this study

Intubation condition	Cases using rocuronium 0.6 mg/kg	
excellent	90	(30%)
good	192	(64%)
poor	18	(6%)
impossible	0	(0%)

Table V: The modified results of intubation conditions

Intubation condition	Cases using rocuronium 0.6 mg/kg
clinically acceptable scores	282 (94%)*
clinically not acceptable scores	(6%)

*P Value <0.05 highly significant

Discussion

Rocuronium is proved to give fine relaxation as good as succinylcholine. This study showed that using propofol as induction agent has better influence on rocuronium intubation condition, in agreement with Dobson et al¹³.

The choice of 0.6 mg/kg of rocuronium is the optimum one because if we decrease the dose of rocuronium to 0.45 mg/kg (intubation time 78 seconds) as in other study¹⁴ and we will not reach to the same intubation time of succinylcholine (60 seconds), and on the other hand if we increase the dose to 0.9-1.2 mg/kg such as in other study⁹ we will end with a longer duration of action which is approximately 60 minutes. This prolongation of action was unacceptable for us because the duration of caesarean section in our hospital is about 30 minutes and if we give antidote for reversing the effect of muscle relaxant this will end with delay recovery from the effect of rocuronium and it is complications.

In this study, narcotics were not added to propofol and rocuronium to improve intubation condition, although it may have a good potentiation of action⁸, as these drugs are lipid soluble and they pass readily through the placenta causing respiratory depression to the newly born baby.

Old muscle relaxant such as vecuronium and pancuronium, beside they are aminosteroid as rocuronium, they have delay onset of action⁶ so they were not used in this study.

In addition to that, the new antidote for rocuronium, sugammadex¹⁵, make a revolution in the safety of using rocuronium even in difficult cases of intubation. The introduction of sugammadex has potentially changed how anaesthesiologists use neuromuscular

blocking agents in everyday practice. More particularly it has allowed us to re-evaluate the use of neostigmine, the use of succinylcholine, how we can avoid post-operative residual curarisation (PORC) and the reversal of deep NMB. The use of rocuronium and its antidote sugammadex could replace succinylcholine for rapid-sequence intubation of anesthesia even in difficult conditions and it is completely eliminates residual paralysis in the postanesthetic recovery room.

The arrival of this drug on the market may result in a significant reduction in the use of suxamethonium for general anaesthesia for caesarean section.

After reviewing different articles^{1,2,7-10,12} about the intubation conditions of succinylcholine and comparing them with our results of rocuronium, no significant difference in intubation condition was found between succinylcholine and rocuronium. In many studies, clinically acceptable intubation condition for succinylcholine was ranging between 95-97% while for rocuronium was 94% in this study.

Succinylcholine has many drawbacks for its use specially in pregnant women such as allergy, scoline apnea, raised intragastric pressure, raised serum potassium, postoperative myalgia and muscle fatigue and bradycardia with repeated doses of suxamethonium without administration of atropine¹⁶.

Conclusion

Although succinylcholine creates excellent intubation conditions in emergency C.S, this study proved that rocuronium is a good alternative choice for succinylcholine or as a first choice muscle relaxant for emergency C.S after excluding cases with risk of difficult intubation (Mallampati grade IV).

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