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Original Research Article

Comparative Study on Different Doses of Succinylcholine for Facilitation of Laryngeal Mask Airway Insertion

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Abstract:

Introduction: In this setting general anaesthesia using the Laryngeal Mask Airway is widely used. Laryngeal Mask Airway insertion is accomplished using Propofol as ithelps blunt the laryngeal reflexes well, when compared to other induction agents. Ambulatory surgery is upcoming in all parts of the world as life becomes more fast pace and time is a limited commodity.

Methodology: The study was predominantly done in the day care theatre, as this is where most number of Laryngeal Mask Airways are used in a day. The required sample size to show a difference in the insertion conditions

Results: The following results were obtained from the study. Group I refers to placebo which was saline,Group II refers to 0.1mg/kg of Succinylcholine and Group III refers to 0.25mg/kg of Succinylcholine. Adequate sample size was attained with a total of 283 patients. Informed consent was taken from all patients. Group I and II had 95 patients each, and Group III 93 patients. Allpatients were ASA I or II. None of the patients had a difficult airway.

Conclusion: This study concludes that a low dose of Succinylcholine does facilitate insertion of theLaryngeal Mask Airway. The ideal dose is 0.25mg/kg of Succinylcholine. 0.1mg/kg is not sufficient and is associated inadequate jaw relaxation and does not always provide smooth insertion conditions.

Keywords: Succinylcholine, Airways, Propofol.

Introduction

Ambulatory surgery is upcoming in all parts of the world as life becomes more fast pace and time is a limited commodity. In this setting general anaesthesia using the Laryngeal Mask Airway is widely used. Laryngeal Mask Airway insertion is accomplished using Propofol as it helps blunt the laryngeal reflexes well, when compared to other induction agents. [1] Often though it has been seen that Propofol as a sole agent is not sufficient to prevent patient movement, coughing and gagging.[2] Additional doses of Propofol are required to prevent these undesirable airway reflexes and multiple insertion attempts needed. These can be associated with adverse haemodynamic changes and airway trauma. Numerous adjuvants have been studied and proven to aid insertion of the Laryngeal Mask Airway eg: Midazolam,[3] low dose Rocuronium,[4] Fentanyl[5] and Remifentanyl[2]; thus reducing the Propofol requirements and avoiding the adverse haemodynamic

changes thatcan occur with large doses of propofol. These also aid in smooth Laryngeal Mask Airway insertion, avoiding unnecessary airway trauma. Succinylcholine is a quick onset, short acting depolarizing muscle relaxant. It is a time-tested drug, easily available and cost effective. The use of Succinycholine to aid insertion of the Laryngeal Mask Airway is advantageous as it avoids depression of the respiratory centre and hasno influence on consciousness, unlike opioids and benzodiazepines. Use of Succinylcholine to facilitate Laryngeal Mask Airway insertion has been studied in the past. Succinycholine has been proven to facilitate Laryngeal Mask Airway insertion, with and without[6] an additional agent such as Fentanyl or Midazolam. Most of these studies used a single arbitrary dose and did not compare two doses to get an ideal dose. [7],[8], [3]. This study compares two doses of Succinylcholine and placebo and aims to identify the ideal dose of Succinylcholine required to facilitate Laryngeal Mask Airway insertion.

Methodology

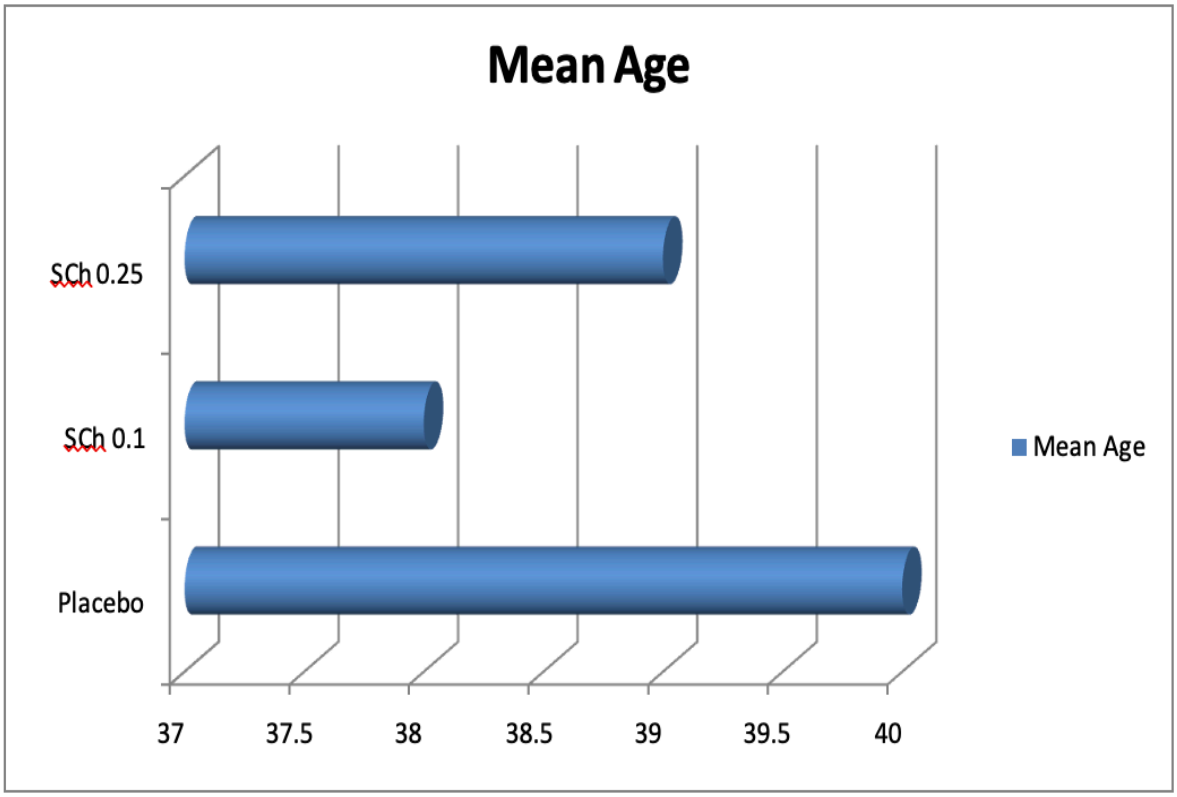
This is a double blinded randomized control trial done on 283 patients. The study was done in the Dept. of Anaesthesia, Integral medical College, day care theatre, as this is where most number of Laryngeal Mask Airways are used in a day. The required sample size to show a difference in the insertion conditions was found to be 92 in each group with an anticipated proportion of insertion conditions as 30%, 10% and 15% respectively with 80% power and 1% level of significance (this is done for three group comparisons). Required sample size for each arm was 92. Values were taken from the „overall insertion conditions" table in the study. A comparison of Midazolam and mini dose Succinylcholine to aid Laryngeal Mask Airway insertion during Propofol anaesthesia" by Wafaa Taha Salem[3]. Patients were not premedicated. All cases were in the elective setting. Surgeries requiring general anaesthesia using the Laryngeal Mask Airway were included, such as exploration under anaesthesia and lay open fistulae, lipoma excision, wide local excision of breast lump, implant removal, skin grafting, cystoscopy, circumcision, tympanoplasty etc. Patients included were ASA I and II, age between 20 and 65 requiring general anaesthesia using a Laryngeal Mask Airway. Patients excluded were ASA > II, age < 20 or > 65, BMI > 30, difficult airways, oral surgery.

Results

The following results were obtained from the study. Group I refers to placebo which was saline,Group II refers to 0.1mg/kg of Succinylcholine and Group III refers to 0.25mg/kg of Succinylcholine. Adequate sample size was attained with a total of 283 patients. Informed consent was taken from all patients. Group I and II had 95 patients each, and Group III 93 patients. Allpatients were ASA I or II. None of the patients had a difficult airway.

Table 1: Demographic Data

	Placebosaline (group)	**0.1mg/kg Succinylcholine (group)**	**0.25mg/kg Succinylcholine (group III)**
No of Patients(%)	95 (33.6%)	95 (33.6%)	93 (32.9%)



Graph 1: Demographically all groups were equally distributed in terms of age, weight, height and BMI.

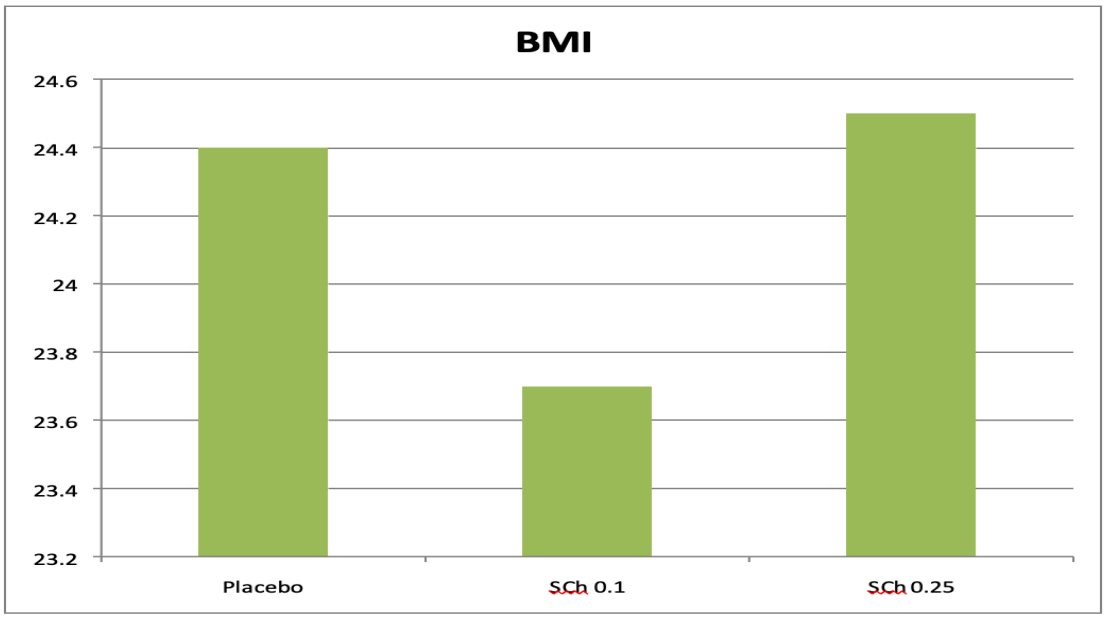
Table 2: Age

	Placebo- saline (group I)	0.1mg/kg Succinnylcholine (group II)	0.25mg/kg Succinylcholine (group III)
Age(yr) - mean(+/- SD)	40 (12)	38 (12)	39 (12)

Mean age was 37 to 40 and was equally distributed in all three groups.

Table 3: Weight, height and BMI

	Placebo- saline (group I)	0.1mg/kg Succinnylcholine (group II)	0.25mg/kg Succinylcholine (group III)
Weight(kg)– mean(+/- SD)	66 (12)	64 (13)	64 (11)
Height(cms)– mean(+/- SD)	163 (9.5)	164 (9.3)	162 (9.1)
BMI – mean(+/- SD)	24.4 (4)	23.7 (4.5)	24.5 (3.7)



Graph 2: The average BMI in all three groups was 23- 24.

Table 4: Sex ratio

	Placebo- saline (group I)	0.1mg/kg Succinnylcholine (group II)	0.25mg/kg Succinylcholine (group III)
Sex- M:F n (%)	64:31 (67.4%:32.6%)	70:25 (73.7%:26.3%)	61:32 (65.6%:34.4%)

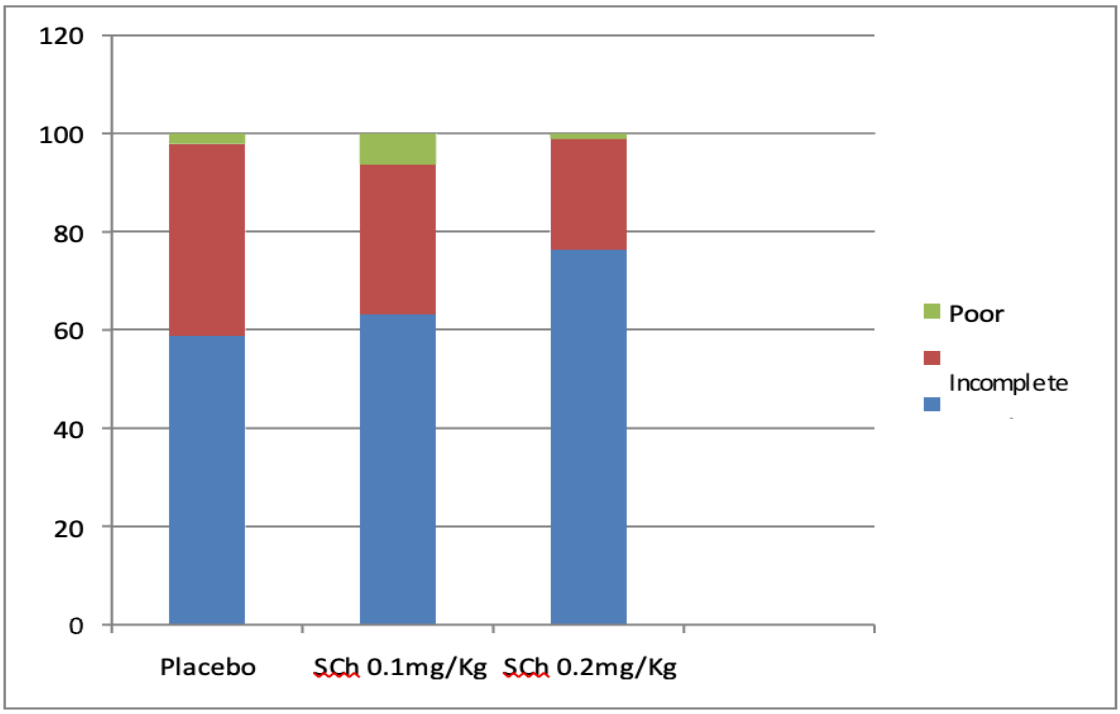
The male to female ratio was equal in all three groups, though there were more malesthan females in each group.

Graph 3: Sex ratio

Table 5: Conditions during LMA insertion- jaw relaxation

	Placebo-saline (group I)	0.1mg/kg Succinnylcholine (group II)	0.25mg/kg Succinylcholine (group III)
Jaw Relaxation (p- 0.026)			
Good- n (%)	**56 (58.9%)**	**60 (63.2%)**	**71 (76.3%)**
Incomplete- n (%)	37 (38.9%)	29 (30.5%)	21 (22.6%)
Poor- n (%)	2 (2.1%)	6 (6.3%)	1 (1.1%)

On looking at conditions during Laryngeal Mask Airway insertion; jaw relaxation was significantly better in Group III, with a p value of 0.026. It was also seen that jawrelaxation was incomplete in close to 40% of the patients in the 0.1mg/kg
Succinylcholine group.
Jaw relaxation

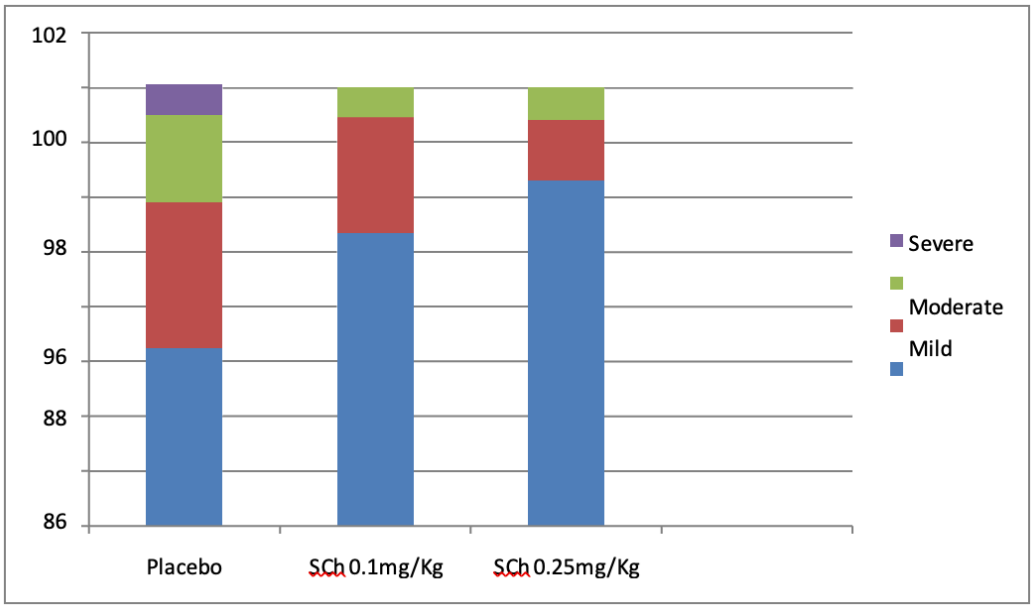


Graph 4:

Table 6: Conditions during LMA insertion- coughing and gagging

Gagging, Cough (p-0.59)			
None- n (%)	86 (90.5%)	90 (94.7%)	90 (96.6%)
Mild- n (%)	5 (5.3%)	4 (4.2%)	2 (2.2%)
Moderate- n (%)	3 (3.2%)	1 (1.1%)	1 (1.1%)
Severe- n (%)	1 (1.1%)	0 (0.0%)	0 (0.0%)

There was no statistically significant difference in the incidence of coughing and gagging between all three groups, though clinically there was more in the Placebo group.

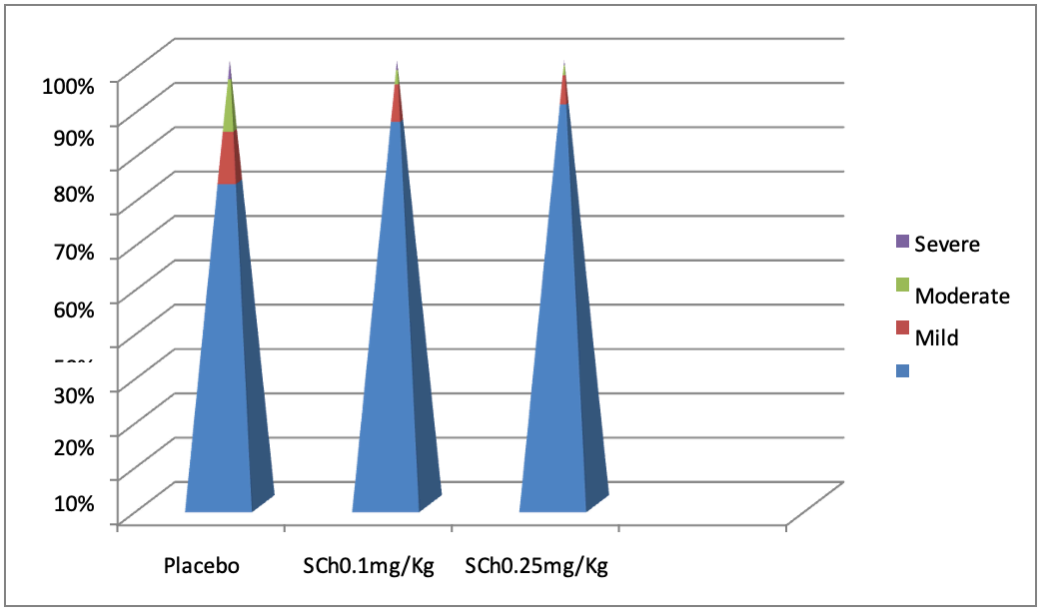


Graph 5:

Table 7: Conditions during LMA insertion- patient movement

Patient movement (p- 0.018)			
None- n (%)	69 (72.6%)	83 (87.4%)	84 (90.3%)
Mild- n (%)	11 (11.6%)	8 (8.4%)	6 (6.5%)
Moderate- n (%)	11 (11.6%)	3 (3.2%)	2 (2.2%)
Severe- n (%)	4 (4.2%)	1 (1.1%)	1 (1.1%)

There was significantly more patient movement in the Placebo group, with a p valueof 0.018. Group II and III had similar values.

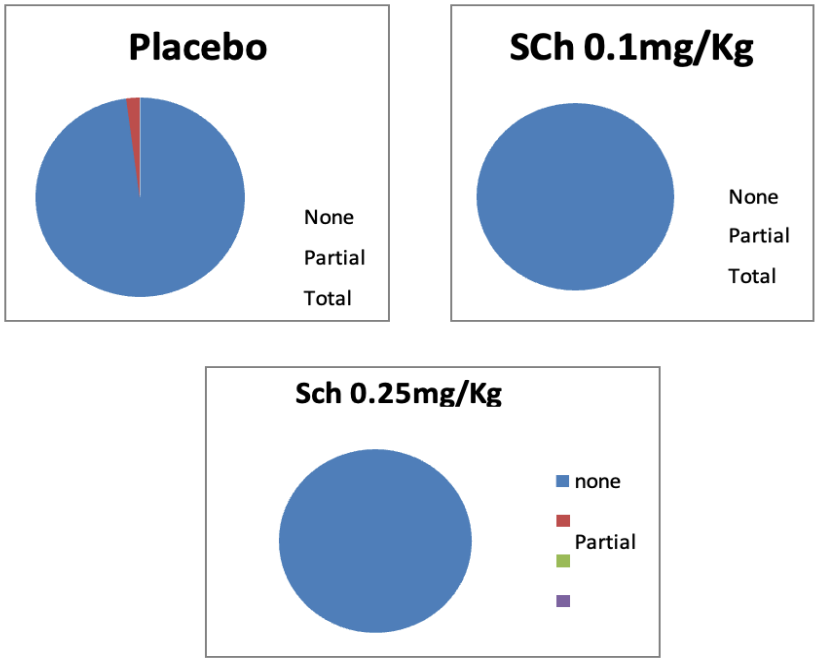


Graph 6: Patient movement

Only two patients in the Placebo group experienced partial

Table 8: laryngospasm. None ofthe other patients had laryngospasm.

Laryngospasm (p-0.136)			
None- n (%)	93 (97.9%)	95 (100%)	93 (100%)
Partial- n (%)	2 (2.1%)	0 (0.0%)	0 (0.0%)
Total	0 (0.0%)	0 (0.0%)	0 (0.0%)



Graph 7: Laryngospasm

Discussion

The departments of general surgery, vascular surgery, endocrine surgery, hepatobiliary surgery, colorectal surgery, orthopaedics, urology and otorhinolaryngology operate every week. Most of these are under general anaesthesia using the Laryngeal mask Airway as regional or neuraxial anaesthesia is asscociated with slower recovery and discharge[9]. The main theatre complex in this hospital has tthirty-twooperating theatres. Here too the Laryngeal Mask Airway is used in several surgeries. In fact around the world the use of the Laryngeal Mask Airway is becoming more and more common for numerous different surgeries. Hence the relevance of thisstudy. Propofol is the induction agent of choice in Laryngeal Mask Airway placement as it blunts the laryngeal reflexes [10]. The disadvantage of using Propofol alone is excessive patientmovement and coughing and gagging. This leads to additional Propofol usage and thus hypotension and prolonged duration of apnoea. Wafaa et al found that failed insertion attempts of Laryngeal Mask Airway placement were due to coughing and gagging in 75% of patients when only Propofol was used [3]. Successful insertion at first attempt was only 60%. Numerous adjuvants have been and are still being studied to facilitate Laryngeal Mask Airway insertion. Benzodiazepines are known to reduce upper airway reflexes[11]. Midazolamhas been studied more than once [3], [12]. Wafaa found that 0.04mg/kg of Midazolam helped reduce the Propofol dose by 40%. Thus, there was less hypotension and more cardiovascular stability. The disadvantage of Midazolam is its sedative effect and particularly in the ambulatory setting this may cause delayed discharge. Other agents that have been studied like Clonidine[13] and Dexmeditomidine[14] all which have some benefit but sedation would be an issue

in the ambulatory surgery setting andcosts and availability too need to be looked into. Relatively newer Opioids such as Alfentanyl, Remifentanyl and Butorphanol are also being studied but duration of apnoea, hypotension, post operative nausea, vomiting and availability are issues to be dealt with[15-16]. Ketamine provided stable haemodynamics and less duration of apnoea and was found tobe more useful in the difficult airway setting[17]. Since relaxation of the muscles of the airway is what would enable smooth insertion, a muscle relaxant would be the best agent to serve this purpose. The ideal muscle relaxant for usein the ambulatory setting is still in search[18]. Muscle relaxants avoid side effects likehypotension and sedation. Non depolarizing muscle relaxants like Mivacurium and Rocuronium have been studied[4]. The effects of residual neuromuscular blockade always remain a concern with non-depolarizing agents, especially in the day care setting. The use Neostigmine and the nerve stimulator are implicated if non depolarizing agents are being used. Use of Neostigmine can be associated with increased incidence of post operative nausea and vomiting. Suggamedex as theanswer to the problem is being hoped for. Depolarizing agents like Succinylcholine are still widely used because of its quick onset,short duration, and excellent intubating conditions[18]. It is easily available, inexpensive, a time-tested drug, and has no sedative side effects. The usual induction dose is 1- 2 mg/kg [7]. Side effects include apnoea, anaphylaxis and myalgia. Lower doses have less of these side effects. 0.1mg/kg of Succinylcholine is known to relieve laryngospasmand does not cause increased duration of apnoea. To date none of the studies done on low dose Succinylcholine compare two different doses to estimate the ideal dose for smooth insertion of the Laryngeal Mask Airway. Yoshino et al did such a study comparing 0.25mg/kg and 0.5mg/kg Succinylcholine, with Thiopentone as the induction agent. 0.5 mg/kg Succinylcholine had higher incidence of side effects like fasciculations, myalgia and apnoea [6]. Most studies compare another agent such as Midazolam, or Fentanyl with Succinylcholine. In our study we look at 0.1 mg.kg and 0.25mg/kg of Succinylcholine. Most studies have a sample size of 60-150. In this study 283 patients were included. 283 patients were equally distributed in all three groups- Placebo, 0.1mg/kg of Succinylcholin and 0.25mg/kg of Succinylcholine. There were 95 patients each in the placebo and 0.1mg/kg group, and 93 patients in the 0.25mg/ kg group. This was adequate to power thestudy well as according to the sample size calculation each arm required 92 patients. Demographically patients were equally distributed in terms of age, weight, height and BMI. Overall, there were more males than females. This is probably because patients coming for Urological procedures were mainly male. Anorectal rectal disorders are more in males than females with ratio of 70%:30%. A lot of patients included in the study came for anorectalprocedures. This is also one of the reasons for males than females.

Conclusions

This study concludes that a low dose of Succinylcholine does facilitate insertion of theLaryngeal Mask Airway. The ideal dose is 0.25mg/kg of Succinylcholine. 0.1mg/kg is not sufficient and is associated inadequate jaw relaxation and does not always provide smooth insertion conditions. There is decreased Propofol consumption with use of Succinylcholine. Haemodynamics were not affected adversely. Duration of apnoea is not unduly prolonged and was the same in all groups. Fasciculations were more in the 0.25mg/kg group but there was no relation between fasciculations and myalgia, reinstating the multifactorial basis behind myalgia.

References

1. Taha S, Siddik-Sayyid S, Alameddine M, Wakim C, Dahabra C, Moussa A, et

al. Propofol issuperior to thiopental for intubation without muscle relaxants. Canadian Journal of Anesthesia/Journal canadien d‟anesthésie. 2005 Mar;52(3):249–53.
2. Lee MP, Kua JS, Chiu WK. The use of remifentanil to facilitate the insertion of the laryngeal mask airway. Anesth. Analg. 2001 Aug;93(2):359–362 , 3rd contents page.
3. Wafaa Taha Salem. A Comparison of Midazolam and Mini-Dose Succinylcholine to Aid Laryngeal Mask Airway Insertion During Propofol Anaesthesia. Journal of the Egyptian Nat. Cacer Inst. 2000;Vol 12(1, March):65–9.
4. Naguib M, Samarkandi AH. The use of low-dose rocuronium to facilitate laryngeal mask airway insertion. Middle East J Anesthesiol. 2001 Feb;16(1):41–54.
5. Goyagi T, Tanaka M, Nishikawa T. Fentanyl decreases propofol requirement for laryngeal mask airway insertion. Acta Anaesthesiol Scand. 2003 Jul;47(6):771–4.
6. Yoshino A, Hashimoto Y, Hirashima J, Hakoda T, Yamada R, Uchiyama M. Low-dose succinylcholine facilitates laryngeal mask airway insertion during thiopental anaesthesia. Br J Anaesth. 1999 Aug;83(2):279–83.
7. Ho KM, Chui PT. The use of mini-dose suxamethonium to facilitate the insertion of a laryngeal mask airway. Anaesthesia. 1999 Jul;54(7):686–9.
8. Liou C-M, Hung W-T, Chen C-C, Hsu S-C, Lau H-K. Improving the success rate of laryngeal mask airway insertion during etomidate induction by using fentanyl or succinylcholine. Acta Anaesthesiol Taiwan. 2004 Dec;42(4):209–13
9. Bettelli G. Which muscle relaxants should be used in day surgery and when. Curr Opin Anaesthesiol. 2006 Dec;19(6):600–5.
10. Murphy PJ, Erskine R, Langton JA. The effect of intravenously administered diazepam, midazolam and flumazenil on the sensitivity of upper airway reflexes. Anaesthesia. 1994 Feb;49(2):105–10.
11. Goel S, Bhardwaj N, Jain K. Efficacy of ketamine and midazolam as co-induction agents with propofol for laryngeal mask insertion in children. Pediatric Anesthesia. 2008;18(7):628–34
12. Higuchi H, Adachi Y, Arimura S, Nitahara K, Satoh T. Oral clonidine premedication reduces the EC50 of propofol concentration for laryngeal mask airway insertion in male patients. Acta Anaesthesiologica Scandinavica. 2002;46(4):372–7.
13. Uzümcügil F, Canbay O, Celebi N, Karagoz AH, Ozgen S. Comparison of dexmedetomidine-propofol vs. fentanyl-propofol for laryngeal mask insertion. Eur J Anaesthesiol. 2008 Aug;25(8):675–80.
14. Chari P, Ghai B. Comparison of butorphanol and thiopentone vs fentanyl and thiopentone for laryngeal mask airway insertion. J Clin Anesth. 2006 Feb;18(1):8–11.
15. Uzun S, Gözaçan A, Canbay O, Ozgen S. Remifentanil and etomidate for laryngeal mask airway insertion. J. Int. Med. Res. 2007 Dec;35(6):878–85
16. Bahk J-H, Sung J, Jang I-J. A Comparison of Ketamine and Lidocaine Spray with Propofol for the Insertion of Laryngeal Mask Airway in Children: A Double-Blinded Randomized Trial. Anesth Analg. 2002 Dec 1;95(6):1586–9.
17. Takeda J. [Muscle relaxants in ambulatory anesthesia]. Masui. 2008 Jul;57(7):845–52
18. Chung DC, Rowbottom SJ. A very small dose of suxamethonium relieves laryngospasm. Anaesthesia. 1993 Mar;48(3):229–30