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A STUDY OF THE EFFECT OF PRETREATMENT WITH LIDOCAINE AND DICLOFENAC IN REDUCING SUCCINYLCHOLINE INDUCED MYALGIA

KEYWORDS: Succinylcholine, myalgia, lidocaine, diclofenac

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ABSTRACT

Succinylcholine, a depolarizing muscle relaxant, known for its rapid onset of action and fast emergence, is the preferred muscle relaxant for ambulatory anaesthesia, short surgical procedures and rapid sequence induction as it provides almost ideal intubating conditions.

Postoperative myalgia is a minor but frequent adverse effect.

Several drugs have been observed to decrease the incidence and severity of post operative myalgia; lidocaine and diclofenac being the safer of these. However, no study compares their efficacy. The purpose of this study was to compare the effect of pretreatment with intravenous lidocaine versus intramuscular diclofenac in succinylcholine induced post operative myalgia.

120 consenting adult in-patients of Father Muller Medical College Hospital who were posted for elective minor surgery, under general anaesthesia, between the age group of 18-50 years with ASA physical status I and II were selected for the study. They were further divided into three groups of 40 each :Group D- 75 mg intramuscular diclofenac pretreatment, Group L - intravenous lidocaine 1.5 mg/kg and Group C - controls.

Patients were pre-oxygenated and induced with 5mg/kg IV thiopentone sodium followed by 1.5 mg/kg of succinylcholine. The severity and intensity of post operative myalgia were assessed with a standardized questionnaire 1 hour, 24 hours and 48 hours after surgery.

RESULTS : IV lidocaine showed a statistically significant ($p<.016$) reduction in the incidence and intensity of succinylcholine induced myalgia. IM diclofenac showed no such reduction when compared to the control group. When compared to diclofenac, lidocaine proved to be more efficacious in reducing the incidence and intensity of pain at all of the three time points.

MATERIALS AND METHODS:

The study was undertaken at Father Muller Medical College, Mangalore after approval by the institutional ethical committee. 120 in-patients were selected for the study using purposive sampling after obtaining consent.

Inclusion criteria

- Adult ASA I and II physical status of either sex
- Age between 18 and 50 years
- Weight - 40 to 65 kg
- Posted for elective minor surgeries

Exclusion criteria

- Major surgeries
- Pregnant and lactating women
- Neuromuscular disorders
- Emergency surgical procedures
- Age below 18 years or above 50 years
- Patient refusal
- True allergy to lidocaine and diclofenac

All patients were subjected to pre anaesthetic evaluation on the day prior to surgery. Routine pre-operative investigations were done. All patients were kept nil per oral for 8 hours with pre medication of Tab Ranitidine 150 mg orally 12 hours before surgery.

Patients were divided into three groups of 40 each, based on random number generated by computer software and pretreatment was given accordingly.

Group	Pretreatment given	Number of patients
D	Intramuscular diclofenac 75 mg 20minutes before administering succinylcholine	n= 40
L	Intravenous lidocaine 1.5mg/kg3 minutes before administering succinylcholine.	n=40
C	Control	n=40

In the operating room, baseline SpO2, heart rate and ECG were recorded. Intravenous access was secured. Inj. fentanyl 2 µg/kg IV was given 5 minutes before induction of anaesthesia.

Patients were pre-oxygenated and induced with 5 mg/kg IV thiopentone sodium followed by 1.5 mg/kg of succinycholine given IV. Tracheal intubation was performed once the fasciculations reached the toes. Anaesthesia was maintained with nitrous oxide 66% in oxygen and isofluorane 0.6%. Loading dose of 0.1 mg/kg vecuronium was given IV followed by maintenance dose of 0.02 mg/kg every 20 minutes IV. Neuromuscular blockade was reversed with IV neostigmine 0.05 mg/kg and 0.01 mg/kg IV glycopyrrolate at the end of the procedure. Standardized post operative care was given to all the participants. Pain related to the surgical procedure was treated with IV pethidine in a dose of 1mg/kg.

Severity and intensity of post operative myalgia was assessed by the investigator with a standardized questionnaire 1hour, 24 hours and 48 hours after surgery.

Standardised Questionnaire To Assess Post Operative Myalgia[1]

1. Do you have any pains or aches or stiffness in your muscles other than the site wherein the surgery was performed?

If the answer is no, myalgia is graded 0=none (no pain); if the answer is yes, the location, severity of pain and necessity for pain medication will be recorded.

A: If the pain is confined to one location, myalgia is graded 1=slight (pain confined to one site but causing no disability).

B: If the pain is affecting more than one location, myalgia is graded 2=moderate or 3 = severe.

2. Does the muscle pain restrict your normal activity? Assessed as: Can you get out of bed? Are you able to turn your head ? Can you cough without pain?

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A: If the answer is yes myalgia is graded 2=moderate (pain affecting more than one site but causing no disability).

B: If one of these questions is answered with no, myalgia will be graded 3=severe (pain affecting more than one site and causing disability).

The data obtained was statistically analyzed after calculating mean values and the standard deviation. Analysis of variance was done to compare normally distributed continuous variables between the treatments and Kruskal Wallis test was used for the ordinal variables. Chi square test was used to obtain other possible associations between two categorical variables.

OBSERVATIONS AND RESULTS:

Table 1: Comparison of Post Operative Myalgia within the Group

Group (n=40)	Post Operative Myalgia	Mean	Std. Deviation	Friedman Test value	p value
C	1hr	1.45	1.061	14.000	0.001*
	24hrs	1.38	1.254		
	48hrs	1.10	0.982		
D	1hr	1.18	0.675	28.083	0.000*
	24hrs	0.98	0.733		
	48hrs	0.65	0.533		
L	1hr	0.45	0.504	11.375	0.003*
	24hrs	0.60	0.744		
	48hrs	0.28	0.506		

* pvalue <0.05 is considered significant

Table 2:Pair-wise Comparisons of fasciculation between time points using Wilcoxon Signed Rank test

Dependent variable	Myalgia	Myalgia	P value
C	1 hr	24 hrs	0.448
		48 hrs	0.003*
	24 hrs	48hrs	0.001*
D	1 hr	24 hrs	0.021
		48 hrs	0.000*
	24 hrs	48 hrs	0.000*
L	1 hr	24 hrs	0.157
		48 hrs	0.071
	24 hrs	48 hrs	0.000*

p value < 0.05/3 = 0.016 is considered as significant

The statistical tests proved that

- There is significant reduction in pain over time within all the three treatment groups.
- Though the intensity of Post Operative Myalgia does not significantly reduce (p>0.016)from 1hr to 24hrs in any of the groups, there is a significant reduction (p<0.016)in the intensity of Post Operative Myalgia from 24hrs to 48hrs in all the treatment groups.

Table 3: Comparison of Post Operative Myalgia between the Treatment Groups

Post Operative Myalgia	Group(n=40)	Mean	Std. Deviation	Kruskal-Wallis Test value	p value
Myalgia 1hr	C	1.45	1.061	26.933	0.000*
	D	1.18	0.675		
	L	0.45	0.504		
Myalgia 24hrs	C	1.38	1.254	9.386	0.009*
	D	0.98	0.733		
	L	0.60	0.744		
Myalgia 48 hrs	C	1.10	0.982	19.411	0.000*
	D	0.65	0.533		
	L	0.28	0.506		

*p value <0.05is considered as significant

Based on the statistical tests, we conclude that

- There is no significant difference (p>0.016) between efficacy of intramuscular diclofenac and control in reducing the intensity of pain at any of the three time points.
- There is a significant difference (p<0.016) between efficacy of intravenous lidocaine and control in reducing the intensity of pain at all of the three time points.
- There is a significant difference (p<0.016) between efficacy of intravenous lidocaine and intramuscular diclofenac in reducing the intensity of pain at all of the three time points.

DISCUSSION:

Succinylcholine, a popular muscle relaxant for ambulatory anaesthesia, short surgical procedures and rapid sequence induction, provides almost ideal intubating conditions. Succinylcholine induced myalgia, a minor but frequent side effect with an incidence of 1.5 – 89%, is one of its drawbacks.

Studies have found that succinylcholine induced myalgia can best be prevented with non-depolarizing muscle relaxants, lidocaine or NSAIDs. A small dose of non-depolarising muscle relaxant can prevent fasciculations and myalgia to some extent but have potentially serious adverse effects[2].

Our study showed an incidence of pain in lidocaine, diclofenac and control groups as 45%,85%and 77.5% respectively. The incidence of myalgia is least in the lidocaine group comparable to studies by Chatterji et al.,[3] Melnick et al.,[4] and Raman et al.[5]However, Chatterji et al.,[3] reported an incidence of 8% in patients receiving lidocaine, lower than the incidence (45%) in our study.

It was believed earlier that myalgia resulted from fasciculations induced by succinylcholine. Contrary to this, Schreiber et al., in a meta-analysis, observed that there was no relationship between the incidence of fasciculations and the development of myalgia with possible different origins.[2] Wong and Chung also suggested a multifactorial pathogenesis for myalgia.[6] Our study, in agreement with Schrieber et al., concluded that the severity of myalgia was not related to the intensity of fasciculations. Also observed was a higher incidence of fasciculations in the diclofenac group, suggesting that NSAIDS have no role in its prevention.

There have been suggestions that NSAIDs could be effective against myalgia which may be inflammatory in origin.[2]Kahraman et al.,[7]confirmed this when they observed a reduction in the incidence of myalgia in patients who received pretreatment with diclofenac. Our study showed results conflicting with the above reports as diclofenac failed to reduce the incidence of pain compared to the control group. This result however is in agreement with that of another study where ketorolac was used as the pretreatment drug and no reduction in the incidence myalgia was observed.[4]

Interestingly, the diclofenac group showed an increase in the incidence of myalgia during the post operative period. This rise is possibly because these patients received the drug by the intramuscular route, which might have contributed to myalgia.

Lidocaine pretreatment has been noted to have a favorable effect on postoperative myalgia and has been used effectively for its prevention.[3,8,9]The lidocaine group in our study had the least intensity of pain as compared to the control and diclofenac groups at all the three time points of study.

While most researchers have studied the efficacy of lidocaine versus a control or non depolarizing muscle relaxants, we compared the efficacy of lidocaine with that of diclofenac, a commonly used NSAID. Lidocaine was found to be superior to diclofenac, in both, increasing the number of patients without muscle pain and decreasing the frequency of moderate and severe myalgia. Moderate and severe pain were reported only in (2.5%,0%), (10%,2.5%) and (5%,0%) patients at

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1hr, 24hrs and 48hrs respectively. Thus lidocaine pretreatment is concluded to be the most effective method of preventing succinylcholine myalgia.

Lidocaine was given in a dose of 1.5 mg/kg as minimal side-effects occur at this dosage.[6] No significant side effects were reported by any of the participants of the study.

LIMITATIONS –

Intramuscular route was used for the injection of diclofenac and this could have influenced the occurrence of myalgia at the site of injection.

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