Original Article

Evaluation of Prophylactic Effect of Intramuscular Diclofenac Sodium for Prevention of Succinylcholine-Induced Myalgia

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Abstract

Background: *Succinylcholine a depolarizing muscle relaxant with rapid onset, predictable course and short duration of action is associated with myalgia.* ***Objectives:*** *To assess the efficacy of intramuscular injection of diclofenac sodium in preventing succinylcholine-induced myalgia.* ***Materials and Methods:*** *Eighty healthy adults scheduled for elective surgery under general anesthesia were enrolledin a double-blind study and randomly allocated into two groups of forty patients. Patients in Group I (diclofenacgroup) were pretreated with inj. diclofenac 75 mg deep intramuscularly into gluteal region one hour prior to induction of anesthesia, while patients in Group II (saline group) received an equivalent volume of saline inj. in same site. Anesthesia was induced in both groups with fentanyl 1.5 mcg/kg, propofol 2.0 mg/kg and succinylcholine1.5 mg/kg. Postoperative myalgia was assessed 24 hours after induction and graded as nil, mild, moderate, or severe.* ***Results:****The demographic data for both groups were comparable ($p > 0.05$). Postoperative myalgia was recorded at 24 hours after induction in diclofenac group with twelve (30%) patients and 24 (60%) patients in normal saline (control) group respectively ($p < 0.05$).* ***Conclusion:*** *Prophylactic use of intramuscular injection of diclofenac is effective in the prevention of postoperative myalgia*

Keywords: *Diclofenac, Succinylcholine, Propofol, Postoperative myalgia (POM).*

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Introduction

Succinylcholine, a depolarizing muscle relaxant with unique properties of rapid onset and short duration of action.[1] It also seems to be a popular muscle relaxant for ambulatory anesthesia and short surgical procedures.[2] It is regularly used by 69% of anesthesiologists and in 97% of emergency surgeries in Europe and the USA for adults.[3] Succinylcholine has unique advantages, including low cost, fast onset of action, rapid recovery, benign metabolites, and reliable degree of relaxation.[4,5] Postoperative myalgia (POM) is a frequent side effect of succinylcholine administration.[6] The exact underlying mechanism of succinylcholine-induced myalgia is not known, thus many attempts have been made to avoid these undesirable effects, which include pretreatment with rocuronium,[7] atracurium,[8] lignocaine,[8] calcium,[9] ketorolac,[10] diclofenac sodium,[11] diazepam,[12] magnesium sulphate,[13] thiopentone sodium,[14] d-tubocurarine[15]and vecuronium.[16] The incidence of myalgia at the first 24 h after operation has been reported to range from 41% to 92 %.[17] In vitro studies have demonstrated that excessive repetitive contractile activity of muscle is associated with increased calcium uptake, activation of phospholipase A_2, generation of arachidonic acid and synthesis of prostaglandins, which may induce inflammation.[18] It is also postulated that calcium influx into muscles causes an increase in muscle damage and pain.[19] The efficacy of NSAIDs suggests that there is an inflammatory genesis for myalgia and prostaglandins may be involved.[20] The use of diclofenac sodium may have interrupted the prostaglandin-mediated destructive cycle and this provides a rationale for its efficacy in preventing postoperative myalgia

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Therefore, in this randomized, double-blinded study, it was compared the effect of prophylactic use of diclofenac sodium on succinylcholine-induced myalgia in patients undergoing ENT surgery.

Materials and Methods

This is a randomized controlled double blind study conducted from May to July 2018 in National Institute of ENT Dhaka. The inclusion criteria were American Society of Anesthesiologists (ASA) physical status I and II, need for general anesthesia with endotracheal intubation, not being addicted to any drugs, being 20-50 years of age. The exclusion criteria were hepatic or renal impairment, cardiac ischemia, pulmonary, neuromuscular or metabolic diseases and pregnancy. All participants provided written informed consent to participate in the study.

Preoperative evaluation included examination of medical history, physical and upper airway examination. A complete blood test, renal function tests, liver function tests, chest x-ray and electrocardiogram were conducted on all patients. Routine monitoring was conducted after patients arriving in operating room with a monitor. A 20 G cannula was inserted to the dorsum of left hand of the patient and Ringer's Lactate solution was started at a rate of 100ml/hour. All 80 patients were randomly allocated into two equal groups, diclofenac sodium group was designated as group I and normal saline (placebo group) as group II. The patients of diclofenac sodium group were pretreated with diclofenac sodium 75 mg deep intramuscularly in gluteal region one hour before induction, while patients of normal saline (placebo) group were given isotonic saline 0.9% in same site one hour before induction. Premedication was done by injecting 1.5 mg/kg of fentanyl. There after, anesthesia was induced in all patients, by 2 mg/kg of propofol intravenously. Following the loss of eyelid reflex, 1.5 mg/kg of succinylcholine was injected intravenously as a muscle relaxant and then the patients were intubated. The maintenance of anesthesia was continued using a mixture of oxygen, nitrous oxide, halothane and vecuroneum as muscle relaxant. At the end of the surgery, muscle relaxation was reversed using neostigmine and atropine as usual. After the desired spontaneous ventilation, the patients were extubated, then transferred to the recovery room and later in the ward.

The incidence and severity of succinylcholine induced postoperative myalgia in the patients were determined 24 hours after surgery by an anesthesiologist who was unaware of the grouping. An attempt has been made not to let know the patient that myalgia was of special interest. Postoperative myalgia (POM) is defined as "a pain with no surgical interference" and is graded based on Kararmaz et al's[21] four-point scale as follows:

0= no muscle pain.
1= muscle stiffness limited to one area of the body.
2= muscle pain or stiffness noticed spontaneously by a patient who requires analgesics.
3= incapacitating generalized, severe muscle stiffness or pain.

Statistical Analysis

Date was summarized as mean ± SD. Unpaired t-test was applied for quantitative data and Chi-square test for qualitative data. P value < 0.05 was taken as significant.

Results

There was no significant difference in terms of age, body weight, sex and ASA status between the groups (Table I). In group I twelve (30%) out of the 40 patients had postoperative myalgia (POM), whereas 24 (60%) out of the 40 patients had POM in group II (P<0.05). Grade 1 POM was lower number of patients in group I when compared with group II (7 versus 15; P<0.05). Grade 2 POM was also lower number of patients in group I when compared with group II (5 versus 9; P<0.05) and there was no grade 3 POM in any of the two groups (Table II). The baseline values of systolic and diastolic blood pressure and heart rate in both groups were similar and there was no any adverse effect.

Table I: Comparison of demographic data between the groups

Parameter	Group I (Diclofenac group) n=40	Group II (Saline group) n=40	p value
Age in year (mean±SD)	34.68±9.21	35.52±7.47	p>0.05
Weight in kg (mean±SD)	56.46 ±8.62	54.87 ±7.82	p>0.05
Sex (M/F)	23/17	24/16	p>0.05
ASA status I/II	35/5	36/4	p>0.05

Table II: Incidence and severity of postoperative myalgia

Postoperative myalgia (POM)	Group I (Diclofenac group) n=40	Group II (Saline group) n=40	p value
Incidence of myalgia number (%)	12 (30%)	24 (60%)	p<0.05
Grading of myalgia number (%)			
0	28 (70%)	16 (40%)	p<0.05
1	7 (17.5%)	15 (37.5%)	p<0.05
2	5 (12.5%)	9 (22.5%)	p<0.05
3	0	0	-

Discussion

Succinylcholine, a depolarizing muscle relaxant possesses a unique property of rapid onset and short duration of action, but is accompanied by side effects such as fasciculation and postoperative myalgia (POS). Pre treatment with various drugs have been tried to reduce these side effects.

Intramuscular diclofenac sodium was tried as pre treatment to decrease the postoperative myalgia in the present study. The findings of present study shows, in diclofenac group twelve (30%) out of the 40 patients had postoperative myalgia (POM), whereas 24 (60%) out of the 40 patients had POM in saline group (P<0.05). Grade 1 POM was lower number of patients in diclofenac group when compared with saline group (17.5% versus 37.5%; P<0.05). Grade 2 POM was also lower number of patients indiclofenac group when compared with saline group (12.5% versus 22.5%; P<0.05) and there was no

grade 3 POM in any of the two groups.

Pandey et al.[22] had a study on prevention of succinylcholine induced myalgia using pregabalin, gabapentin and diclofenacthen myalgia was found 37.5%, 35% and 32.5% respectively. Myalgia found in present study was 30% and study done by Pandey CK et al was 32.5% using diclofenac as pretreatment, which is nearly similar.

Pandey et al.[23] showed in his study that lignocaine was superior to diclofenac sodium in reducing postoperative myalgia due to succinylcholine.

Hossain et al.[24] had a study on prevention of succinylcholine induced myalgia using intramuscular diclofenac and dicolfenac suppository and myalgia was found 84% and 44% respectively, which is conflicting to present study. The difference may be due to use of induction agent, propofol was used in present study thiopentone was used by Hossain study. But result of diclofenac suppository was nearly similar to present study.

Conclusion

Pretreatment with intramuscular diclofenac sodium 75 mg in patients who received propofol for induction of anesthesia and succinylcholine for muscle relaxation can reduce the frequency and severity of postoperative myalgia.

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