Administration of I.V. lidocaine before induction of general anesthesia prolong suxamethonium action in caesarian section surgeries. clinical assessment

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ABSTRACT

Background: Known as suxamethonium or succinylcholine, is a medication used to cause short-term paralysis as part of general anesthesia. The duration of operation is one of the important factors accounting to the success of the operation. Simple safe available drug can change the plan of anesthesia.

Objective: The purpose of this study was to assess adding Lidocaine three minutes intravenously before induction of general anesthesia on the duration of optimum prolongation the action of Suxamethonium . With other group with regular method.

Type of the study: a cross-sectional study

Methods: A 100 candidate to compare the effect of Lidocaine for unpremeditated patients ,American society of anesthesia(ASA) physical status II .patients were scheduled for caesarian section surgery were randomly assigned to two groups: Group I patients received 1.5 mg/kg Lidocaine 3 minutes before induction of general anesthesia, Group 2 patients received just the anesthetic agents. For assessment of prolongation of action the researcher Deepened on the clinical signs of recovery from Suxamethonium which are: spontaneous breathing, ability to swallow when we open the patient's lower jaw (observing movement of the tongue).between the two group Both groups received general anesthesia.

Results: The of prolongation of Suxamethonium in elective cases in Group I was a about 7 - 15 minutes, while in Group II the time of Suxamethonium was about 3 - 5 minutes Conclusions : The study concluded that there was a significant difference between the two groups from the side of suxamethonium time in group one(lidocaine group)as there was prolongation of time more than group two .

Key word; general anesthesia Propofol , Ketamin Lidocaine and Suxamethonium

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Suxamethonium chloride ,Known as suxamethonium or succinylcholine, is a medication used to cause short-term paralysis as part of general anesthesia. This is done to help with tracheal intubation or electroconvulsive therapy. It is given either by injection into a vein or muscle. When used in a vein onset of action is generally within one minute and effects last for up to 10 minutes[1,2] Mechanism of Action It binds to post-synaptic nicotinic receptors, activating them and opening ion channels, which causes depolarization and contraction.Phase I Block In contrast to acetyl choline, which is hydrolyzed in synaptic cleft, this suxamethonium is not rapidly metabolized. It remains attached to receptors for longer durations, leading to persistent depolarization of receptors. Muscle membrane becomes irresponsible to further stimulus and this is known as phase I block or depolarizing block. Small contractions of the muscle fibers and fasciculations are seen in this phase.Phase II Block .After some time, the muscle membrane becomes desensitized to the effects of neurotransmitters, this is known as phase II block or the desensitizing block. In this phase, flaccid paralysis of the muscles is seen.

Therapeutic Uses

1. For short surgical procedures (abdominal surgeries)
2. Bronchoscopy
3. Laryngeoscopy
4. Esophagoscopy
5. Can be used in electroconvulsive therapies to prevent convulsions and trauma e.g. status epilepticus
6. Also used in orthopedic manipulations(1,2)

This study tries to answer the question of adding lidocaine hoping to prolong anesthetics drugs action, for short surgical procedures (abdominal surgeries), researcher use clinical assessment to answer this issue. using simple and effective method in maintain the optimal time for intermediate surgical operations using simple available drugs (Suxamethonium and Lidocaine) in the absence of short and intermediate muscle relaxants. Lidocaine, 2-(diethylamino)-N-(2,6-dimethyl phenyl)-acetamide, is an amide local anesthetic agent. The amide anesthetics block fast voltage-gated sodium channels in the cell membrane of postsynaptic neurons, preventing depolarization and inhibiting the generation and propagation of nerve impulses. At lower blood concentrations, sensory neurons are primarily affected while at higher concentrations the effects become generalized. Lidocaine also possesses anti-inflammatory and immunomodulating properties. In comparison to other agents in the class, lidocaine has a rapid onset of action and an intermediate duration of effect.[3,4] Local numbing agent; The efficacy profile of lidocaine as a local anesthetic is characterized by a rapid onset of action and intermediate duration of efficacy. Therefore, lidocaine is suitable for infiltration, block, and surface anesthesia. Longer-acting substances such as bupivacaine are sometimes given preference for

subdural and epidural anesthesias; lidocaine, though, has the advantage of a rapid onset of action. Epinephrine (adrenaline) vasoconstricts arteries, reducing bleeding and also delays the resorption of lidocaine, almost doubling the duration of anaesthesia. For surface anesthesia, several available formulations can be used for endoscopies, before intubations, etc. Buffering the pH of lidocaine makes local numbing less painful.[5] Lidocaine drops can be used on the eyes for short ophthalmic procedure .There is tentative evidence for topical lidocaine for neuropathic pain.[6]Heart arrhythmia; Lidocaine is also the most important class-1b antiarrhythmic drug; it is used intravenously for the treatment of ventricular a rrhythmias (for acute myocardial infarction.[7] Inhaled lidocaine can be used as cough suppressor acting peripherally to reduce the cough reflex.[8]Lidocaine, along with ethanol, ammonia, and acetic acid, may also help in treating jellyfish stings, both numbing the affected area and preventing further nematocyst discharge.[9][10] For gastritis, drinking viscous lidocaine may help with the pain.[11] Insensitivity Relative insensitivity to lidocaine is genetic. In hypokalemic sensory overstimulation, relative insensitivity to lidocaine has been described in people who also have attention deficit hyperactivity disorder.[11] In dental anesthesia, a relative insensitivity to lidocaine can occur for anatomical reasons due to unexpected positions of nerves. Some people with Ehlers-Danlos syndrome are insensitive to lidocaine.[11]Adverse drug reactions (ADRs) are rare when lidocaine is used as a local anesthetic and is administered correctly. Most ADRs associated with lidocaine for anesthesia relate to administration technique (resulting in systemic exposure) or pharmacological effects of anesthesia, and allergic reactions only rarely occur.[12] It is generally safe to use lidocaine with vasoconstrictor such as epinephrine including in regions such as the nose, ears, fingers and toes.[13] While concerns of tissue death if used in these areas have been raised evidence does not support these concerns.[18]Interactions: Any drugs that are also ligands of CYP3A4 and CYP1A2 can potentially increase serum levels and potential for toxicity or decrease serum levels and the efficacy, depending on whether they induce or inhibit the enzymes, respectively.[14]Pharmacolog*:* Mechanism of action: Lidocaine alters signal conduction in neurons by blocking the fast voltage-gated Na^+ channels in the neuronal cell membrane responsible for signal propagation.[14] Pharmacokinetics: When used as an injectable it typically begins working within four minutes and lasts for half an hour to three hours.[4][5] Lidocaine is about 95% metabolized (dealkylated) in the liver mainly by CYP3A4 to the pharmacologically active metabolites monoethylglycinexylidide (MEGX) and then subsequently to the inactive glycine xylidide. MEGX has a longer half-life than lidocaine, but also is a less potent sodium channel blocker.[15] The volume of distribution is 1.1-2.1 l/kg, but congestive heart failure can decrease it. About 60-80% circulates bound to the protein alpha$_1$ acid glycoprotein. The oral bioavailability is 35% and the topical bioavailability is 3%. The elimination half-life of lidocaine is biphasic and around 90–120 minutes in most patients. This may be prolonged in patients with hepatic impairment (average 343 min) or congestive heart failure (average 136 min).[16] Lidocaine is excreted in the urine (90% as metabolites and 10% as unchanged drug).[15]

Methods : Study type; cross-sectional stud (some analytical element).Study duration; from April 2015 to February 2016. Setting ;nursing home hospital /gynecology department .Ethical issue; obtaining informed consent from all the patients. Study sample;- 100 elective cs. unpremedicated, American society of anesthesia (ASA) physical status II patients.Exclusion criteria;- are Patients refusal, sepsis, head injuries, Suxamethonium apnoea and moderate to severe metabolic disturbances.Patients assignment ; Patients were assigned to one of two groups in randomized manner:

Group I ;-patients received Ketamine 0.25 m^g / kg, Propofol 2 - 3 mg/kg, 1.5 mg/kg Lidocaine 3 minutes before Suxamethonium 1 M g/kg.

Group II;- received just Ketamine 0.25 mg / kg, Propofol 2-3 mg/kg and Suxamethonium I mg/kg.

Outcome variable for compares between the two groups using clinically assessment measured by the researcher herself , duration of prolongation of Suxamethonium action measured by minuets. The data; measurement of study applied in MINI TAB soft were v. 22 used. Descriptive statistic as graph and table. Analytical statistic as t test and t test P value below 0.05 represent statically significant edge.

Results: By using the MINI TAB and by using the T-student test, it's found that there is highly significant difference in duration of action of Suxamethonium between the two groups The measurement of prolongation of Suxamethonium in Group I was a about 7 - 21 minutes in elective cases, while in Group II the,time of Suxamethonium was about 3 - 5 minutes in elective Cases

Table I : comparison of Time of Suxamethonium action with Lidocaine administration 3 minutes before.

Suxamethonium action	N	Mean	Standard Deviation	P- Value
With lidocaine	50	13.5	3.099	0.002
Without lidocaine	50	5.42	1.002	

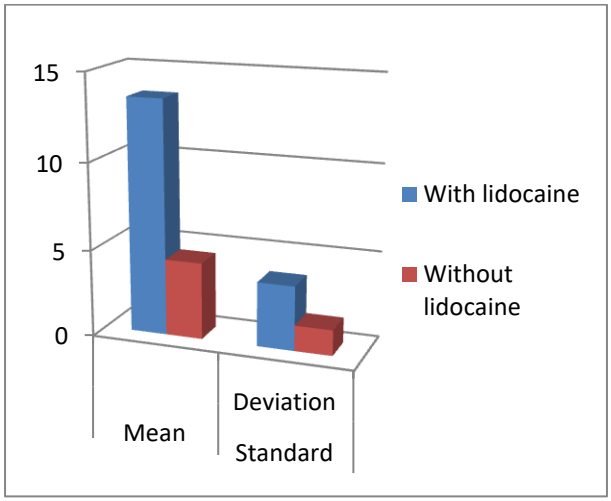

Figure 1 : Comparison of the duration of action of Suxamethonium between both groups.

Discussion :The need to explore the effect of intravenous Lidocaine in the pre-induction period would prolong the Suxamethonium action and the period of relaxation may be prolonged. All patient were Assessed in this study by clinical observation. The cases were highly selective with good list of exclusion criteria were to help for clarifying the real effect of the study aim.

Group I showed an observed prolongation in the Suxamethonium activity (7 - 15) minutes which is more than its normal Suxamethonium activity time . The P value is highly significant for these cases (0.002).

Group II showed normal Suxamethonium effects, action and recovery, the time was about 3 - 5 minutes in elective cases , at the table above in the result which is still in the normal action of Suxamethonium.So without Lidocaine, Suxamethonium takes its time and finishes its action. Knowing that pregnant women have low level of pseudo cholinesterase many caesarian sections could be done under this procedure from skin incision till suturing, of Rectus Abdominis muscle, with highly skilled gynecologists the whole operation could be done under this maneuver[18]. The activity of Lidocaine as membrane stabilizer has been shown to maintain the end-plate in its depolarized state giving, the chance to muscles to stay in the paralytic phase, keeping Na channels blocked by Lidocaine then the depolarization occurred by Suxamethonium will maintain the cell membrane stabilized, then the neuromuscular junction in the depolarized phase and finally the muscle in the flat relaxed level[19]. The benefit from this maneuver is for short procedure operations (elective and emergency) to get the optimal time for induction, intubation and recovery from relaxation. Lessen the requirement for usage of other anesthetic drugs such as the non depolarizing muscle relaxants and the reversals (Neostigmin, Physostigmin, Edrophonium and Atropin). Many anesthesiologists suffered of poor anesthetic and relaxant drugs supply in the suburban and rural hospitals[20] (or even in some secondary or tertiary centers especially in Iraq) so they could manage their short operations by this method in the absence of short acting muscle relaxants such as Rocurronium. [21] Although using the short non-depolarizing muscle relaxants for intubation in most of elective cases, but still Suxamethonium is the ultra-short acting relaxant and should be available in all surgical theatres. Missing (in most of our hospital) for major, minor and accessories equipments (like; flexible fibroptic, laryngoscope and VideoLaryngoscope) for the anesthesiologists dealing with suspected difficult intubation patients this problem is still not resolved.In the other hand, this study includes the caesarian sectionsurgeries but there are tens of other operations need this method to be done like caesarian sections, tonsillectomy, hemorroidectomy, abscess drainage, alignment of fractures others and others. [22]

Conclusion adding lidocaine may be used to prolong suxamethanium action still there is a need of furthers studies

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