Comparative study between addition of ketamine or dexmedetomidine to lignocaine in intravenous regional anesthesia

Thesis

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صدق الله العظيم

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LIST OF ABBREVIATION

ADRs	**Adverse drug reactions**
ASA	**American Society of Anesthesiologists**
Avp	**Vasopressor**
CNS	**Central nervous system**
CPR	**Cardiopulmonary resuscitation**
CT	**Computer Tomography**
CVS	**Cardiovascular system**
DBP	**Diastolic arterial blood pressure**
FDA	**Food and Drug Administration**
HR	**Heart rate**
ICU	**Intensive care unite**
IVRA	**Intravenous regional anesthesia**
LA	**Local anesthetic**
lD	**Lignocaine dexamedetomidine**
Lk	**Lignocaine ketamine**
MBP	**Mean arterial blood pressure**
MEGX	**Monoethylglycinexylidide**
MEGX	**Metabolites monoethylgcinexlidide**
MRI	**Magnetic Resonance Imaging**
NMDA	**N-methyl-D D-aspartate glutamate**
NSAIDS	**Nonsteroidal anti-inflammatory drugs**
NTG	**Nitroglycerin**
PABA	**Paraaminobenzic acid**
SpO2	**Peripheral oxygen saturation**
SPSS	**Statistical package for the social sciences**
VAS	**Visual analog score**
AAGBI	**Anesthesia association of Great Brition and Ireland**

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INTRODUCTION

Intravenous regional anesthesia (IVRA) were first described in 1908 for anesthesia of the hand andforearm. The earliest agent injected into the isolated vascular space were procaine.The technique regained popularity in the 1960's when Holmes used lignocaine. Lignocaine remains the standardlocal anesthetic (LA) agent for surgical procedures in North America and prilocaine is used widely in Europe ***(Brown& Fink, 1998).***

IVRA is simple to administer, reliable, and cost-effective. It is ideal for short operative procedures on the extremities performed on an ambulatory basis. Disadvantages include concerns about local anesthetic (LA) toxicity, slow onset, poor muscle relaxation, tourniquet pain and minimal postoperative pain relief ***(Johnson, 2000).***

The ideal IVRA solution should have the following features: rapid onset, low dose of LA, reduced tourniquet pain, and prolonged post-deflation analgesia. At present, this may only be achieved by the addition of adjuncts to LA. Several adjuncts have been used including narcotics, nonsteroidalanti-inflammatory drugs (NSAIDS), muscle relaxants, α2 agonists and neostigmine ***(Choyce&Peng, 2002).***

Much research has been done on suitable adjuncts and additives to reduce anesthetic dose and to obtain improved tourniquet tolerance, better muscle relaxation, and prolonged postoperative pain control. Research evidence suggests that some adjuvants may offer some benefits. (e.g., ketorolac, clonidine, meperidine, and muscle relaxants) ***(Guay, 2009).***

Ketamineexerts a noncompetitive blockade of N-methyl-D-aspartate (NMDA) receptors that play a major role in synaptic plasticity and are specifically implicated in central nervous system (CNS) facilitation of painprocessing. Therefore, NMDA receptor antagonists have been implicated in perioperative pain management as they modulate central sensitization induced both by the incision and tissue damage ***(De Kock&Lavand'homme, 2007).***

Dexmedetomidine is an alpha2-adrenergic agonist and produces sedative–hypnotic, analgesic, and anxiolytic effects by an action on alpha2-receptors in the locus ceruleusin the pons***(Apan et al., 2009).***

AIM OF THE WORK

The aim of this study is to compare theonset and duration of sensory block when adding dexmedetomidine and ketamineto lignocaine in intravenous regional anesthesia. Also compare hemodynamic effects, postoperative analgesia, and adverse effects of these two drug after releasing of tourniquet.

INTRAVENOUS LOCAL ANESTHESIA

Intravenous (IVR) regional anesthesia is a common anesthetic technique for surgical procedures on the body's extremities where a local anesthetic is injectedintravenously.Thetechniqueusuallyinvolvesexsanguination,which forces blood out of the extremity, followed by the application of pneumatic tourniquets to safely stop blood flow. The anesthetic agent is introduced into the limb and allowed to set in while tourniquets retain the agent within the desired area. After some time, the tourniquet is depressurized to restore circulation (***Perlas etal., 2003).***

IVRanesthesiawere introduced in 1908 by the German surgeon August Gustav Bier, hence the more common term "Bier block" for this technique. Although used commonly when it was first introduced, Bier block fell in popularity before being reintroduced by Holmes in 1963. Most experience with Bier block has been in operating rooms, where it is considered a safe and effective alternative to general anesthesia in selected cases involving the upper and lower limbs. Bier block can also be used in the emergency department to provide rapid and complete anesthesia, as well as muscle relaxation and a bloodless operating field***(Wedel and Horlocker, 2008).***

Originally anesthesiawere obtained by the intravenous injection of procaine in a previously exsanguinated vascular space, isolated from the rest of the circulation by two Esmarch bandages used as tourniquets.

After initial enthusiasm, the technique fell into obscurity for >50 years. In 1963, Holmes reintroduced the Bier block with the novel use of lignocaine. Since the duration of anesthesia depends on the length of time the tourniquet is inflated, there is no need to use long-acting or more toxic agents. Its application for longer surgical procedures is precluded by the discomfort caused by the tourniquet, typically beginning within 30 to 45 minutes. Other disadvantages include incomplete muscle relaxation and lack of postoperative pain relief. With the implementation of a safety protocol and with meticulous attention to detail, concerns about local anesthetic (LA) toxicity should merely be a theoretical issue***(Peng etal.,2002)***.

Although alllocal anesthetic agents have been reported to have been used for IVRA.Atpresent lignocaine remains the most commonly used local anesthetic of choice in North America. When used in the recommended dose of not more than 3 mg/kg, it appears to be remarkably safe in IV regional blockade. Most researchers report the use of a large volume of a dilute solution of local anesthetic. We often use a smaller volume of a concentrated agent to simplify by avoiding the need for dilution and multiple syringes. By using smaller volumes, we find the procedure tends to be more straightforward and less time consuming; the medication is simpler to prepare and easier to inject***(Guay, 2009).***

As Lignocaine became the local anesthetic of choice for intravenous regional anesthesia (IVRA) because of the