Effect of Adding Dexamethasone to Bupivacaine in Ultrasound Guided Supraclavicular Brachial Plexus Block Versus Bupivacaine alone for Upper Limb Orthopaedic Surgery: A Comparative Study

A Thesis

Submitted for Partial Fulfillment of Master Degree in Anaesthesia

By

Mostafa Mohamed Nageeb Abd Al-Salam
M.B.B.Ch, Faculty of Medicine, Alexandria University

Under Supervision of

Prof. Dr. Hesham Mohamed El Azzazi
Professor of Anaesthesia, Intensive Care and Pain Management
Ain Shams University

Dr. Ashraf El Sayed El Agamy
Assistant Professor of Anaesthesia, Intensive Care and Pain Management
Ain Shams University

Dr. Marwa Mostafa Mohamed
Lecturer of Anaesthesia, Intensive Care and Pain Management
Ain Shams University

Faculty of Medicine
Ain Shams University
2018

سورة البقرة الآية: ٣٢

Acknowledgment

First thanks to **GOD** *to whom I relate any success in achieving any work in my life.*

I wish to express my deepest thanks, gratitude and appreciation to ***Prof. Dr. Hesham Mohamed El Azzazi,*** *Professor of Anaesthesia, Intensive Care, Pain Management, Faculty of Medicine, Ain Shams University, for his meticulous supervision, kind guidance, valuable instructions and generous help.*

Special thanks are due to ***Dr. Ashraf El Sayed El Agamy,*** *Assistant Professor of Anaesthesia, Intensive Care, Pain Management, Faculty of Medicine, Ain Shams University for his sincere efforts, fruitful encouragement.*

I am deeply thankful to ***Dr. Marwa Mostafa Mohamed,*** *Lecturer of Anaesthesia, Intensive Care, Pain Management, Faculty of Medicine, Ain Shams University for her great help, outstanding support, active participation and guidance.*

List of Contents

List of Tables

List of Figures

List of Figures cont...

List of Abbreviations

Abb.	Full term

ATP .....*Adenosine Triphosphate*
CBG.....*Corticosterone Binding Globulin*
CNS.....*Central Nervous System*
CPB .....*Cardiopulmonary Bypass*
DNA.....*Deoxyribonucleic Acid*
ECG.....*Electrocardiogram*
HR .....*Heart Rate*
IQR.....*Interquartile Range*
IV .....*Intravenous*
LA.....*Local Anaesthetic*
LAST.....*Local Anaesthetic Systemic Toxicity*
MABP.....*Mean Arterial Blood Pressure*
NIBP .....*Non-Invasive Blood Pressure*
PABA.....*Para-amino Benzoic Acid*
PONV.....*Postoperative Nausea and Vomiting*
RDS.....*Respiratory Distress Syndrome*
RNA.....*Ribonucleic Acid*
SD.....*Standard Deviation*
US.....*Ultrasound*
Vd .....*Volume of Distribution*

ABSTRACT

Dexamethasone is a potent long acting corticosteroid that has been used as an anti-inflammatory, antiemetic, in diagnostic tests and other uses. It has been shown to prolong peripheral nerve block and extend the duration of analgesia when added to local anaesthetics.

The application of the ultrasound in supraclavicular brachial plexus block is of great significance. It has decreased the incidence of complications (such as pneumothorax and intravascular injection) and so improved the patient safety. It also improved the success rate of the block by visualization of the brachial plexus and detecting anatomical variations.

Keywords: Postoperative Nausea and Vomiting - Local Anaesthetic Systemic Toxicity - Heart Rate - Deoxyribonucleic Acid

INTRODUCTION

Brachial plexus blocks are among the most commonly performed peripheral nerve blocks for upper extremity surgeries in clinical practice. It offers many advantages over general anaesthesia for upper limb surgeries such as sympathetic block, better postoperative analgesia, high success rate and fewer side effects ***(Kooloth et al., 2015)***.

Various approaches to the brachial plexus have been described but the supraclavicular approach is the easiest and most consistent method for anaesthesia and perioperative pain management in surgery below the shoulder joint. Local anaesthetics alone for supraclavicular brachial plexus block provide good operative conditions but have shorter duration of postoperative analgesia. This problem can be overcome by using long acting local anaesthetics like bupivacaine or by using adjuvant in regional anaesthesia. Adjuvant added to brachial plexus block should prolong the analgesia, without having systemic side effects, prolong motor block and should also reduce the total dose of local anaesthetic. Various studies have investigated several adjuvants including opioids, clonidine, neostigmine, bicarbonate added to local anaesthetics in brachial plexus block to achieve quick, dense and prolonged block, but the results are either inconclusive or associated with side effects ***(Dhumane and Shakir, 2016)***.

Dexamethasone, a high-potency, long-acting glucocorticoid, has been shown to prolong peripheral nerve blockade in animals and, when added to bupivacaine, to extend the duration of analgesia in humans. Although incompletely understood, dexamethasone's mechanism of action may stem from decreased nociceptive C-fiber activity via a direct effect on glucocorticoid receptors and inhibitory potassium channels. Other suggested mechanisms include a local vasoconstrictive effect, resulting in reduced local anaesthetic absorption, or a systemic anti-inflammatory effect following vascular uptake of the drug ***(Albrecht et al., 2015)***.

Aim of the Work

The aim of our study is to evaluate the effects of adding dexamethasone (8 mg) to 28 ml of bupivacaine 0.5% in ultrasound guided supraclavicular brachial plexus block for upper limb orthopaedic surgery versus bupivacaine 0.5% alone.

Chapter 1
SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK

Historical review

In ***November 1885, William Stewart Halsted,*** a surgeon working at the Roosevelt Hospital in New York performed the first nerve block of the cutaneous branch of the ulnar nerve under direct vision on his assistant, John Hall, who volunteered to undergo the procedure. Various other anaesthetic block techniques (under direct vision) were performed on various nerves; including the brachial plexus via the supraclavicular route; in the latter case, 0.5 % cocaine was injected directly into the plexus ***(Alemanno, 2014)***.

The supraclavicular brachial plexus block techniques are the most complete form of regional anaesthesia of the upper limb, their efficacy extending from the shoulder to the hand. It is no accident that historically, of the first three brachial plexus blocks, two were performed at a level above the clavicle, namely the Kulenkampff technique (1911) and Kappis posterior approach (1912), the exception being Hirschel's axillary approach (1911). Kulenkampff developed a technique, which the First World War promoted in the field. Despite the risk of pneumothorax, it long remained the most commonly performed technique, although with a number of variants, up until 1970,