Comparative study between *Fentanyl with (Lidocaine and Bupivicaine) Versus (Lidocaine and Bupivicaine) Alone in Supraclavicular Brachial Plexus Block in Upper Limb Surgeries*

Thesis

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Mohamed Afifi

List of Contents

List of Tables

List of Figures

Fig. No.	Title	Page No.

INTRODUCTION

Brachial plexus block is an excellent modality of anesthesia for upper limb surgeries providing better control of post operative pain with less co morbidities compared to general anesthesia as post operative nausea and vomiting and incidence of cognitive disorders ***(Sadowski et al., 2014).***

Ultrasound guidance provide real time visualization of the brachial plexus with direct visualization of the spread of the local anesthetic, improving the success rate, minimizing complications and increasing safety margin of the supraclavicular block ***(Honnannavar and Mudakanagoudar, 2017).***

Relieving post operative pain is one of the primary goals of anesthesia. Local anesthetics alone in supraclavicular block have a limited time in achieving this goal. Many additives like dexamethasone, clonidine and epinepherine have been tried to prolong the duration of the analgesia ***(Bindal et al., 2018)***

Bupivacaine is a widely used local anesthetic which is related chemically and pharmacologically to the amide local anesthetics available. Using 0.5% bupivacaine in supraclavicular brachial plexus block, the onset time may be up to 20 min with surgical anesthesia taking up to 40 min. The duration of block ranges from 4-12h with residual anesthesia still being present at 24h ***(Miller and Roland, 2006).***

Lidocaine as a local anesthetics differs from other local anesthetics in having a rapid onset, high dose limitation minimizing incidence of toxicity and moderate duration of action ***(Song et al., 2013).***

Fentanyl is similar to other opioid drugs, it target opioid receptors being selective on MU receptors, (mu selective agonist) but it also can act on other opioid receptors like kappa and delta. This interaction with the opioid receptors especially the Mu receptors produces its analgesic effect with subsequent increase of neurotransmitter dopamine in the brain reward centers ***(Carlos and Lopez-Ojeda, 2018).***

AIM OF THE STUDY

The aim of this work is to study the effect of Fentanyl as an adjuvant to bupivacaine and Lidocaine in supraclavicular brachial plexus block.

Chapter 1

ANATOMY OF BRACHIAL PLEXUS

The brachial plexus is a structure which is formed of the ventral rami of C 5 to T1 (sometimes from C4 to T2).It merges into three trunks between the middle and anterior scalene which will head towards the first rib. AT the level of the clavicle the ventral and dorsal roots form and from them will originate the three bundles which will be termed lateral, medial and posterior according to their position to the axillary artery ***(Sadowski et al., 2014).***

Roots:

The five roots arise from C5 to T1 from the intervertebral foramina and proceed lateral and caudal towards the first rib, through their pathway they are covered by the posterior fascia of the anterior scalene muscle anteriorly and by the anterior fascia of the middle scalene muscle posteriorly, these muscles are attached proximally to C3 till c6 and extend laterally till the first rib ***(Arbona et al., 2011).***

Trunks:

As we move more distally the roots become trunks, the C5 and C6 rami unite cranially to form the superior trunk at the lateral border of the middle scalene muscles. C8 and T1 rami unite to form the inferior posterior to the inferior aspect of the

anterior scalene muscle, between the superior and the inferior trunks, the middle trunk will pass which is a continuation of the C7 ventral ramus ***(Mian et al., 2014).***

Divivsions and cords:

Each trunk divides into an anterior and a posterior division. The anterior division of the upper trunk and the anterior division of the middle trunk will give rise to the lateral cord of the brachial plexus which will give rise to the musculocutaneous nerve and the lateral root of the median nerve, while the anterior division of the lower trunk will form the medial cord which will give rise to the medial cutaneous nerve of the arm, ulnar nerve, and the medial root of the median nerve, and the posterior divisions of the three trunks will unite together to form the posterior cord which will give rise to the axillary and the radial nerves ***(Abid, 2016).***

AS in figure (1) the naming of the cords can be easily recalled by their relative positions to the axillary artery. The lateral cord will be lateral to the axillary artery, the medial cord will border the axillary artery from the medial side and subsequently the posterior cord will be posterior to the axillary artery. The relations of the brachial plexus cords to the axillary artery have major clinical significance regarding the brachial plexus blocks ***(Mian et al., 2014).***

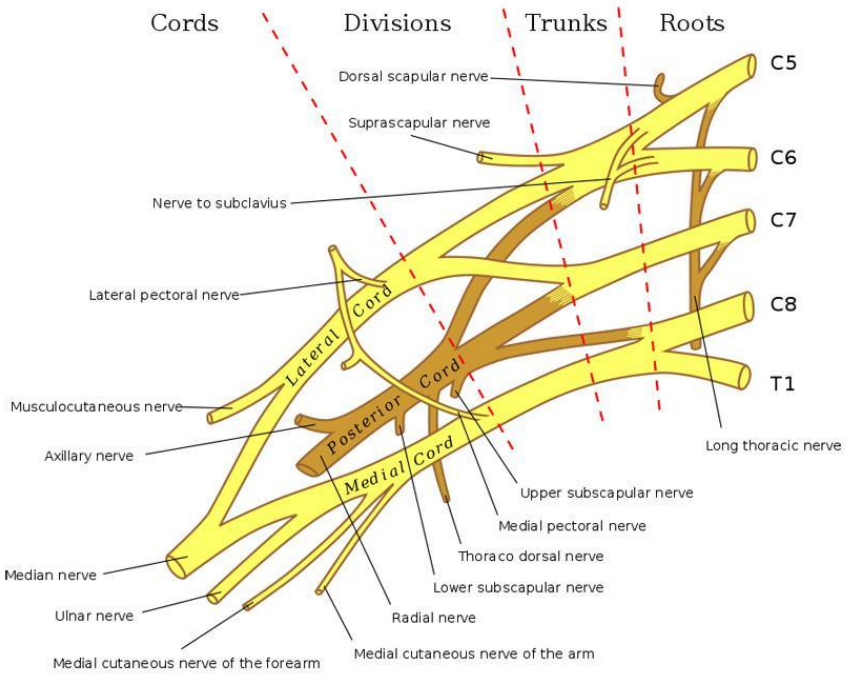

Figure (1): Suprascapular nerve brachial plexus (Medscape brachial plexus anatomy).

Branches of the brachial plexus:

Musclocutenous nerve: (figure 2)

The musculocutaneous nerve is a branch of the lateral cord of the brachial plexus which will run down and out, being lateral to the median nerve and anterolateral to the axillary artery, in its course it will cross the circumflex humeral vessels and will perforate the coracobrachialis muscle ***(Alain, 2001).***

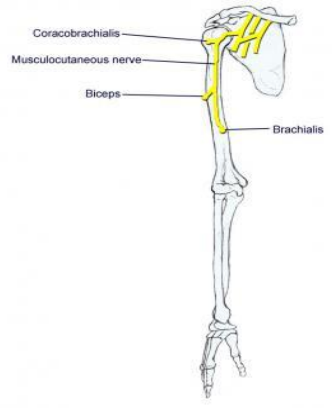

Figure (2): Distribution of the musculocutaneous nerve ***(Uysal et al., 2003).***

Ulnar nerve: (figure 3)

The ulnar nerve is a terminal branch of the brachial plexus arising from the medial cord of the brachial plexus. The nerve courses along the medial side of the humerus, the nerve continues posteriorly after it pierces the medial intermuscular septum in the upper arm. The nerve then courses into the cubital tunnel at the posteromedial elbow, running between the olecranon process and medial epicondyle. Distal to the elbow, the ulnar nerve passes between the ulnar and humeral heads of flexor carpi ulnaris muscle to enter the flexor compartment of the forearm. Then, it is found deep to flexor carpi ulnaris, and lateral to flexor digitorum profundus. AT the wrist the ulnar nerve will pass superficial to the flexor retinuclum then it will enter the palm of the hand via the Guyon's canal ***(Morgan and Mikhail, 2013).***

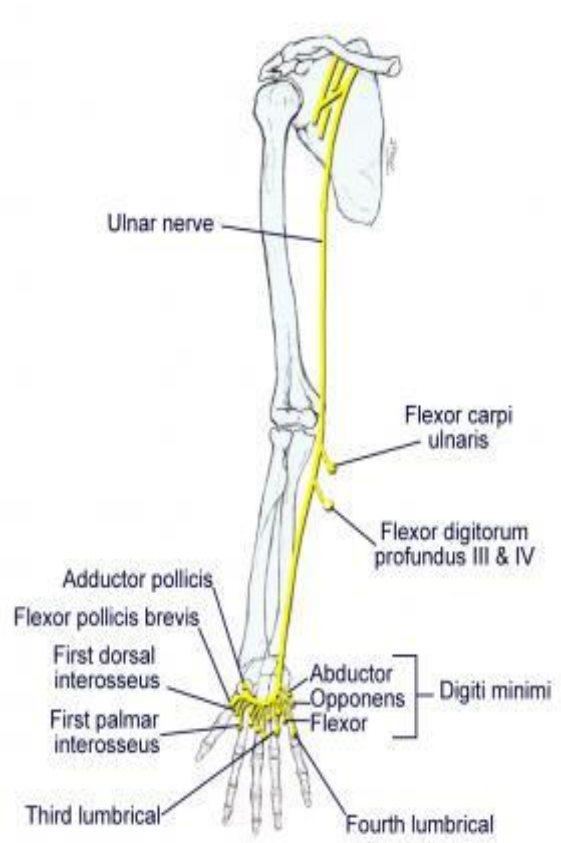

Figure (3): Distribution of the ulnar nerve ***(Uysal et al., 2003).***

The median nerve: (figure 4)

The median nerve is formed by the medial root and lateral root of the median nerve from both the lateral and the medial cords of the brachial plexus from c5 till T1, it will cross the cubital fossa medial to the brachial artery and the continue in the forearm between the flexor digitorum profundus and superficialis muscles. At the wrist, it passes between the

palmaris longus and flexor digitorum tendons, deep to the flexor Retinaculum in the carpal tunnel, to enter the hand.

The median nerve innervates the most flexor muscles in the forearm and intrinsic muscles of the thumb.It supplies cutaneous sensation to the palm's thenar eminence and the palmar surface of the first three fingers and the lateral half of the fourth finger, up to the posterior surface of the fingers distal to the distal interphalangeal joint, and provides sensation to the joints of the elbow, radius–ulna, wrist, and fingers ***(Arbona et al., 2011).***

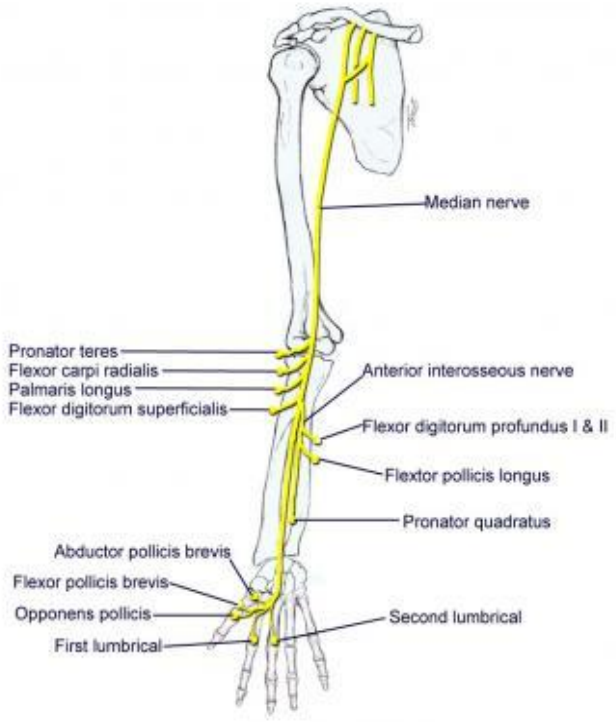

Figure (4): Distribution of the median nerve ***(Spinner and Kline, 2000).***