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A Clinical Comparative Study between Bupivacaine and Midazolam Versus Bupivacaine plain in Brachial plexus block by Supraclavicular approach in Upper Limb Surgeries

Thesis

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✍ *Israa Ihab Abdel Aziz*

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List of Abbreviations

Abbrev.	Full-term
ANOVA	: Analysis of variance
AXI	: Axillary nerve
BP	: Brachial plexus
BP	: Brachial plexus
CNS	: Central nervous system
DBP	: Diastolic blood pressure
DC	: Direct current
GABA	: Gamma amino butyric acid
HR	: Heart rate
Hz	: Hertz
LAs	: Local anesthetics
MC	: Musculocutaneous nerve
MEAV	: Minimum effective anesthetic volume
MED	: Median nerve
MSM	: Middle scalene muscle
NSAIDs	: Non-steroidal anti-inflammatory drugs
PCA	: Patient-controlled analgesia
PNB	: Peripheral nerve blockade
PNS	: Peripheral nerve stimulation
RAD	: Radial nerve
SA	: Subclavian artery

SBP : Systolic blood pressure

SD : Standard deviation

ULN : Ulnar nerve

US : Ultrasound

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Introduction

Brachial plexus block is an excellent method for attaining optimal operating conditions for upper limb surgeries by producing complete muscular relaxation, maintaining haemodynamic stability and the associated sympathetic block. They also provide extended postoperative analgesia with minimal side effects. In addition, it offers a better preservation of mental functions in elderly; decreased risk of aspiration due to intact pharyngeal and laryngeal reflexes; avoids difficult intubation; decreases postoperative complications associated with intubation and provides better postoperative analgesia without undue sedation facilitating early mobilization and discharge ***(Chandni et al., 2013).***

Bupivacaine is used frequently for supraclavicular nerve block as it has long duration of action from 3 to 6 hours. Adjuncts to local anesthetics for brachial plexus block may enhance the quality and duration of analgesia ***(Laiq et al., 2008).***

Many adjuvants have been used including opioids such as morphine, fentanyl, tramadol, buprenorphine, sufentanil and calcium channel blockers such as verapamil and alpha-agonists such as clonidine ***(Sarma et al., 2015).***

Midazolam, a water soluble benzodiazepine is known to produce antinoociception and to enhance the effect of local anaesthetic when given epidurally or intrathecally.

Midazolam produces this effect by its action on Gamma Amino Butyric Acid-A (GABA-A) receptors. GABA receptors have also been found in peripheral nerves ***(Kumar et al., 2016).***

Amongst various approaches to brachial plexus block, supraclavicular approach is the most commonly performed and most reliable method for surgeries below the shoulder joint. Potential complications include pneumothorax (1-6%), haemothorax, Homer's syndrome and phrenic nerve block ***(Pathak et al., 2012).***

Aim of the Work

The aim of this work is to determine the onset time, duration and analgesic efficacy of midazolam-bupivacaine combination compared to plain bupivacaine (0.5%) for brachial plexus block.

Anatomy of the Brachial Plexus

Knowledge of formation of brachial plexus and its ultimate cutaneous and muscular distribution is absolutely essential to the intelligent and effective use of brachial plexus anaesthesia for upper limb surgeries. Close familiarity with the vascular, muscular and fascial relationships of the plexus is equally essential to the mastery of various techniques, for it is these perineural structures which serve as the landmark by which needle may accurately locate the plexus percutaneously. In its course from intervertebral foramina to the upper arm, the fibres are composed consecutively of roots, trunks, divisions, cords and terminal nerves.

Brachial plexus is a complex network of nerves supplying the whole upper limb, including its motor and sensory supply, arising from the neck and passing through the axilla to the upper limb. It is composed of 5 roots, 3 trunks, 6 divisions, 3 cords, and terminal branches **(Figure 1)** ***(Andres and Sala, 2001).***

1-Roots:

The ventral rami of spinal nerves from C5 to T1 are referred to as the roots of the brachial plexus. The typical spinal nerve root results from the union of the ventral nerve

rootlets originating in the anterior horn cells of the spinal cord and the dorsal nerve rootlets ***(Andres and Sala, 2001).***

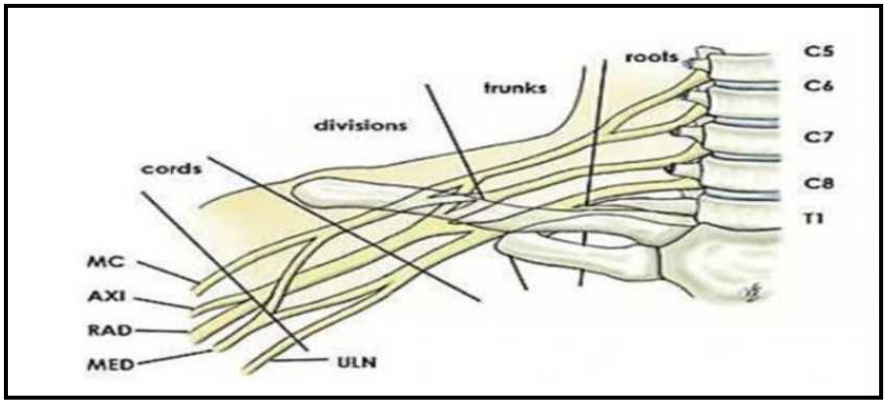

Figure (1): Brachial plexus with terminal branches labeled: MC is musculocutaneous nerve, AXI is axillary nerve, RAD is radial nerve, MED is median nerve, and ULN is ulnar nerve ***(Andres & Sala, 2001).***

The roots then get exit through the transverse processes of the cervical vertebrae just posterior to the vertebral artery, which runs in a cephalic direction through the transverse foraminae. Each transverse process consists of a posterior and anterior tubercle, which meet laterally to form the costotransverse bar **(Figure 2).** The transverse foramen lies medial to the costotransverse bar and between the posterior and anterior tubercles. The spinal nerves that form the brachial plexus run in an inferior and anterior direction within the sulci which is formed by these structures (***Gloss et al., 2006).***