EVALUATION OF PERFUSION INDEX BY MASIMO SET PULSE OXIMETRY TO PREDICT THE EFFICIENCY OF ULTRA SOUND GUIDED SUPRACLAVICULAR BLOCK IN PATIENTS UNDERGOING UPPER LIMB ORTHOPEDIC SURGERY

Thesis

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Abstract

The relationship of the pulsatile to the non-pulsatile amounts of blood at any particular site corresponds to PI at that site seventy patients scheduled for elective upper limb orthopedic surgery with ultrasound guided supraclavicular block and will be measure the average change in perfusion index by Masimo SET pulse oximetry (Masimo Corporation 40 Parker Irvine, California). At baseline and 10, 20,30min from administration of the block in blocked limb and contralateral unblocked limb.

Keywords

MAP-HR- PACU- ARDS-NIBP

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List of Abbreviations

AC	**: alternating current**
ASA	**: American Society of Anesthesiologist's**
ARDS	**Average drug reactions**
ASM	**Anterior scalene muscle**
BMI	**Body mass index**
BPL	**Brachial plexus**
BT	**Bleeding time**
CA	**Carotid artery**
CBC	**Complete blood picture**
CL	**Clearance**
CNS	**Central nervous system**
CPO	**Conventional pulse oximeter**
CT	**Clotting time**
DC	**Direct current**
DSA	**Dorsal scapular artery**
DST	**Discrete saturation transform**
ECG	**electrocardiogram**
HR	**heart rate**
IJV	**internal jugular vein**
LA	**local anaesthia**
LMWH	**low molecular weight heparin**
MAP	**mean arterial blood pressure**
MSM	**middle scalene muscle**
NIBP	**noninvasive blood pressure**
PABA	**para amino benzoic acid**
PACU	**Post anesthesia care unit**
PC	**Prothrombin concentration**

PI	**Perfusion index**
PN	**Phrenic nerve**
PT	**Prothrombin time**
PTT	**Partial thromboplastin time**
SA	**Subclavian artery**
SAO_2	**Arterial oxygen saturation**
SD	**Standard division**
TCA	**Transverse cervical artery**
TRI	**Transient radial irritation**
VDSS	**Steady state of volume of distribution**

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INTRODUCTION

The perfusion index is defined as the ratio between the range of absorption of a suitably long light wave (infrared, red) by pulsatile blood flow (arterial) versus non-pulsatile blood flow (venous, capillary, tissue, arterial non-pulsating) and is expressed as a numerical VALUE .PI display ranges from .02% (very weak pulse strength) to 20% (very strong pulse strength).(1).

The perfusion index is an indirect, noninvasive, and continuous measure of peripheral perfusion that provides Useful information to the practicing physician in several clinical settings. Pulse oximetry provides a relatively simple Means to continuously monitor PI in conjunction with other critical parameters, i.e., oxygen saturation and pulse Rate. Furthermore, the PI provides a means of determining an appropriate monitoring site for pulse oximetry. (2)

The Masimo SET infrared signal is influenced primarily by the amount of blood at the monitoring Site, not by the level of oxygenation in the blood. The ratio of AC (pulsatile) to DC (non-pulsatile) components of the IR (infrared) signal correspond to the pulsatile and the non-pulsatile amounts of blood. The relationship of the pulsatile to the non-pulsatile amounts of blood at any particular site corresponds to PI at that site. (3)

Supraclavicular block provides excellent anesthesia for upper limb surgery (4, 5). And is performed at the distal trunk/proximal division level, where the brachial plexus is most compact. This may explain its historical reputation for providing fast onset and complete, reliable anesthesia for the upper limb, and the nickname ‘spinal of the arm. (6)

Moreover, ultrasound guidance in supraclavicular block has been introduced and gaining popularity (7). Ultrasound-guided supraclavicular block has many advantages including the higher success rate, faster onset time, and fewer complications (8).

A real milestone in regional anesthesia was the introduction of ultrasound imaging. This auxiliary method enables bedside imaging and evaluation of nerves, adjacent structures (vessels, pleura), needle location and above all spread of anesthetics. The method is particularly useful in patients in whom classical methods may be ineffective (obesity — lack of anatomical landmarks, anatomical varia-bility, difficulties in nerve stimulation, e.g. neuropathies (9).

Peripheral nerve block is a common technique of regional anesthesia the traditional method to evaluate adequacy of the block for surgery is based on loss of sensory response to stimuli, which requires patient cooperation (10). Several methods have been described for objective assessment of the nerve block. Among them is the quantitative evaluation of the block of autonomic innervation to the arm. After successful nerve peripheral nerve blockade local vasodilation. Increase local blood flow and increase skin temperature occur as a result of blockade sympathetic nervous fibers. (11-13)

How soon after administration of the block changes in PI predicted block effectiveness has not been establish and the aim of the study to investigates whether PI is a reliable and objective to detect that is can be used as diagnostic tool for efficiency of supra clavicular block in patients undergoing upper limb orthopedic surgery by Masimo SET pulse oximetry.

AIM OF WORK

1. The aim of this study was to detect that perfusion index by Masimo SET pulse oximetry. Can be used as diagnostic tool for efficiency of supra clavicular block in patients undergoing upper limb surgery.

2. To evaluate range of value of perfusion index where supraclavicular block was efficient.

SONOANATOMY

Peripheral nerve blocks have certain advantages over general anesthesia such as associated analgesia, minimal side effects and a more rapid recovery.(14-16) the supraclavicular brachial plexus block provides reliable anesthesia of the entire upper limb with excellent conditions for tourniquet application. Kulenkampf in 1911 described a technique based on an injection made at the supraclavicular part of the brachial plexus associated with a short onset of action (17).

Despite a few modifications, the supraclavicular approach remained risk prone owing to its association with a high incidence of pneumothorax.(18) After Grange et al performed first Doppler guided block in 1978, the evolution of real time ultrasound guided blocks (with or without nerve stimulation) resulted in ease of performance, increased safety profile, and a better quality block.(19-20)

Ultrasound has played a significant role in re-establishing the supraclavicular brachial plexus block in perioperative care. However, a thorough understanding of the anatomy, sonoanatomy, sonotechniques including scanning and needling is essential to ensure a safe and high quality block.(21)

Anatomy

The anterior rami of the cervical and first thoracic spinal nerves (C5-8 and T1) form the brachial plexus. The brachial plexus originates in the neck as ‘roots’ and terminates in the axilla as ‘cords’, giving off various branches along its course. The roots of the brachial plexus emerge

between the scalenus anterior and scalenus medius muscles to form trunks which cross the floor of posterior triangle.

Each trunk divides into anterior and posterior divisions and rearranges to form the cords at the outer border of the first rib to continue down into the axilla. Thus the roots of the brachial plexus are situated between the scalene muscles, divisions behind the clavicle and cords in the axilla. The roots and trunks along with their branches form the infraclavicular portion of the brachial plexus (Fig. 1).

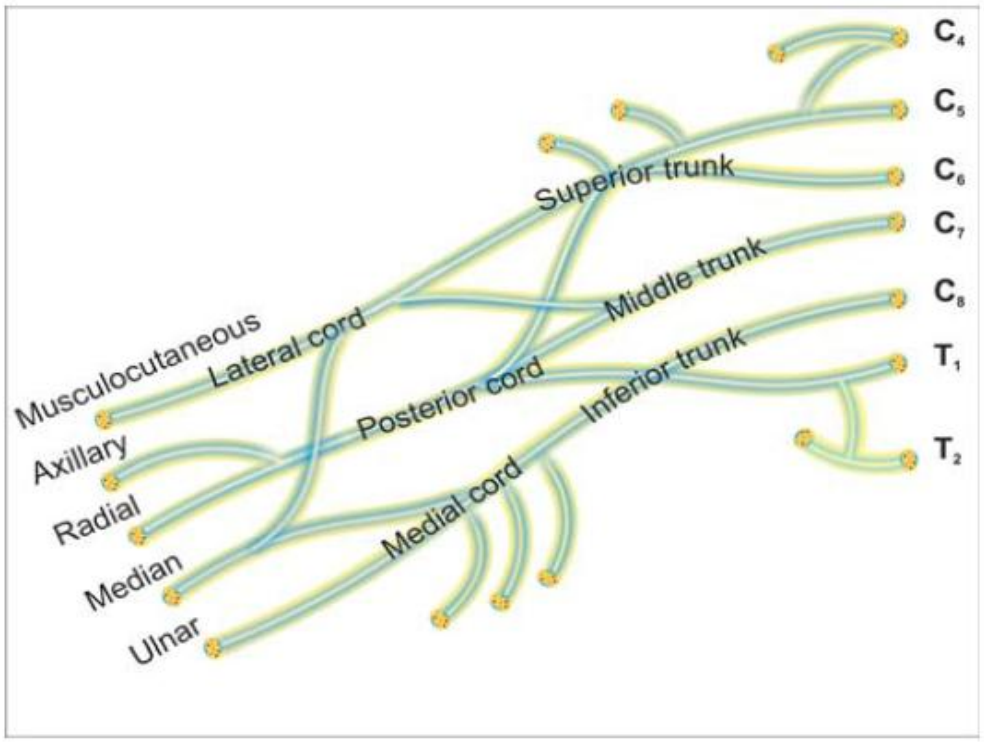

Fig. 1: Schematic diagram of brachial plexus

The scalenus anterior muscle originates from the tubercles on the C3-6 cervical vertebrae and descends forwards and laterally to be inserted onto the scalene tubercle and adjacent part of the first rib. The phrenic nerve (C3-5) courses on the scalenus anterior within the prevertebral fascia, leaving its medial border near its lower edge and runs between the subclavian artery and vein to enter thorax.