Uitrasound guided peripheral nerve block

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ABSTRACT

The technology and clinical understanding of anatomical sonography has evolved greatly in the past decade. Successful sonar guided peripheral nerve blockade requires optimum understanding of the anatomy of the peripheral nerves to be blocked so as to achieve optimum nerve localization and avoids injury of the surrounding structures.

KAY WORDS

UITRASOUND _GUIDED_ NERVE BLOCK

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List of Abbreviations

- 2-D : two dimensional
- 3-D : three dimensional
- ARNI : anesthesia related nerve injury
- C: cervical segment
- Cm : centimeter
- C_m : minimum effective concentration
- C_{max} : peak blood level of local anesthetics
- CNS : central nervous system
- CT : computed tomography
- CVS : cardiovascular system
- CWD : continuous wave Doppler
- GABA : gamma amino butyric acid
- HRUS : high resolution ultrasound system
- Hz : Hertz
- IP : in plane approach
- KHz : Kilo Hertz
- L : lumbar segment
- MHz : Mega Hertz
- NSAIDs : non steroiodal anti-inflammatory drugs
- OOP : out of plane approach
- PNBP : peripheral nerve blood flow
- PW : pulsed wave
- RLN : recurrent laryngeal nerve
- S : sacral segment
- T : thoracic segment

- TNS : transient neurologic symptoms
- Ug : micro gram
- VIP : vertical infraclavicular brachial plexus block

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Introduction and Aim of Work

In recent years there has been a growing interest in the practice of regional anesthesia. New pharmacological agents (e.g. pure isomers – ropivacaine, additives – clonidine) and a broad spectrum of techniques (both single injection and continuous catheter techniques) allow anesthesiologists to facilitate most surgical procedures with regional anesthesia alone or in combination with general anesthesia.

Peripheral nerve blocks have been found to be superior to general anesthesia as they provide effective analgesia with few side effects and can hasten patient recovery. Unfortunately, the practice of regional anesthesia does not enjoy widespread endorsement because of inconsistent success, varying from one anesthesiologist to another. Current methods of nerve localization (e.g., paresthesia and nerve stimulation) are essentially "blind" procedures, since they both rely on indirect evidence of needle-to-nerve contact . Seeking nerves by trial and error and random needle movement can cause complications. Although uncommon, complications such as intravascular local anesthetic injection resulting in systemic toxicity, inadvertent spinal cord injury following interscalene block, Pneumothorax following supraclavicular block, and nerve injury have all been reported.

Imaging guidance for nerve localization holds the promise of improving block success and decreasing complications. Among imaging modalities currently available, ultrasonography seems to be the one most suitable for regional anesthesia. Perhaps the most significant advantage of ultrasound technology is the ability to provide anatomic examination of the area of interest in real-

time. Ultrasound imaging allows one to visualize neural structures (plexus and peripheral nerves) and the surrounding structures (e.g., blood vessels and pleura), navigate the needle toward the target nerves, and visualize the pattern of local anesthetic spread.

Aim of the study:

1. Anatomical Considerations concerning neuron-anatomy of upper and lower extremities and their fixed anatomical relations.
2. Spot light on pharmacology and Toxicology of local anesthetics for proper recognition and prevention of nerve blocks associated problems (e.g. over dosage, intravascular injection).
3. Complications of Peripheral Nerve Blockade, that are greatly minimized by using the ultrasound guidance.
4. Clinical understanding of anatomical sonography, physical mechanisms of ultrasound involved in image generation and to understand how this exciting technology offers several distinct potential benefits over conventional nerve seeking techniques, not only can it visualize peripheral nerves and their neighboring structures, it also can visualize track needle movement in real time and assess adequacy of local anesthetic spread at time of injection.
5. Rationale and Equipment of ultrasonic guided nerve blocks in order to learn basic techniques using ultrasound guidance in regional block and to be familiar with sonographic images of various peripheral nerves which are commonly used.