Journal of Clinical Research in Pain and Anaesthesia

Mini-Review *Volume 1; Issue 2*

Ultrasound in Regional Anaesthesia and Pain Management "Echo ERA"

Aboud AlJa'bari*

Cardiothoracic and Regional anesthesiologist, University of Jordan, Jordan

***Corresponding author:** Dr. Aboud AlJa'bari, Cardiothoracic and Regional anesthesiologist, University of Jordan, Jordan, Tel: +962795143563; E-mail: J_aboud@hotmail.com

Received Date: June 22, 2019; **Published Date:** June 25, 2019

Keywords: Sonography; Ultrasound

Abbreviations: TPUS Bx: Trans-Perineal Biopsies; PSA: Prostate-Specific Antige.

Introduction

Ultrasonography is an easy, quick and noninvasive technique, enabling dynamic real time interaction with the clinical examination. Technological advances have made it reality to obtain high-resolution dynamic images, which may even make ultra-sonography a better alternative to other ulternative devices. Using ultrasound for regional anesthesia allows clinicians to visualize their needle and target structures more clearly and confidently, while also avoiding structures in the needle's path, potentially decreasing complications; such as nerve injury, vascular injury and tissue damage [1-3]. Ultrasonography has become an invaluable first-line imaging modality for the diagnosis and treatment of diseases of the musculoskeletal system [4,5]. Musculoskeletal sonography is well on its way to being accepted as 'standard of care' in physical medicine. In the past few years, the most prominent interest in this imaging modality has shifted from a need to visualize the 'current physiologic state' of the tissue, to accurate placement of medication, and needle visualization.

Other clinical Use of Ultrasound in trans-perineal Biopsies: For more than 25 years, PSA testing and trans-rectal ultrasound guided prostate biopsy (TRUS-Bx) has been the primary diagnostic pathway for prostate cancer. An increasing number of surgeons are beginning to reconsider the efficacy, potential risks and drawbacks of trans-rectal biopsies and are returning to trans-perineal biopsies (TPUS Bx) as part of a more precise, systematic and targeted method for diagnosing prostate cancer in some patients [6,4]. Modern prostate brachytherapy has established as an effective treatment for localized prostate cancer over the past three decades.

Advances in diagnostic imaging and trans-rectal ultrasound-guided prostate brachial therapy techniques have the potential for more accurate localization of cancers within the prostate and improved patient safety , also, ultrasound is an excellent imaging modality to visualize mesh. The benefits of 3D and multi-compartment pelvic floor imaging. Other uses of ultrasound to assist with diagnosing pelvic floor disorders in gynecological cases [5,7-9].

Thyroid ultrasound provides physicians with efficient, safe, and noninvasive tools to help diagnose thyroid diseases. To use ultrasound technology in thyroid examinations effectively, physicians face the challenge of acquiring new knowledge and skill sets. The advantages and limitations of using ultrasound to examine thyroids, provides an introduction to thyroid ultrasound examination techniques, and describes several methods for using ultrasound in the diagnosis of thyroid cancer [5,10,11].

Citation: Aboud AlJa'bari. Ultrasound in Regional Anaesthesia and Pain Management "Echo ERA". J Clin Res Pain Anaesthesia 2019, 1(2): 180010.

The technology and clinical understanding of anatomical sonography has evolved greatly over the past decade, ultrasonography has become a routine technique for regional anaesthetic nerve block. Direct visualization of the distribution of local anaesthetics with high-frequency probes can improve the quality and avoid the complications of upper/lower extremity nerve blocks and neuroaxial techniques [5,8,9,12- 15].

Ultrasound guidance enables the anaesthetist to secure an accurate needle position and to monitor the distribution of the local anaesthetic in real time [5,12,13]. The advantages over conventional guidance techniques, such as nerve stimulation and loss-of-resistance procedures, are significant improved our practice in adults and children. Considering their enormous potential, these techniques should have a role in the future training of anaesthetists. Nerves are not blocked by the needle but by the local anaesthetic. The traditional guidance techniques used in regional anaesthesia have consistently failed to meet this perfectly logical requirement. 'Blind' blocks that rely solely on anatomical landmarks and/or fascia clicks (e.g. ilioinguinal/iliohypogastric nerve blocks) are known to produce serious complications [1,2,3,5,7,15-21,].

The goal key requirement for successful regional anaesthetic blocks is to ensure optimal distribution of local anaesthetic around nerve structures. This goal is definitely achieved under sonographic visualization. Ultrasound guidance can significantly improve the quality of nerve blocks in almost all types of regional anaesthesia, upper limb,lower limb and neuro-axial or truncal body [6,8,9,12,15,22,23].

In addition, complications such as intraneuronal and intravascular injection can be avoided [6,17,18].
The use of ultrasound guidance in daily clinical practice requires high-level ultrasonographic equipment and a high degree of training. Anaesthetists need to develop a thorough understanding of the anatomical structures involved, and they need to acquire both a solid grounding in ultrasound technology and the practical skills to visualize nerve structures. The successful performance of nerve block under direct ultrasonographic guidance varies with the operator's skill in a given regional anaesthetic technique [5,9,15].

Even the technique of nerve stimulation which has been recommended as the gold standard for nerve identification in regional anaesthesia over the past decade fails to ensure an adequate level of nerve block (e.g. in axillary brachial plexus blocks) [12,10,11,13,14]. In addition, it carries a risk of inflicting damage to nerve structures by direct puncture. [1,16].

Before the advent of ultrasound in regional anaesthesia, it was impossible to verify precisely where the needle tip was located relative to the nerves and how the local anaesthetic was distributed. Ultrasound visualization of anatomical structures is the only method offering safe blocks of superior quality by optimal needle positioning. In addition, the amount of local anaesthetic needed for effective nerve block can be minimized by directly monitoring its distribution [3,4,5,6,8,9,12,13,14,15,21].

Indications for pain therapy

Ultrasound has been shown to offer excellent guidance in selective ganglion or nerve blocks for invasive pain therapy [7,8,10,11,15,23]. Lumbar sympathetic and coeliac plexus blocks have been shown to yield similarly good results with ultrasound imaging as with CT scans [1,5,9,18]. Ultrasound guidance is useful to monitor the puncture site, needle position and spread of the local anaesthetic in stellate ganglion blocks [2,7,10,11,19,20,23,]. Furthermore, it can be expected to increase the safety of these techniques by avoiding inadvertent vascular or subdural administration of local anaesthetic [11,8,9,12].

A new ultrasound-based approach to facet nerve block has been developed and tested on cadavers, volunteers and patients [23]. In the past, the only way to diagnose and specifically treat facet syndrome, a common cause of low back pain, has been to block the lumbar facet nerve under visualization by fluoroscopy or CT scanning [5]. The newly developed approach based on ultrasound guidance is simpler and involves no exposure to radiation. Studies involving the use of ultrasound guidance are also under way for cervical facet nerve block and several other types of acute and chronic pain management [23,10,11]. The preliminary results of these studies are encouraging. All the results that have been obtained so far emphasize the great potential of ultrasound guidance in invasive pain therapy.

I suggest that it is best to begin learning ultrasonographic block on peripheral nerves under supervision before going on to more central blocks. Despite a lack of specific learning curves for ultrasonographically guided regional anaesthetic nerve blocks, we have observed a rapid increase in the number of successful blocks performed by anaesthetists experienced in regional Anaesthesia, always depending on individual ability. To offer an improved background in ultrasonography and regional Anaesthesia,

interested anaesthetists should take part in specific workshops.

In conclusion, incorporating ultrasound into anesthetic practice is intended to improve patient safety and the efficacy of interventional anesthesia. To use ultrasound technology effectively, anesthetists face the challenge of acquiring new knowledge and skill sets.

References

1. Aida S, Takahashi H, Shimoji K (1996) Renal subcapsular hematoma after lumbar plexus block. Anesthesiology 84(2): 452-455.
2. Bergmann RA, Thompson SA, Afifi AK, Saadeh FA (1988) Compendium of Human Anatomy Variation. München: Urban and Schwarzenberg, 494-499.
3. Büttner J, Kemmer A, Argo A (1988) Axilläre Blockade des Plexus brachialis. Reg Anaesth 11: 7-11.
4. Fornage BD (1988) Peripheral nerves of the extremity: imaging with ultrasound. Radiology 167(1): 179-182.
5. Greher M, Kapral S (2003) Is regional anesthesia simply an exercise in applied sonoanatomy? Anesthesiology 99(2): 250-251.
6. Fanelli G, Casati A, Garancini P, Torri G (1999) Nerve stimulator and multiple injection technique for upper and lower limb blockade: failure rate, patient acceptance, and neurologic complications. Study Group on Regional Anesthesia. Anesth Analg 88(4): 847-852.
7. Jöhr M, Sossai R (1999) Colonic puncture during ilioinguinal nerve block in a child. Anesth Analg 88(5): 1051-1052.
8. Kirchmair L, Entner T, Wissel J, Moriggl B, Kapral S, et al. (2001) A study of the paravertebral anatomy for ultrasound-guided posterior lumbar plexus block. Anesth Analg 93(2): 477-481.
9. Kirvela O, Svedstrom E, Lundbom N (1992) Ultrasonic guidance of lumbar sympathetic and celiac plexus block: a new technique. Reg Anesth 17(1): 43-46.
10. Kapral S, Krafft P, Gosch M, Fleischmann D, Weinstabl C (1995) Ultrasound imaging for stellate ganglion block: direct visualization of puncture site and local anesthetic spread. a pilot study. Reg Anesth 20(4): 323-328.
11. Kapral S, Krafft P, Gosch M, Fridrich P, Weinstabl C (1997) Subdural, extra-arachnoid block as a complication of stellate ganglion block: documentation with ultrasound. Anasthesiol Intensivmed Notfallmed Schmerzther 32(10): 638-640.
12. Kapral S, Krafft P, Eibenberger K, Fitzgerald R, Gosch M, et al. (1994) Ultrasound-guided supraclavicular approach for regional anesthesia of the brachial plexus. Anesth Analg 78(3): 507-513.
13. Kapral S, Jandrasits O, Schabernig C, Likar R, Reddy B, et al. (1999) Lateral infraclavicular plexus block vs. axillary block for hand and forearm surgery. Acta Anaesthesiol Scand 43(10): 1047-1052.
14. Kilka HG, Geiger P, Mehrkens HH (1995) Infraclavicular plexus blockade. A new method for anaesthesia of the upper extremity. An anatomical and clinical study. Anaesthesist 44(5): 339-344.
15. Kirchmair L, Entner T, Kapral S, Mitterschiffthaler G (2002) Ultrasound guidance for the psoas compartment block: an imaging study. Anesth Analg 94(3): 706-710.
16. Büttner J (1999) Kontinuierliche periphere Techniken zur Regionalanästhesie und Schmerztherapie-Obere und untere Extremität. Bremen: Uni-Med 158.
17. Chang PC, Lang SA, Yip RW (1993) Reevaluation of the sciatic nerve block. Reg Anesth 18(1): 18-23.
18. Chayen D, Nathan H, Chayen M (1976) The psoas compartment block. Anesthesiology 45: 95-99.
19. Davies MJ, McGlade DP (1993) One hundred sciatic nerve blocks: a comparison of localisation techniques. Anaesth Intensive Care 21(1): 76-78.
20. De Andrés J, Sala-Blanch X (2002) Ultrasound in the practice of brachial plexus anesthesia. Reg Anesth Pain Med 27(1): 77-89.
21. De Filho GR, Gomes HP, da Fonseca MH, Hoffman JC, Pederneiras SG, et al. (2002) Predictors of successful neuraxial block: a prospective study. Eur J Anaesthesiol 19(6): 447-451.

22. Grau T, Leipold RW, Delorme S, Martin E, Motsch J (2002) Ultrasound imaging of the thoracic epidural space. Reg Anaesth Pain Med 27(2): 200-206.

23. Greher M, Scharbert G, Kamolz LP, Beck H, Gustorff B, et al. (2004) Ultrasound-guided facet nerve block: a sono-anatomical study of a new methodological approach. Anesthesiology 100(5):1242-1248.