A Critical Analysis of Spinal Block Anaesthesia under Ultrasonographic Guided Technique: Is Levobupivacaine Alone Effective or on Adjuvant is Warranted?

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INTRODUCTION

Recent years have witnessed increasing interest in postoperative pain management. The aim of postoperative pain management is to provide subjective comfort in addition to inhibiting trauma-induced nociceptive impulses to blunt autonomic and somatic reflex responses to pain. The brachial plexus supraclavicular block is extremely useful in patients with significant co-morbidities such as severe respiratory and cardiovascular disease, morbid obesity and in those with potential airway difficulties. It provides a superior quality of analgesia and avoids the common side-effects associated with general anaesthesia such as postoperative nausea and vomiting. Out of various agents which are used for brachial plexus block, levobupivacaine is the agent which not only prolongs motor and sensory blockade but is also less cardiotoxic and neurotoxic.

Keywords: Spinal Anaesthesia, Block Anaesthesia, Safety Profile.

Abstract: The aim of postoperative pain management is to provide subjective comfort in addition to inhibiting trauma-induced nociceptive impulses to blunt autonomic and somatic reflex responses to pain. The brachial plexus supraclavicular block is extremely useful in patients with significant co-morbidities such as severe respiratory and cardiovascular disease, morbid obesity and in those with potential airway difficulties. It provides a superior quality of analgesia and avoids the common side-effects associated with general anaesthesia such as postoperative nausea and vomiting. Out of various agents which are used for brachial plexus block, levobupivacaine is the agent which not only prolongs motor and sensory blockade but is also less cardiotoxic and neurotoxic.

Many modifications were done over the years, but the ultrasound guided technique has become a standard because of its simplicity and reproducible success. Ultrasound (USG) guided supraclavicular block is considered to be one of the most effective anaesthetic procedures for upper extremity surgeries. The use of ultrasound has several benefits including block under direct visualization, faster onset and reduction in the dose of local anaesthetic (Chan, V. W. et al., 2003). USG guidance also improves accuracy of needle placement, visualization of local anaesthetic spread in real time, compensation for anatomical variation and avoidance of intraneural or intravascular injection.

Various local anaesthetic agents like bupivacaine, levobupivacaine, ropivacaine and lignocaine have been used with safety and efficacy in performing such blocks (Santorsola, R. et al., 2001). Local anaesthetic preferentially binds to the inactivated state of voltage gated sodium channels, but has also been found to bind potassium channels, G-protein coupled receptors, N-methyl-D-aspartate (NMDA) receptors, and calcium channels in vitro (Marban, E. et al., 1998). Concentration of local anaesthetic which has been used for a blockade of different local anaesthetics varies from 0.5%, 0.25% and 0.375%. It has been observed that it is not the concentration but volume that affects the effective dose of local anaesthetic (Gupta, P. K. & Hopkins, P. M. 2013). Out of various agents which are used for brachial plexus block, levobupivacaine is the agent which not only prolongs motor and sensory blockade but is also less cardiotoxic and neurotoxic.
Localized spinal analgesia in surgery was described as early as 1909 by Jonnesco (Jonnesco, T. 1909). Since that time various techniques have evolved, each attempting to confine the extent of somatic and sympathetic paralysis to the site of operation (Bonica, J. J. 1953). Among such techniques are segmental spinalas, in which localization is effected by placing catheters to predetermined levels in the subarachnoid space and “unilateral” spinals in which limitation of spread is accomplished by using hyperbaric or hypobaric solutions.

The term unilateral spinal anaesthesia is used when block is of operative side only with absence of block on non-operative side (Brown, S. 1952). When surgery involves only one lower limb, such block is advantageous as it minimizes cardiovascular effects, avoids motor block of non-operative limb and facilitates early discharge (Hander, H. T. 1959 & Enk, D. et al., 2001). Although unilateral spinal is often practiced, but the potential to control the speed of drug, there by restricting the distribution of spinal block to the operative side, remains controversial and frequently debated (Fanelli, G. et al., 2000 & Kuusniemi, K. S. 2000). Low dose local anaesthetic solutions by using a pencil-point needle and slow intrathecal injection have been reported to obtain satisfactory unilateral spinal anaesthesia (USpA) (Kelly, D. 1996). USpA techniques allow the administration of small doses of local anaesthetic and thus provide a more controllable sensory and sympathetic level of anaesthesia. Finally, USpA has more stable cardiovascular parameters compared with conventional bilateral spinal block (Casati, A. et al., 2004).

USpA aims to limit the distribution of spinal block to the operated side, because most of the operative procedures involve only one lower limb (Casati, A. 1999). Compared with the conventional technique, it requires a bit longer preparation time to get the drug fixed to the side to be operated in preference to non-operating limb. It produces fewer haemodynamic side-effects and has higher cardiovascular stability, increased autonomy after surgery and better patient acceptance (Casati, A. et al., 1998). It also reduces the incidence of clinically relevant hypotension following spinal anaesthesia. Hypotension is the most frequent side effect of spinal anaesthesia, occurring in more than 30% of patients.

Spinal anaesthesia typically cause decrease in arterial blood pressure with only minor decrease in heart rate, stroke volume, or cardiac output even with poor left ventricular function. In conventional spinal anaesthesia, it is not possible to limit the accompanied sympathetic block that normally exceeds the sensory block by 2-6 segments (Esmagolu, A. et al., 2004). Hypotension occurs from decrease in systemic vascular resistance from sympathetic block with vasodilation and redistribution of central blood volume to lower
extremities and splanchnic beds. Various prophylactic and rescue regimens have been advocated for haemodynamic disturbances with emphasis on prevention of hypotension.

A potential way for prophylaxis of hypotension is by manipulation of spinal anaesthesia to achieve a predominantly unilateral block (Fanelli, G. et al., 2000). The unilateral spinal anaesthesia has been claimed by many as an alternative technique, to restrict the undesired sympathetic block (Liu, S. S. et al., 1996). Unilaterality can be maintained if patient remains in a lateral position for surgery; however, eventual turning of the patient into a supine position results in partial redistribution to bilateral anaesthesia. Thus patient’s position during and immediately after spinal anaesthesia influences the spinal distribution of drug i.e. patient position is fundamental basis for unilateral block (Green, N. M. et al., 1958). It also results in rapid recovery and greater satisfaction among outpatients, in addition to preventing unnecessary nerve block in the contralateral limb.

One of the major issues in orthopaedic surgery is requirement of lateral position for many surgeries like total hip replacement, bipolar hip arthroplasty etc. Lateral position can lead to uneven distribution of spinal anaesthesia in both lower limbs.

While clinicians describing this unilateral technique allude to an associated decrease in anaesthetic morbidity, not many controlled clinical studies have been reported comparing this technique to conventional bilateral spinals. In some studies reported earlier the true “unilaterality” of the sympathetic blockade was termed dubious. Some clinicians have expressed doubt that such unilateral sympathetic paralysis can be obtained, and they feel, therefore, that the rationale behind the unilateral spinal is fallacious.

REFERENCES:


