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RESEARCH ARTICLE

Spinal Anesthesia: Much More Than Single Shot of Hyperbaric Bupivacaine

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Abstract

There is significant and renewed attentiveness in the use of regional anesthesia techniques for many common surgeries. The vast majority of anesthesiologists world wide use the routinely the hyperbaric solution of bupivacaine for almost all types of surgery. However, they ignore that spinal anesthesia has more to offer. A different kind of technique for a different kind of patients. The understanding of spinal anesthesia in relation to sensory and motor blocks with hyperbaric and isobaric solutions is shown in this article. The possibilities of performing unilateral spinal anesthesia are described. The use of posterior spinal anesthesia shows that it is possible to perform only sensitive spinal anesthesia without motor block.

The possibility of using isobaric and hypobaric solutions for different types of surgery has increased considerably. Thoracic spinal anesthesia has been shown feasible and safe for different types of surgeries, and more recently, thoracic continuous spinal anesthesia is being used. This article shows the possibility of performing spinal anesthesia for laparoscopic surgery, thoracic spinal anesthesia, segmental spinal anesthesia and continuous techniques.

Keywords

Regional anesthesia, Understanding spinal anesthesia, Thoracic spinal anesthesia, Laparoscopic anesthesia, Continuous spinal anesthesia, Segmental spinal anesthesia, Combined spinal-epidural anesthesia

Key Points

Question

What is the reason for using spinal anesthesia with hyperbaric bupivacaine most of the time?

- Ignorance of modern anatomy?
- Ignorance of the other solutions (isobaric and hypobaric)?
- Difficulty performing subarachnoid punctures in lateral decubitus and prone position?
- Difficulty changing the acquired habits.
- Lack of knowledge of the anterior and posterior roots?
- Ignorance of the safety of thoracic puncture?
- Unawareness of continuous spinal anesthesia?

Meaning

- The use of several other forms of spinal anesthesia with isobaric, hypobaric, continuous lumbar and thoracic spinal anesthesia, combined spinal-epidural anesthesia, thoracic anesthesia, segmental spinal anesthesia should be considered and the benefits of these techniques for different types of patients and surgeries must be known.

Introduction

Spinal anesthesia has always seduced us, and it is recognized for its simplicity. After the solution is

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infused in the spinal anesthesia, the anesthesiologist is no longer the one who decides what will happen, but it is the encounter of the local anesthetic with the cerebrospinal fluid (CSF) that will result in the outcome. I did what I know, but this combination is independent of me. Is this statement correct? We can only innovate in spinal anesthesia with knowledge. However, when there is no knowledge, nothing makes sense.

Knowing the anatomy (ancient and modern), local anesthetics, their density (hypobaric, isobaric, hyperbaric), techniques, injection speed, doses, different types of punctures (sitting, lateral decubitus, jackknife position), puncture sites (lumbar and thoracic) and the association with adjuvants, can provide a path for the knowledge of its performance for each patient and type of surgery.

We anesthesiologists have patients, surgeons, and institutions as clients. For these customers, the technical skills required are decisive for the evaluation of our performance and the patient's outcomes. What we are looking for are colleagues who are trusted service providers. Due to their high-level social skills, they are able to respond to the needs of different people and create a positive atmosphere. For this, there is a need for knowledge of all the possibilities of spinal anesthesia.

In 1989, Covino claimed that spinal anesthesia is probably the most widely used technique for regional anesthesia [1]. Spinal anesthesia has numerous advantages and few disadvantages when compared to epidural anesthesia [1]. Our philosophy of understanding spinal anesthesia it means treating each patient individually, applying knowledge about the technique and using all its possibilities.

Most anesthesiologists think that spinal anesthesia is a spinal puncture and injection of 15 mg hyperbaric bupivacaine, forgetting the understanding of spinal anesthesia. The purpose of this article is to disseminate the knowledge of spinal anesthesia for all types of surgery, and not to use a fixed dose of hyperbaric solution for all procedures.

Anatomy in Cadavers

Leonardo da Vinci, in the middle ages, was considered the discoverer of human and animal anatomy [2]. Over the years Leonardo da Vinci dissected around 30 corpses and the results of his studies were compiled into 18 sheets known as the Anatomical Manuscript A. The spinal cord is a conductive nervous cylinder, which begins at the foramen magnum of the skull and ends at the medullary cone, and is protected by the spinal canal [3]. The vertebral canal houses the epidural space, the subdural space, the meninges, the arachnoid trabeculas, the CSF, the ligaments, the vessels and the spinal cord. The vital function of the vertebral canal is serving as a protective space for the spinal cord to traverse the length of the spinal column allowing proper innervation to the entire human body. The spinal cord is the major structure contained within the vertebral canal. The spinal cord is surrounded by three protective membranes that outline the neuraxial spaces [3]. The membranes mentioned from the outermost to the innermost are called meninges and refer to the dura mater, the arachnoid and the pia mater [3]. The pia mater directly involves the spinal cord.

Cerebrospinal Fluid

Spinal anesthesia is the most widely used regional anesthesia technique where the local anesthetic is injected directly into the CSF that involves the spinal cord and nerve roots. CSF is a clear, colorless body fluid found within the tissue that surrounds the brain and spinal cord of all vertebrates. CSF is produced continuously in areas of the brain called ventricles and is absorbed by the bloodstream [4]. Estimates are that there is approximately 125 mL to 150 mL of CSF in the body at any given time. CSF appears to have several important functions [4]. One of these is to provide a buoyant force to support the brain.

Anatomy by Image

Most anesthesiologists like the platitude of spinal anesthesia, but recent imaging studies [5-7] have shown that the precursors of spinal anesthesia were covered in reason, prior to the advent of intubation, spinal anesthesia throughout its spine.

The nerves of the cauda equina inside the dural sac have been extensively studied with the aid of technology. The radicles spread diffusely, occupying the posterior region of the lumbar space [8,9]. CSF volume has been assessed by anteroposterior measurement of the subarachnoid space and the spinal cord dimension based on digitalized studies with two-dimensional MRI [10].

The spinal cord and the cauda equina move, depending on the severity when the patient assumes the lateral decubitus position, occurring over its entire length, with the greatest magnitude between the L2-L3 spaces, with the measured distance of 3.4 ± 1.0 mm [11]. In the lower thoracic region, the deviation was less than 1.0 mm [11]. Forced flexion of the spine dislocates the spinal cord and the cauda equina to the ventral side of the subarachnoid space. Forced flexion of the lower limbs causes deviation of the medullary nervous tissue from the lower thoracic region to the sacral region [11].

Baricity

In 2017, we wrote an article trying to explain all the possibilities for a complete understanding of spinal anesthesia [12]. Most anesthesiologists prefer the use of hyperbaric solution for all types of procedures, ignoring the other solutions (isobaric and hypobaric) and the various other types of technique (unilateral and posterior anesthesia), thoracic spinal anesthesia, combined spinal-epidural anesthesia and continuous spinal anesthesia.

Values of density of CSF determined in modern equipment vary from 1.00103 to 1.00013 among healthy adults of both genders [13]. Using a densimeter (DMA 450), all densities of the different solutions of local anesthetics and adjuvants were evaluated [14]. Local anesthetic solutions of density greater than 1.00103 are hyperbaric, with densities under 1.00013 are hypobaric, and with densities between 1.00103 and 1.00013 are called isobaric. Each solution behaves differently within the CSF. All adjuvants used in daily clinical practice are hypobaric, and mixing them in the same syringe modifies the baricity of the final solution [14].

The use of hypobaric, isobaric or hyperbaric solutions of the various local anesthetics in the spinal channel has shown that each solution has its own private onset time, spread and motor block duration. The result is that the dispersion of these solutions will depend on the puncture position. Although spinal anesthesia has more than enough 120 years, only in 2006 the understanding of the differences was explained especially in relation to the motor block depending on the solutions and the puncture position [15].

Puncture Position

There are two schools of anesthesiology teaching. One seeks to teach the puncture in a sitting position and the other in lateral decubitus. Both schools do not routinely teach puncture in the supine position to perform posterior (sensitive) spinal anesthesia. Spinal puncture can be done in three positions: sitting, lateral decubitus and prone jackknife.

Sitting position

The use of a well-trained assistant is essential for placing and maintaining the patient in a safe position. Deep sedation makes it difficult to maintain a sitting position. This position can facilitate location of the midline, especially in obese patients or some defect in the spine (scoliosis). The patient should assume a comfortable sitting position, with the legs placed over the edge of the operating table and the feet supported by a stool. In patients with vasovagal syncope, it is due to a common autonomic reflex involving the cardiovascular system. It is associated with bradycardia (cardioinhibitory response) and/or hypotension (vasodepressor response), likely mediated by parasympathetic activation and sympathetic inhibition [16]. In these patients, the sitting position should be with the legs along the operating table. In the sitting position, isobaric anesthetics (slightly hypobaric) as well as adjuvants (all hypobaric) tend to have more prevalent cephalic dispersion [17,18]. In the sitting position, hyperbaric anesthetics tend to have a more predominant caudal dispersion, which can lead to cauda equina syndrome [19,20].

Lateral decubitus

The use of a well-trained assistant can help the patient assume the position of legs flexed on the abdomen and chin flexed on the chest and maintaining the patient in a safe position.

The position can also be facilitated by using an appropriate amount of sedation that allows the patient to be relaxed yet cooperative. The use of a well-trained assistant is essential for placing and maintaining the patient in a safe position. Deep sedation makes it difficult to maintain a sitting position. In the lateral decubitus position, the hyperbaric anesthetic has a predominance of the block on the side that is down, resulting in a more lasting sensory block than the motor [12,15]. With the isobaric anesthetic (slightly hypobaric), on the other hand, it has a longer motor block than the sensitive block on the contralateral side [12,15].

Dorsal position (jackknife)

Sometimes it is more time-efficient to place the patient in a prone jackknife position before spinal puncture. A pillow should be placed on the abdomen to facilitate the opening of the intervertebral spaces. An assistant is not as essential for this technique as with the sitting and lateral decubitus position. The prone position is used for a variety of procedures ranging from short duration procedures to major surgeries such as orthopedic, anorectal and plastic surgery [21].

Difference between positions

Some studies comparing the isobaric solutions of 0.5% bupivacaine in elderly patients of orthopedics [22] and hyperbaric 0.5% bupivacaine in lower abdominal, pelvic, lower limb and urological patients surgeries [23], showed no differences in sensory block and motor block, hemodynamic parameters and patient satisfaction. However, lateral position appears to be more comfortable for elderly patients [22,23]. Comparing the sitting position with lateral decubitus in pregnant patients, the study suggested that lateral position might be more beneficial to parturients and neonates in more adequate anesthesia and lower complication incidence [24]. Lateral position may be more beneficial on the aspect of onset time of anesthesia and adequate analgesia even the incidence of hypotension and complications.

In a recent meta-analysis, he showed that the lateral decubitus position during lumbar puncture seems to be a good alternative for preventing post-dural puncture headache (PDPH) [25]. Studying the difference in success between the lateral and sitting position among infants 1 to 90 days of age, no significant difference was found [26].

Ultrasound Guindace for Lumbar Puncture

In a recent review of the literature, the use of ultrasound (US) to guide performance of lumbar puncture has been shown in randomized trials to improve lumbar puncture success rates while reducing the number of attempts and the number of traumatic taps [27]. In meta-analysis twelve studies (n = 957 total patients) were identified, with 90.0% of patients and landmark-based lumbar puncture was successful in 81.4% of patients [28]. Concluding the US assisted for lumbar puncture were associated with higher success rates, fewer traumatic puncture, shorter time to successful, fewer needle passes, and lower patient pain scores. US should be considered prior to performing all lumbar puncture, especially in patients with difficult anatomy. In Brazil, few services use the US for lumbar punctures in spinal anesthesia. It is more common in pregnant obese patients, with excellent results [29]. Spinal block with ultrasound is an ideal technique for patients with anatomical difficulties, decreasing the risk of trauma and failure to obtain the CSF [30].

Puncture Site

In all positions (sitting, lateral decubitus, prone), the goal is to place the patient so that the midline is readily identifiable. With the patient in the proper position, the anesthetist uses the palpating hand to identify clearly the intervertebral space.

Lumbar puncture

A lumbar puncture is an invasive access to the subarachnoid space in the lower spinal canal. The subarachnoid space lies between the arachnoid and pia mater and contains a solution called CSF. Recent evidence supports the use of an atraumatic needle to reduce the risk of PDPH. Needle size is based on experience and clinical judgment of the anesthesiologist. The needle passes through the following layers before it reaches the subarachnoid space: Skin, subcutaneous fat, supraspinous ligament, interspinous ligament, ligamentum flavum, dura mater, subdural space, and arachnoid mater.

Thoracic puncture

It is important to understand the anatomy when blocking the neuro-axis in the thoracic region. When approaching the subarachnoid space through combined spinal-epidural block, needle penetration is easily perceived. In general, the paramedian approach favors the penetration of the needle and catheters into the thoracic space. Likewise, the knowledge of the depth between the skin and the epidural space through the paramedian access helps to identify the location of the needle entry into this space. Thoracic puncture can be performed in the sitting position or in the lateral decubitus position, depending on the preference of the anesthesiologist. With the geometry of the thoracic spine recently studied [7], it is expected that in the patient in the supine position or in a sitting position the exaggerated curvature of the spine will displace the spinal cord even more anteriorly, which would reduce the trauma of the nervous tissue by the puncture needle. The various reports described of spinal cord injury with pencil point needles, suggest that due to the need to penetrate more than 2 mm into the subarachnoid space, it can result in conus damage. This is one more reason to prefer the cutting bevel of the Quincke needle for low thoracic spinal anesthesia [31].

Sensitive Block and Motor Block

The installation of sensory and motor blocks will depend on the puncture position, the anesthetic solution used (hypobaric, isobaric, hyperbaric) and does not depend on the dose.

When the isobaric solutions are injected, the sitting position favors the migration of one solution (drug) into the other (CSF), exerting a great influence on the distribution of analgesia. This solution injected in a sitting position (slightly hypobaric) and placed immediately in the supine position will favor the anterior (motor) roots over the posterior (sensitive) roots. Thus, the motor block will have a longer duration than the sensitive block [15,32]. When injected in lateral decubitus (left or right), the limb that is down will have a complete block (sensory and motor) of less duration than the one that is up [15,32].

When using the hyperbaric, solution one must bear in mind the effects of gravity on the movement of the solution within the subarachnoid space. Absolute baricity is used, since the CSF has a maximum specific weight of 1.0090 and all hyperbaric solutions contain glucose between 5 and 8% with a specific weight between 1.0260 and 1.0360. Sitting the patient will tend to keep the level of the block low, with caudal concentration. The distribution will lie in accordance with the natural curvatures of your spine, and is greatly influenced by position biases, such as large lordosis or large kyphosis. Scoliosis alone does not influence the movement of the solution in the spinal canal. The Trendelenburg position favors cranial migration with higher thoracic levels [33].

Hypobaric solutions are not commercially available. The anesthesiologist must prepare them, at the time of use. The 0.15% bupivacaine and 50% to 0.15% enantiomeric excess levobupivacaine solution are hypobaric and must be prepared from the 0.5% commercial solution. The 0.6% lidocaine solution is prepared from the 2% commercial solution. This solution tends to float on the surface of the LCS and it will end up predominantly bathing the roots that are on the top. A unilateral selective block is obtained, with minimal hemodynamic repercussions, due to the restricted unilateral sympathetic block and the increase in venous return caused by the cephalodeclive position. These advantages must be counterbalanced by the disadvantage of not blocking the lower limb.

For orifice proctological surgeries in the pocketknife position it is of great value. The subarachnoid space can be punctured with the patient in prone position, already in the operative position. After the injection of the hypobaric anesthetic, the block tends to look for the highest point, in this case, the sacral region, promoting a saddle block, with a diluted solution, without sympathetic compromise. It does not offer hypotension, bradycardia or respiratory depression. Floating the solution bathes only the posterior (sensitive) roots and the motor block is restricted to the anal region, leaving the lower limbs free [34,35].

Unilateral Spinal Anesthesia

The injection of a non-isobaric (hyperbaric or hypobaric) local anesthetic should induce a unilateral spinal anesthesia in patients punctured and maintained in a lateral decubitus position for a certain time. The most important factors to be considered when performing a unilateral spinal anesthesia are: Type and gauge of the needle, density of the local anesthetic relative to the CSF, position of the patient, speed of administration of the solution, and dose/concentration/volume of the anesthetic solution [34].

In a study comparing 5 mg bupivacaine hypobaric (0.15%), isobaric (0.5%) and hyperbaric (0.5%) sidedness was obtained in 80% of patients with hypobaric, 76% with hyperbaric and only 28% with isobaric [35]. Showing that the isobaric solution is not a good indication for performing unilateral spinal anesthesia.

Studying the low dose of 0.4% enantiomeric excess levobupivacaine (S75: R25) with 5% glucose for unilateral orthopedic provided a rapid onset of sensory and motor block, duration and patients satisfation dose-dependent [36]. Thus, 4, 6 and 8 mg provided recovery times of 75, 117, and 174 min.

Posterior Spinal Anesthesia

We recently wrote an article suggesting that posterior spinal anesthesia with puncture in the prone position (Jackknife position) should be used much more [37]. Several types of orthopedic, anorectal, and plastic surgeries, of short to medium duration, are performed in the prone position. Thus, for patient comfort, the puncture in the position in which it will be operated facilitates both the patient and everyone in the operating room because there will be no need to move the patient. The hypobaric solutions of local anesthetics should be indicated for posterior spinal anesthesia, obtaining sensitive spinal anesthesia without motor block [37]. However, in orthopedic surgeries where the pneumatic tourniquet is essential, we can perform spinal anesthesia with isobaric solution of local anesthetics, obtaining sensory and motor blocks.

Tourniquet pain is described as a poorly localized, dull, tight, aching sensation at the site of tourniquet application [38]. In awake patients undergoing extremity surgery under regional anesthesia blockade, tourniquet pain is described as a dull, ill-defined ache that occurs approximately 45 to 60 minutes after a tourniquet is inflated. It is more common under general anesthesia (53-67%) and occurs most often during lower-limb surgeries. The exact etiology is unclear, but it is thought to be due to a cutaneous neural mechanism [39].

A recent study comparing 5 mg of 0.1% hypobaric bupivacaine in prone position with the same dose of 0.5% hyperbaric bupivacaine in sitting position showed that they had the same onset, longer duration with hyperbaric solution, higher incidence of proprioception with hypobaric solution [40]. At end of surgery, all patients passed the operating table to the stretcher without help. The 0.1% bupivacaine solution was chosen because it guarantees hypobaricity significantly lower than the 0.15% bupivacaine solution [41].

Spinal Anesthesia for Laparoscopic Cholecystectomy

Most anesthesiology services the choice of anesthetic technique for upper abdominal laparoscopic surgery is mostly limited to general anesthesia with muscle paralysis, tracheal intubation and intermittent positive pressure ventilation. Recently, some studies compared to general anesthesia with spinal anesthesia for laparoscopic, with some advantages for regional technique [42,43]. Recently the anatomy of the thoracic spinal canal was investigated with magnetic resonance imaging in 50 patients [7]. It was also demonstrated the safety of spinal anesthesia with puncture at T10 using the combined spinal-epidural [44,45].

Spinal anesthesia was used in 4,645 patients over the last 11 years [46]. In another study with 3,492 patient´s spinal anesthesia was the technique of choice for laparoscopic cholecystectomy [47], a fact confirmed by comparing general anesthesia with high doses [43] or with low doses [48].

In a recent review, showing all the steps and advantages of spinal anesthesia for laparoscopic cholecystectomy [49] and the meta-analysis of randomized controlled trials showed that spinal anesthesia as the sole anesthesia technique is feasible, safe for elective laparoscopic cholecystectomy [50].

Thoracic Spinal Anesthesia

Recently, two review articles have been published on thoracic spinal anesthesia. One in 2016, which reports that thoracic spinal anesthesia is a viable procedure, with a low incidence of hypotension, based on studies of MRI [51], and several articles published with more than 1,000 patients without neurological complications [45,48,52,53]. Another published in 2018, asked if thoracic spinal anesthesia is to do or not to do, and concluded that thoracic spinal anesthesia carries many benefits, yet it is not devoid of risks [54].

The MRI identified the measured distances in three views: 5.19 mm in T2, 7.75 mm in T5 and 5.88 mm in T10, sufficient distance to permit the careful advancement of a needle (accidentally or intentionally) without reaching the medulla and administer anesthetic for a thoracic spinal anesthesia [7].

In a recent study to verify the incidence of neurological complications in thoracic spinal anesthesia comparing two types of needles (Quincke vs. Whitacre) in 300 patients, puncture success was observed in all patients with 20 (6.6%) paresthesia with no significant difference between the needles [52]. All paresthesia were transient and no neurologic complications were observed. In the pencil tip needle the hole is lateral and is 0.8 mm and ends only in 1.7 mm, so there is a need to penetrate the subarachnoid space 2 mm for the CSF to appear [31]. In the cut point needles, its orifice is terminal and the appearance of the CSF is immediately after puncture of the subarachnoid space. Thus, it seems that it is safer to insert a needle with a terminal hole than with a needle with a lateral hole and 0.8 mm from its end.

Segmental Spinal Anesthesia

Epidural segmental anesthesia can be used for punctures at different levels: in the cervical region (in C7-T1), in the thoracic region (between T4 and T10), in the lumbar region (between L2 and L4) and in the sacral region. This technique is often used for cervical-brachial surgical procedures, upper limb orthopedics, thoracoabdominal, plastic surgery (various types), thoracic and orthopedic surgery of lower limbs and labor analgesia. However, segmental spinal anesthesia it is rarely used, mainly due to ignorance of its possibilities [55].

Segmental spinal anesthesia was described in 1909 [56], with puncture in T2 for surgeries on the head, neck, upper limbs, and thorax, puncture between the T12 and L1 vertebrae for lower abdomen and lower limb surgeries. The puncture between the T7 and T8 vertebrae is very often difficult to perform, and is not necessary.

In the same way as the segmental epidural anesthesia, it is possible to limit spinal anesthesia only to the field be operated and some of the side effects of this technique can be avoided. Thus, with single thoracic puncture [48,52,53] or combined spinal-epidural anesthesia [44,45], segmental spinal anesthesia can be obtained.

Studying 636 patients of different types of surgery (gynecological, laparoscopic, orthopedic and urological) doing a single shot thoracic puncture with low dose of local anesthetic, showed a rapid onset of action, low incidence of arterial hypotension and without neurological complications [53]. In another study with 300 patients who underwent puncture with two types of needle (Whitacre and Quincke), the incidence of paresthesia was compared to lumbar puncture, all transient and no neurological complications were observed, showing that a lower thoracic puncture is safe [52].

Lumbar Continuous Spinal Anesthesia

In a recent retrospective article in continuous spinal anesthesia (CSA) with 455 orthopedic patients performed between 1998 and 2015, using a catheter outside the cutting-tip needle shows minor insertion problem, showed a low incidence of hypotension, paresthesia and headache [57]. No neurological complications were observed, such as cauda equina syndrome or transient neurological symptoms. This catheter was used in labor analgesia with excellent results without PDPH [58].

Microcatheters that use thin gauge needles are difficult to handle, the appearance CSF is slow or impossible, and injection of the local anesthetic is slow and can break. They provide inadequate blocks due to poor anesthetic distribution hyperbaric in the subarachnoid space, which can cause cauda equina syndrome [59,60]. After these reports of cauda equina syndrome due to methodological error, the American FDA suggested the discontinuity of the microcatheters.

The main advantage of CSA is the possibility to gradually inject the local anesthetic and control dispersion in the CSF, providing security and control over the needs of each patient. Unfortunately, the manufacturer discontinued this catheter and we anesthetists have lost an excellent product in our therapeutic arsenal [57].

Thoracic Continuous Spinal Anesthesia

Recently, thoracic CSA was performed with puncture in T10-T11 intervertebral space with a new catheter (Spinolong polymedic kit), for radical cystectomy in patients over 80-years-old [61]. The kit included a 21G Tuohy-shaped spinal needle and 24G intrathecal catheter. The set features a sharp-tip needle and an intermediate catheter. Therefore, this pilot study shows that CSA and analgesia is a feasible option as an additional way to reduce morbidity and mortality in frail octogenarians who require radical cystectomy. In another study of one year of experience in Italian geriatric hospital with 90 patients showed that thoracic CSA might be a valid alternative to general anesthesia in high-risk older patients undergoing major abdominal surgery [62]. In Editorial the authors defend that the thoracic CSA is an interesting alternative to general anesthesia [63].

Combined Spinal-Epidural Anesthesia

Combined spinal-epidural (CSE) block is a technique in which spinal anesthesia and the catheter epidural are simultaneously used in the same patient. Both techniques used in the neuroaxis have their advantages and disadvantages. The technique of combining the two compartments through combined spinal epidural anesthesia was first used in 1937 [64]. Nowadays the CSE is considered the gold standard for labor analgesia.

CSE anesthesia provides a rapid onset of action, efficacy and safety of the use of spinal anesthesia, associated with the possibility of improving an inadequate blockade, prolonging the duration of anesthesia during the surgical procedure and providing adequate control of postoperative analgesia with epidural catheter, mainly in major orthopedic surgeries [65-67].

A recent retrospective study with 230 patients used the dose of 0.5% isobaric bupivacaine according to height. It showed that CSE anesthesia technique is effective, safe, produces a stable hemodynamic with provision of prolonging surgical analgesia to any length of time depending upon the duration of surgery, with catheter supplementation in 7.3% of the patients in geriatric patients undergoing major orthopedic surgery [68].

In a study aiming to compare the effectiveness of CSE analgesia and low-dose epidural analgesia in labor in relation to maternal and fetal effects, they showed that both provide comparable pain relief and maternal and fetal outcomes [69]. CSE can be beneficial for parturients coming in advanced labor, as its onset of action is faster.

Conclusion

I did not come into the world with a needle, but at least I knew how to use it very early so that, after becoming an anesthesiologist, I could glorify spinal anesthesia in practice. I identified myself with spinal anesthesia in such a way that I broke the bone and sucked the substantial marrow with such awareness that it was no longer an illustration, but a true translation. The spinal anestesia is old, simple, easy and a popular technique. Anatomy, physiology and pharmacology are very important and necessary for its understanding. Nothing is better than the freedom to decide what to do. Only knowledge.

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Conflict of Interest

None.

Contribution

None.

IRB

None.

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