Case Report

Unilateral sensitive spinal anesthesia. case report

Abstract

A 46-year-old male was admitted for tenolisys of anterior compartment of lower leg under spinal anesthesia. Spinal puncture was performed with the patient in the lateral left side, in the L3-L4 using 27 G needle, and 4 mg of 0.1% hypobaric bupivacaine were administered. The patient remained in that position for 10 min. In the limb to be operated, the level of sensory block was observed in L1 without motor block. With this new technique that was obtained surgical analgesia, but without motor blockade. We call this new technique of unilateral sensitive spinal anesthesia.

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Introduction

Most anesthesiologists think that spinal anesthesia is a spinal puncture and injection of 15mg hyperbaric bupivacaine, forgetting the understanding of spinal anesthesia.[1] The spinal hemianesthesia technique was described in great detail in 2014.[2] Recently we evaluated the densities of various anesthetics solutions and adjuvants used in spinal anesthesia.[3] We report a case of unilateral sensitive spinal anesthesia without any degree of motor block, to release tendons and muscles after an accident that involved the lower leg right.

Case report

After written consent for publication, a 46-year-old male (height 1.70m, weight 80kg, ASA I) was admitted for tenolisys of anterior compartment of lower leg under spinal anesthesia after an open trauma in traffic accident 1 year ago (Figure 1), indicated for surgical release of the tendon and muscle under anesthesia. Tests revealed all electrolytes normal. Bilirubin, urea, creatinine unchanged. Chest X-ray and ECG were normal.

Figure 1 Programming the incision to release muscles and tendons of the right leg.

Before induction of spinal anesthesia, routine monitoring (electrocardiogram, pulse oximetry, and noninvasive blood pressure measurement) was started and an intravenous line was placed. After sedation with midazolam (1mg) intravenously and cleaning the skin with alcohol 70% and removal of excess spinal puncture was performed with the patient in the lateral left side, by the paramedian line in the L3-L4 interspaces using 27G Quincke needle. After appearance of cerebrospinal fluid (LCS) 4mg of 0.1% hypobaric bupivacaine (bupivacaine 0.5%=1mL + distilled water=4mL) were administered at a speed of 1mL.15s^{-1}. The patient remained in that position for 10 min and placed in the supine position to the beginning of surgery. In the limb to be operated, the level of sensory block (tested by pinprick) was observed in L1 and there were no motor block. In the contralateral limb there was no degree of anesthesia (sensory and motor block) (Video). The surgical procedure lasted 30minutes without hypotension, bradycardia or decreased oxygen saturation.

Video: Sensitive unilateral spinal anesthesia without motor block.

Discussion

It is virtually impossible to perform unilateral spinal anesthesia with full doses of the drug.[4] In practice, a conventional unilateral spinal anesthesia technique can only result in a motor hemi-block and a sensory block preferential to one side.[4] The spinal cord emits nervous filaments, the anterior radicula (motor fibers) and the posterior radiculae (sensitive fibers) from the antero-lateral and postero-lateral sulcus of the medula, respectively (Figure 2). Both radicula go to the conjugation foramen formed by each superposed pair of vertebra. After the formation of the ganglia of the posterior roots by the posterior radiculae they turn themselves to the sensitive portion of the nerves, unite to the anterior radiculae that emerge from the spinal canal as spinal nerves. The distance between the spinal roots on the right and left sides is, approximately, 10 to 15 mm in the lumbar or thoracic region, and this reduced distance is enough to produce restricted unilateral block of the spinal roots.

The increasing of the solution temperature from 20°C to 25°C or 37°C leads to a significant reduction in the density of all solutions used.[3] For this reason the densities of both solutions of bupivacaine tested were determined at 37°C using the same densimeter.[3] The median

densities of the 0.15% bupivacaine solution was 0.99815±0.00203 and 0.10% bupivacaine 0.99726±0.00232, both hypobaric in relation to the LCS. Then the 0.10% solution of bupivacaine was significantly more hypobaric than the 0.15% solution of bupivacaine ($p<0.10$, Friedman test).

Figure 2 Dissection of the spinal cord with anterior and posterior roots.

The distribution of hypobaric solutions depends on patient positioning and anatomy of the spine. Therefore, selective sensorial blockade is produced when 0.15% hypobaric bupivacaine or 0,6% hypobaric lidocaine is used in patients in the jackknife position, since they cause little or no motor blockade in anorectal surgeries, because of the short latency, and the duration of the blockade depends on the anesthetic and dose used.[4] Subarachnoid puncture in the above mentioned position and the hypobaricity of bupivacaine and lidocaine resulted in excellent sensorial blockade (100% of the patients) and minimal incidence of motor blockade (10% of the patients).[5] Studying the doses of 4,5mg, 6mg and 7.5mg of 0.15% hypobaric bupivacaine was obtained adequate levels of anesthesia for surgery in a single lower extremity limb.[6] The onset of action was rapid and duration of action was dose dependent.[6]

Conclusion

The smallest dose of 0.15% hypobaric bupivacaine (4,5mg) resulted in a higher rate of unilateral spinal block, with narrower distribution and shorter duration.[6] In order to obtain a lower incidence of motor block to facilitate movement of the feet was used lowest dose (4mg) and lowest concentration (0.1%), which was more hypobaric compared with the highest concentration (0.15%), and the same duration. The lower extremity is innervated by two plexus: the lumbar plexus is primarily involved in innervating the ventral aspect, whereas the lumbosacral plexus is primarily involved with innervating the dorsal aspect of the lower extremity. The lumbar plexus is made up of the ventral roots of the first four lumbar nerves. The sciatic nerve is formed from the anterior divisions of L4, L5, S1, S2 and S3 nerves.

Spinal anesthesia was performed in lateral decubitus the L3-L4 level with 4 mg of hypobaric bupivacaine (0.1%), remaining the patient in this position for 10min. Sensory roots are thinner and more easily blocked than that the motor roots. Thus, the low dose (volume and mass) allowed to remain with the patient moves the ankle and foot (innervated by the sciatic) under complete surgical analgesia, facilitating the surgeon's job to release the muscles and tendons. The eloquence of orthopedic specialty is the movement. With this new technique that was obtained surgical analgesia, but without motor blockade. We call this new technique of unilateral sensitive spinal anesthesia.

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Conflicts of interest

The authors declare there are no conflicts of interest.

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