CONTINUOUS SPINAL ANAESTHESIA – ANOTHER REVIVAL?

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In the last hundred years Continuous Spinal Anaesthesia (CSA) has been in and out of anaesthesiology practice at least three times, and of late the fourth resurgence is around the corner. The practice of CSA has remained controversial mainly because of neurological complications associated with it. HP Dean[1] described this technique initially in 1906, about seven years after the first reports of spinal anaesthesia. However it was not accepted into practice till. WT Lennin[2] rediscovered it in 1940 and described the procedure by using a special malleable needle for this purpose. EB Touhy[3] modified the original technique in 1944 and placed an urethral catheter in the sub arachnoid space through a special needle. Despite this innovation the technique did not meet with widespread acceptance. The main concerns during these years regarding CSA, were of technical difficulties associated with the procedure, and post dural puncture headache. Bizzare[4] in 1960s brought about the second revival and advocated the use of 20 / 21G spinal needle and placed through them smaller catheters in the subarachnoid space. This became popular initially, but some how this procedure never caught the fancy of the average anaesthesiologist. In the late eighties and early nineties, micro catheters were popularized by Hurley and Lambert to reduce the incidence of post puncture headache[5,6]. The size of these catheters varied between 27 – 32 G, which were introduced through the spinal needles of 25 / 27G size. CSA initially became popular; but reports of cauda equina syndrome following the use of micro catheters put the technique into disrepute[7]. The unequal spread of the local anaesthetic in the cerebro spinal fluid, along with prolonged high concentration of the drug around the nerve endings was theorized to be the cause of this dreaded complication. The drug used in most of these cases was hyperbaric 5% lidocaine. In addition there were reports that micro catheters did not decrease the incidence of post dural puncture headeache[8]. The Food and Drug Administration (FDA) acted on these initial reports and issued stringent guidelines regarding the use of micro catheters. Thereafter, in 1992 FDA withdrew all micro catheters thinner than 24 G from use in USA. However, with the availability of macro catheters and isobaric and hypobaric local anaesthetics, this technique of CSA is again being revived.

There are two types of spinal catheters available. The micro catheters (through the needle, variety) and macro catheters (over the needle variety). The micro catheters are thin tubes, which are inserted in the spinal space through a 27G, 29G or 30G spinal needle with a Quincke or Sporette end. Such spinal catheters have a single hole and its size varies between 30 – 32 G. The other – macro catheters are of 22G or 24G size and are mounted on a Quincke beveled 27G or 29G spinal needle provided with a pull wire. The catheter is open at the end and has a side eye 0.5cm from its tip. Though both the variety of catheters are available in our country the macro variety are associated with lesser complications.

The technique involves identification of the epidural space as done normally with a 18g / 20 G needle with the patient in the sitting or lateral position. There after the duramater is punctured and a special spinal catheter is threaded in the sub arachnoid space. Usual precautions and exclusion criteria for a neuraxial blockade hold good. Once the catheter is in place (as evident by free flow of cerbro spinal fluid) the catheter is fixed like an epidural catheter and the same attached to a special bacterial filter, supplied with the set. Normally the catheter is threaded cranially for 3 – 5 cm in the spinal space. The patient is made supine and increments of local anesthetic are injected through the catheter. The height of the blockade can be checked and supplemental bolus dosage given if required for the required level of the block. The intravenous fluids can also be administered simultaneously as per cardiovascular parameters and overloading avoided specially in high-risk patients. The duration of the block can be extended as when it starts to wear off by intermittent boluses of local anaesthetics. The catheter can be kept for 2 –3 days in the postoperative period to provide continuos postoperative analgesia. The local anaesthetic used is usually isobaric bupivacaine, but this is not available in our country. We are regularly using the normally available hyperbaric solution without any problems. In order to avoid any pooling of the drug in the dural sac and to ensure proper mixing of the drug the same can be diluted with the cerebrospinal fluid while injecting or by carrying out barbotage. We usually inject bupivacaine (0.5 %) in an initial dose of 5 mg wait for 3-5 minutes and then in increments of 2.5 mg till the required level of block is achieved. The catheter and the filter have a dead space of 0.5ml, which must be considered while calculating the amount of drug given. The duration of block for surgery is prolonged by repeating the dose of bupivacaine when there are signs of the block wearing off. Alternatively bupivacaine can be administered in the form of an infusion if an infusion pump is available. For postoperative pain relief we use 3-5 ml of 0.125% or 0.25% of bupivacaine per hour for an adult patient.

The advantages claimed for CSA are- prolonged spinal anaesthesia like a continuos epidural, decreased dose of local anesthetic required as compared to an epidural, less hemodynamic variations following the spinal block as compared to single bolus technique and ability to use intrathecal narcotics spinally for cancer pain relief. The disadvantages include– possibility of higher incidence of post dural puncture headache[8,.9], direct nerve injury by the catheter, high

incidence of parasthesias, potential for infection and hemorrhage and technical difficulty in insertion[10,11], and the cost of the set.

The incidence of post puncture headache quoted in various studies varies between 4% – 33% [12,13]. The author has been regularly using macro catheters in orthopedic patients and the incidence of headache is negligible. Failure to produce adequate spinal anaesthesia can occur inspite of correct placement of the catheter. This occurs if the catheter gets entangled in the nerves resulting in poor distribution of the local anaesthetic. It can also occur in cases of migration of the catheter through the inter vertebral foramina. Failure could also result due to the incomplete mixing of a hyperbaric drug with in the spinal space. Cauda aquina syndrome has not been reported after macro catheters have been used. This could be attributed to the fact that spinal catheters are now usually inserted in a cephalad direction and not more than 4cm are inserted in the spinal space.

Presently, CSA is being considered the technique of choice for high-risk cardiac patients for lower limb, urological and lower abdominal surgery. There have been reports of the safe use of CSA for labor pain relief also. As long as adequate precautions are taken and standard recoomendations[14] followed CSA is a very safe and useful method to produce neuraxial blockade. In India both micro and macro catheters are available but have not been popular. The reasons for this could be the high cost of the spinal catheters, fear of infection, feasibility of continuous epidural as an alternative or simple ignorance of the technique.

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