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Original Article

Continuous spinal anesthesia with epidural catheters: An experience in the periphery

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Abstract

Background and Aim: Continuous spinal anesthesia (CSA) offers considerable advantages over "singleshot" spinal or epidural anesthesia since it allows administration of well-controlled anesthesia using small doses of local anesthetics and a definite end point with less failure rate. There are described technical difficulties with introduction of spinal micro catheters and hence this study was undertaken by using epidural catheters.

Materials and Methods: Sixty patients of ASA grade II to III were selected and they were administered continuous spinal anesthesia with Portex 18-G epidural catheters.

Results: The introduction was done in first attempt and was easy in all cases. The intraoperative period was uneventful in all cases. Early postoperative analgesia was achieved in all cases. Only two patients (3%) had postdural puncture headache controlled with simple analgesics. In a 3 month postoperative followup, the incidence of neurological complication is nil.

Conclusion: We conclude CSA with epidural catheters is a simple and safe alternative for prolonged procedures with negligible failure rate especially in high-risk patients and in patients with possible difficulties in administration of general anesthesia.

Key words: Continuous spinal anesthesia, epidural catheters, high risk patients

INTRODUCTION

Continuous spinal anesthesia is the technique of initiating and maintaining spinal anesthesia with small doses of local anesthetic injected intermittently into the subsubarachnoid space.[1] Its use has been reported for various procedures such as Cesarean section, orthopaedic, trauma or peripheral vascular procedures in the lower limb, urological, gynecological, rectal and perineal surgeries. It has been used in old and high-risk patients.[2-5] However, CSA has not gained wide popularity because of the fear of postanaesthetic cauda equina syndrome, and the difficulty in placing microcatheters into the subarachnoid space. As there are technical difficulties in introduction of spinal catheters and inaccessibility to such catheters in peripheral South India we resorted to this study of introduction of epidural catheters into the subarachnoid space. We selected high-risk patients with possible prolonged duration of surgery to perform the study.

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MATERIALS AND METHODS

Sixty patients of ASA II and III were selected for the study. All patients were informed about the study and approval from the institutional ethics committee was obtained. All patients had a few systemic diseases and the projected time of surgery was more than 2 hours. Out of the 60 patients, 12 had anticipated dificult airway. They were premedicated with Inj. Pentazoine 30 mg and promethazine 12.5 mg IM 30 minutes before anesthesia. They were positioned in the right lateral position and after a local anaesthetic injection in L3-L4 interspace in midline, insertion of 16-G epidural needle was done to get a free flow of CSF. 2.5-3 ml of Bupivacaine heavy (Anawin – Neon labs) with 1 mg of preservative free midazolam was injected into the subarachanoid space and the 18-G epidural catheter was introduced in all cases in the first attempt. The anaesthetic protocol were otherwise similar to a spinal anesthetic. Inj. Bupivacaine heavy was administered again when there was a recession in level or if there is patient discomfort. In all the patients the catheters were removed at the end of surgery. Routine monitoring included pulse oximetry, ECG and noninvasive blood pressure measurement (NIBP). For all patients, the following variables were recorded: age, weight, ASA physical status, duration of procedure, anesthetic drugs and doses, the most cephalad sensory level to pinprick, the use of additional systemic sedatives and analgesics, baseline and changes in BP and heart rate (HR), the use of sympathomimetic drugs, volume of IV fluid, and perianesthetic complications. The last included technical failure to thread the catheter, evidence of inadequate anesthesia (either insufficient sensory level or quality of the block), “high” spinal anesthesia, hypotension, bradycardia, postdural puncture headache (PDPH) and adverse neurological sequelae including persistent pain, motor or sensory deficits, haematoma or infection. They were followed up for a three month period for any adverse neurological sequalae.

RESULTS

Out of the 60 patients, 41 were male (68.3%). All the 60 patients had different combinations of systemic illness [Table 1]. The types of surgery is detailed in Table 2. The mean age of the patients was 54.2±12.4 years (SD) and weight was 76.2±17.8 kg (SD). All the patients were pre planned to administer continuous spinal anesthesia with epidural catheters. Hyperbaric bupivacaine with preservative-free midazolam was given to all patients and the dose of local anesthetic adjusted to achieve the desired level. The level was between T4 and T6 in all the cases. Forty patients required second dose of local anesthetic because of complaints and they received 1.5 ml of hyperbaric 0.5% bupivacaine through the catheter with an air flush to empty the drug within the catheter tubing. The anesthetic management was according to practice protocols followed. Anesthetic duration, fluid administration, the use of sympathomimetic drugs, the appearance of PDPH and other side effects if significant were noted. The hemodynamic changes were within acceptable limits. They are tabled below [Tables 3 and 4]. During the first dose of spinal anesthetic, sympathomimetics were necessary in 46 patients and ephedrine was used in all. One patient received 6 mg, 10 patients needed 12 mg, 10 needed 18 mg, 11 patients needed 24 mg, 11 needed 30 mg and the rest three needed 36 mg of ephedrine. All the patients (TURP with hernioplasy) who were positioned in lithotomy did not need sympathomimetics. None of the 60 patients needed additional systemic analgesics or sedatives. In all the 40 patients who required second anesthetic dose, the level was adequate and below T4. Thirty out the 40 needed one or two shots of 6 mg Inj. Ephedrine for hypotension. As most of the patients were catheterized, the problem of voiding did not arise in our study. PDPH was observed only in two patients which resolved in 2 days with oral analgesics. No postanesthetic neurological deficit was detected in any of our cases.

DISCUSSION

This study describes the use of continuous spinal

Table 1: Various systemic illnesses

Systemic illness	No. of patients
Diabetes mellitus and bronchial asthma	20
Diabetes mellitus and hypertension	21
Diabetes mellitus and IHD	12
Anemia with COPD	02
Parkinsonism with COPD	5

IHD: Ishemic heart disease; COPD: Chronic obstructive pulmonary disease

Table 2: Types of surgery

Type of surgery	No. of patients
Incisional hernia repair	11
Hysterectomy with incisional hernia repair	14
TURP with inguinal hernia (bilateral)	14
Orthopedic hip surgeries	16
Vascular surgery (lower limb)	05

TURP: Transurethral resection of prostate

Table 3: Hemodynamic variables

Baseline systolic BP (mmHg)	137.8±22.9
Maximal systolic BP decrease	35.1±9.8
Baseline diastolic BP (mmHg)	84.5±12.4
Maximal diastolic BP decrease	13.4±10.3
Baseline HR (beats per minute)	85.3±13.2
Maximal HR decrease	9.2±8.4

Table 4: Clinical detail

Duration (min)*	125.6±34.5
Fluids (ml)*	1830±578
Sympathomimetics (*n*)	46 (77%)
PDPH (*n*)	2 (3%)

*Mean±SD; PDPH: Postdural puncture headache anesthesia with a standard 18-G epidural catheter as an effective and safe anesthetic approach especially in high-risk patients.Continuous spinal anesthesia combines the advantages of both epidural and spinal anesthesia. The failure rate is very low as placement of the Tuohy needle in the subarachnoid space is easily ascertained by the escape of CSF. We did not encounter any failure and the catheter was inserted in the first attempt in all cases (100%). Rabonowitz reported 85% success in placing the catheter in the first attempt. In all his cases, he succesfully used 20-G epidural catheter,[6] but we used an 18-G catheter and this difference of 15% may be due to a bigger sized catheter. Onset of anesthesia is easy to control and can be either gradual, or rapid, depending on the sequence of injection of the local anesthetic (LA). The administered dose of LA is small reducing the possibility of systemic toxicity if the catheter is accidentally inserted intravascularly. We did not titrate to use LA in the fear of failure of insertion of the catheter later and the consequences. We gave the required anesthetic dose for the particular surgery in the first attempt to get the level and all our cases reported significant but acceptable haemodynamic disturbances. In forty of our patients, the duration of surgery went beyond the acceptable time limit of the first dose and hence we administered the second dose of the local anaesthetic. In all the cases, the second dose worked well to prove the catheter was in situ.The administration of the second dose effected an early postoperative analgesia as the surgery was completed in another half hour in many cases. This is an incidental observation and we cant comment that it instituted postoperative analgesia as the effect is an obvious result. Our study is deficient in that it neither had controls with single shot spinal anesthesia nor continuous epidural anesthesia to comment either on postoperative pain or hemodynamic disturbances. We removed the catheter in all the cases at the end of surgery for the fear of position and intrathecal infection especially in peripheral set ups like us. There is a general fear of PDPH with the use of epidural catheters in intrathecal space but we encountered this complication only in two cases. This clearly demonstrates that PDPH is less common when we insert catheter into the spinal compartment. Ng A reported the insertion of epidural catheter for prophylaxis for PDPH in accidental dural puncture during epidural attempts.[7] The insertion of epidural catheter was regarded as a treatment to prevent PDPH in accidental dural punctures during attempted epidural anesthesia.[8] This fact of incidence of PDPH goes along with our findings. There was another fear that the presence of a "big" catheter may initiate neurological sequalae like cauda equina syndrome. It is to be highlighted at this juncture that we used only hyperbaric bupivacaine as repeated doses of lignocaine[9] has established neurotoxicity in such instances. Shenkman *et al*.[10] reported succesful use of epidural catheters in subarachnoid space in patients for ESWL and they did not have any neurological side effects. We did not encounter any adverse neurological complaints in any of our 60 cases.

CONCLUSIONS

Continuous spinal anesthesia with standard epidural catheters is feasible and successful. The technique can be used in patients with extended duration of surgery where administration of general anesthesia is associated with risks. The hemodynamic effects are acceptable. The incidence of PDPH is negligble. There are no adverse neurological outcomes. There is an effective early postoperative analgesia.

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