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Sacral Epidural Anesthesia.

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I. Introduction

Sicard and Cathelin demonstrated the first epidural anesthesia on an adult through sacral hiatus in 1901. This became known as adult caudal or low epidural anesthesia. Owing to the often distorted anatomy of sacral hiatus in adults, this remained a challenging and often unsuccessful technique. With the introduction of lumbar epidural, this method further lost its popularity in adults. But in infants and children, Caudal anesthesia through sacral hiatus still remains widely accepted .[2] We hypothesized that administering caudal epidural anesthesia in adults through third dorsal foramen of sacrum instead of the sacral hiatus would improve on the success rate of this procedure while ensuring acceptable hemodynamic stability owing to less pronounced cephalic extension of the block as compared to the lumbar approach. In this study, sacral epidural anesthesia through third dorsal foramen of sacrum was administered to evaluate the merits and demerits of the method.

II. Methods

With the approval of Medical Ethical Review Board and written informed consent for procedure and study, 30 elderly patients(range 70 -90 yrs) belonging to ASA class II and III, admitted for surgical repair of old fracture of tibia were selected. The mean age and body weight were 80.60 ±7.50 years and 59.03±7.20 kg respectively. All patients were subjected to preoperative assessment. After the establishment of intravenous infusion, patients were helped to sit on the operation table, and anatomical landmarks like highest point of the iliac crest, posterior superior iliac spine, posterior inferior iliac spine, sacroiliac joint, tip of coccyx, on the both sides were identified. 3 rd dorsal sacral foramen was located by a point situated two cm lateral from midline and 11 (eleven) cm cephalad to tip of coccyx at the level of posterior inferior iliac spine.

With aseptic preparation, the identified area was infiltrated with 6 ml of 1% of injection Xylocaine. Nerve stimulator needle (0.8 mm x 100 mm 21G Stimuplex A100 needle/ BBraun) was inserted through 3rd dorsal foramen to sacral epidural space. Correct placement of needle without blood and CSF was verified by loss of resistance and movement of great toe of the same side. Once correct positioning is confirmed, 20 ml of 0.375% injection bupivacaine were injected.

Heart rate, blood pressure, respiration, and oxygen concentration were recorded. Upper level of sensory block was assessed by pinprick. Modified Bromage scale was used to assess onset and gradation of motor blockade. The time of onset of motor block was defined as the time gap between epidural injection and total loss of motor activity. The onset time of sensory blockade was defined as the interval between epidural injection and bilateral loss of sensation. Duration of sensory block was defined as the time interval between epidural injection and complete recovery of sensation. Hypotension was defined as a fall in systolic blood pressure below 100 mm of Hg. Data collected with the help of predesigned proforma were submitted for statistical analysis.

III. Results:-

30 patients were successfully administered sacral epidural through 3rd dorsal sacral foramen. Their demographic profile of mean age of 80.60 ±7.504 years and mean weight of 59.03±7.2 kg was male predominant. Hemodynamic profile like the mean value of heart rate (85.53±12.448) beats/ minute and SBP (116.53±15.536) mm of Hg did not show bradycardia and hypotension respectively. Nerve block profile showed the following. The mean±SD of onset time of motor block (24±4.433) minutes and that of sensory block was (18.50±3.972) minutes at level of T_{12}. The duration of sensory block was (177±9.154) minutes and that of motor block was (116.33±8.087) minutes. Cephalad spread at the end of (18.50±3.972) minutes reached to the level of 12TH thoracic vertebra.

IV. Discussion

Anesthetic management of elderly patients is problematic owing to their limited organ reserve and coexisting compromised cardio-respiratory status. Neuraxial block, as compared to general anesthesia, results in

better control of surgical stress as well as reduction in blood loss during surgery. But hypotension and bradycardia occurs frequently during Spinal Anesthesia. Sacral epidural is devoid of such hemodynamic fluctuations.

In adult, the fusion of first four sacral spinous processes and distorted hiatus makes midline epidural approach difficult. In addition, absence of sacral hiatus in 7.7% of population[4] and absence of sacral canal in 5%-10% population[6] imposes further challenge. Anomalies are also common in sacral foramina.[1]They may be smaller or even may be obliterated due to deposition of calcium around the rim. Bilateral 3rd dorsal foramens are ideal place to introduce needle, but sometimes it may become difficult. At that event, it is better not to persist with the same foramen, but to try another one, if possible, even through 1st or 2nd foramen.

Sacral canal, the lowermost extension of spinal canal forms capacious sacral epidural space to accommodate large volume of local anesthetic with free leakage of local anesthetic through eighteen communications (8 dorsal, 8 ventral foramens, 1 sacral hiatus and lumbar epidural space). This necessitates extra volume. It is quite likely that dose required will be double the amount required for lumbar epidural. The majority of this local anesthetic is absorbed systemically by the highly rich venous plexus, thereby increasing the chances of systemic toxicity. However, no toxic effect was noted in this study.

In our study, nerve stimulator needle was introduced through 3rd dorsal foramen to epidural space unlike sacral spinal anesthesia [8] where 1st and 2nd dorsal foramen were used. Use of 3rd sacral foramen results in avoidance of dural puncture and subsequent onset of total spinal anesthesia. Limited cephalad spread provides for greater hemodynamic stability, hence allaying concerns about cardio-respiratory status of aged persons. Sciatic nerve stimulation, evidenced by movement of great toe on the same side is the positive sign of correct placement of needle in the sacral epidural space.

V. Conclusion

With improved hemodynamic stability, sacral epidural through dorsal foramen is simple and safer technique to replace lumbar epidural or caudal for lower limb surgeries.

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Table 1: Shows patient details along with operative details and hemodynamic status during the operation

DEMOGRAPHIC PROFILE	
Age (Year)	80.60 ±7.504
Sex (Male : Female)	16:14
Height (cm)	161.23±7.347
Weight (Kg)	59.03±7.2
HEMODYNAMIC PROFILE:	
Systolic Blood Pressure (mm Hg)	116.53±15.536
Oxygen Saturation (%).	85.53±12.448
Heart Rate (beats / min).	99.03±0.893
NERVE BLOCK PROFILE	
Systolic Blood Pressure (mm Hg)	116.53±15.536
Oxygen Saturation (%).	85.53±12.448
Heart Rate (beats / min).	99.03±0.893
Onset of Sensory Block (min)	18.50±3.972
Duration of Sensory Block.(min)	177±9.154