MODIFIED COMBINED SPINAL AND EPIDURAL ANALGESIA - A NEW APPROACH

Dr. D. P. Samaddar1  Dr. Sampath Kumar2

SUMMARY

Modified CSEA with 25 G Quincke spinal needle was tried in 60 adult patients subjected for lower abdominal or lower extremity surgery. Needle insertion technique advocated by Ali and Samson was used while identifying epidural space with a thin bore spinal needle. Patient’s weight related dose of epidural morphine (50 g kg⁻¹ body weight) based on paediatric studies was tried ignoring the nature of surgical intervention in contrast to the adult studies.

Modified CSEA could be successfully performed in 85% cases. Weight related dose of epidural morphine (2-4 mg) in this study, though was lesser than the quoted adult studies, offered almost 24 h post of pain relief in 88.23% cases without any incidence of respiratory depression, pruritus and post dural puncture headache.

Modified CSEA advocated in the text is a cost effective and less complication prone alternative technique. Single shot, weight related dose of epidural morphine provides considerably long duration of analgesia therefore need of epidural catheter might be obviated.

Keywords : Anaesthesia technique : regional; spinal, epidural, CSEA. Analgesia : Post operative. Analgesic : morphine

Introduction

Combined spinal and epidural analgesia is commonly performed by double space (DST) or single space/segment technique (SST). Ability to perform CSEA through single intervertebral space has made SST a popular technique. Despite this advantage SST suffers from certain specific complications, technical problems and of course there is the cost factor.

Migration of epidural catheter in subarachnoid space have been reported leading to extensive block. Delayed respiratory depression due to drug entering into subarachnoid space through migrated catheter has also been claimed. Metallic flecks getting deposited in the epidural space while using needle through needle technique have raised concern. Meningitis, knotting of catheter, inadvertent dural puncture with the wide bore Tuohy needle are additional problems with currently practiced CSEA technique.

Length of spinal needle, site of hole in Tuohy needle at the patient end (back vs end hole) and type of spinal (pencil tip vs. Quincke) are some of the unresolved controversies with arguments in favour and against each point. Precipitous fall in blood pressure due to subarachnoid block before catheter is introduced particularly in Obstetric patients might necessitate immediate resuscitation. In such situation subsequent introduction of epidural catheter becomes impossible. Disposable special kit for SST is very costly and may not be affordable to all of us. In order to overcome the cost factor two attempts have been made recently by Indian authors but both appear to be cumbersome for routine clinical use.

Need to develop and accrue the benefits of CSEA through a simpler, cost-effective and less complication prone technique is therefore felt. A prospective pilot study was undertaken to perform CSEA by single space technique using conventional 25 G Quincke needle, which has not been tried before.

Materials & Methods

This prospective study was conducted in the department of Anaesthesia and Critical Care of Tata Main Hospital, Jamshedpur, which is a multidisciplinary 740 bedded general hospital.

60 patients of either sex belonging to ASA grade I & II posted for lower abdominal or lower extremity surgery were included in the study. Patients with bleeding disorder, spinal deformity, local infection and gross obesity were excluded from the study.

Method

Block was performed in sitting position at L₂₋₄ intervertebral space using No. 25 G Quincke spinal needle. Needle was advanced through an 21G introducer after

1. M.D., Anaesthesiology.
2. M.D., Anaesthesiology.
Department of Anaesthesiology & Critical Care
Tata Main Hospital, Jamshedpur

Correspond to:
Dr. D.P. Samaddar
Senior specialist Anaesthesia &
In charge ICU , TMH, Jamshedpur.
infiltrating the selected space with 2ml Lignocaine (1%). Epidural space was identified by applying a constant pressure on the plunger of 2ml air filled glass syringe fixed to the hub of spinal needle. Modified insertion technique advocated by Ali and Samson 27 was adopted for ease of identification of the epidural space (fig. 1). According to this technique, the dorsum of the operator’s left hand rests on the patient’s back, while the left thumb advances the spinal needle. Continuous restrain by the left three fingers thus helps in slow continuous advance movement of the spinal needle until the loss of resistance is clearly appreciated once the tip is in the epidural space. Single shot Morphine 50 microgram Kg⁻¹ body weight in 10ml saline was deposited in the epidural space. For orthopaedic patients weight before injury (as mentioned by the patient) was considered for deciding dose of morphine. Nearest 0.5mg decimal fraction was taken into account while calculating the final dose of morphine (e.g. if calculated dose is 2.35mg then 2.5 mg was taken as the final dose). After depositing morphine in epidural space, needle was further advanced to the subarachnoid space. Bupivacaine 0.5% heavy was used for subarachnoid block (SAB). Patients were immediately placed in supine position. Head down tilt was given if needed.

In the event of inadvertent dural puncture (direct dural tap) SAB was performed and the patient was excluded from the study. General anaesthesia was given to the patients where either subarachnoid tap could not be performed (Failed dural tap) or even after depositing local anaesthetic SAB was ineffective (Failed spinal). All these cases of direct dural tap, failed dural tap and failed spinal were not followed subsequently for the study and were grouped as “unsuccessful CSEA”. Monitoring of ECG, \( \text{SaO}_2 \), blood pressure and pulse rate was done for all the patients continuously during the course of surgery. Subsequent observation and monitoring was done in the post-operative ward for 24hours by the well informed ward nurse and doctor on duty.

Diclofenac sodium 75mg intramuscular (IM) was given at the end of 2 hours from initiation of SAB and every 12 hours subsequently till the patient required analgesia. Morphine 0.2 mg Kg⁻¹ body weight IM as escape analgesia was also given in the post-operative period if additional analgesic was demanded by the patient.

Block failure rate (unsuccessful CSEA), duration of post-operative analgesia (time interval between end of surgery and first IM morphine), incidence of complications particularly respiratory depression (i.e. respiratory rate less than 12 breaths/min. or PaCO₂ >45 mm Hg), pruritus and post-spinal headache were documented. Time of IM injection of Morphine was noted by the attending nurse. Documentation and follow up was done by one of the authors upto 24 hours postoperatively.

**Observations & Results**

Out of total 60 cases, 51 patients were female and 49 had undergone Obstetric & Gynaecological operations (Table 1 & 2). CSEA could be performed successfully in 51 cases (85%). In rest 9 cases (15%) it was unsuccessful (Table 3): i) Inadvertent direct dural tap in 5 (8.3%), ii) failed spinal in 3 (5%) and iii) technical difficulty in tapping dura (failed dural tap) in one case (1.6%- Fig.2). 51 successful CSEA patients were followed post-operatively for 24 hours to assess efficacy of single dose epidural morphine (Table 4). 45 patients (88.23%) effect of epidural morphine lasted for 20-24 hours. IM morphine was required after 12-20 hours in 5 patients (9.80%) and after 2h in one (1.96%) patient. Minimum and maximum dose of epidural morphine in our series was 2 and 4 mg respectively.

<table>
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<tr>
<th>Table 1. Demographic profile</th>
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<tr>
<td><strong>n = 60</strong></td>
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<tr>
<td>Female = 51</td>
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<tr>
<td>Male = 9</td>
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<tr>
<td>Weight = 38 - 80 Kg (Mean = 61.7 ± 10.51)</td>
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<td>Age = 20 - 78 yrs (Mean = 38.85 ± 15.44)</td>
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<th>Table 2. Profile of Operations</th>
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<tr>
<td>Obstetrics &amp; Gynaecological</td>
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<tr>
<td>Caesarian Section = 38</td>
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<tr>
<td>Hystrectomy (Abdominal) = 7</td>
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<tr>
<td>Hystrectomy (Vaginal) = 4</td>
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<tr>
<td>Orthopaedic</td>
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<tr>
<td>Dynamic Hip Screw for Trochantric # femur = 4</td>
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<tr>
<td>Amputation below Knee = 1</td>
</tr>
<tr>
<td>Potts # internal fixation = 1</td>
</tr>
<tr>
<td>Patelllectomy = 1</td>
</tr>
<tr>
<td>Surgery</td>
</tr>
<tr>
<td>Appendicectomy = 2</td>
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<tr>
<td>Inguinal Herniorraphy = 2</td>
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<td>Total = 60</td>
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<th>Table 3 : Success &amp; Failure</th>
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<tr>
<td><strong>n (%)</strong></td>
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<tr>
<td>Successful = 51 83%</td>
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<tr>
<td>Unsuccessful = 9 15%</td>
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Table 4: Duration of post-operative analgesia

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<th>Duration (in hours)</th>
<th>n (%)</th>
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<tr>
<td>&lt; 2</td>
<td>1 (1.96)</td>
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<tr>
<td>12 - 19</td>
<td>5 (9.8)</td>
</tr>
<tr>
<td>20 - 24</td>
<td>45 (88.23)</td>
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There was no incidence of post dural puncture headache (PDPH), pruritis and respiratory depression in this series.

Discussion

CSEA could be successfully performed in 51 patients (85%). In rest 15% patients though we could not perform CSEA (Table 3 & Fig 2), the incidence of failed spinal 5% (n=3) and failed dural tap 1.6% (n=1) was lower as compared to quoted incidence of 8.3-25% for failed spinal and 3.5-10.6% for failure to tap the dura with conventional SST-CSEA. The incidence of direct dural tap while locating the epidural space was higher 8.3% (n=5) in present study than the claimed incidence (0.4-2.7%) with conventional CSEA. Higher difficulty of direct dural tap in our series was due to difficulty in appreciating lack of resistance with very thin bore spinal needle since it was the authors’ initial attempt of developing this technique. Higher failure rate (8%) in locating epidural space with smaller gauze (20G) Tuohy needle was also reported by Liu et al as compared to 1% failure while using No.17 or 18G Tuohy needle. However, we did not observe any additional harm in the present series as the spinal needle used was very thin (cf. Tuohy needle). As the authors gained more experience this problem was very rarely encountered.

Dose of epidural morphine (50 mg Kg⁻¹ body weight) was decided based on the paediatric studies conducted by Rasch et al 1990, Gunter et al 1992 and Hennebreg et al 1993. Caudal morphine in the same dose was also found effective by Wolf et al in paediatric patients who underwent orchidopexy and lower abdominal surgery. Prolonged post operative analgesia with this dose could be achieved when given epidurally (15 hrs mean) and through caudal route (up to 24 hrs). Since pharmacokinetic parameters observed after epidural administration of morphine in children are similar to adults, we decided to use 50 mg Kg⁻¹ body weight morphine for the adult patients in our series who underwent lower abdominal and lower extremity surgery.

Unlike paediatric studies weight of the patient was not taken into consideration in the adult studies. For lower extremity surgery pre-decided fixed dose of 2mg and for lower abdomen 2mg to 7.6 ± 2.1 SD had been used in adult patients. LSCS in particular lower dose (2mg) was not found effective and relatively higher dose 4-5 mg had been advocated for satisfactory result.

Most of our patients had undergone LSCS (63.33%) but we used weight related dose of epidural morphine for both LSCS and non LSCS cases without making extra allowance for caesarean cases. The weight related dose of epidural morphine (2-4mg) was however lesser in our series as compared to the effective dose quoted by above mentioned authors. This can be explained by the fact that patient’s included in our series had lesser weight (61.7 ± 10.51) as compared to 73.6 ± 3.3 Kg in the study by Rosen et al who found 5mg as the best effective dose in LSCS. Lower fixed dose of epidural morphine 2 and 4mg was tried in LSCS by other authors also and they concluded that 4mg was the suitable dose which was lesser than the dose advocated by Rosen et al but higher than the dose used in our series. Trial with fixed dose, ignoring patient’s weight, could be the reason for not observing satisfactory result in these series. Difference in result could partly be due to racial and socio-economical variation in our study.
similar result with lesser dose could be attributed to use of weight related dose (as discussed above), simultaneous use of non-steroidal anti-inflammatory drug (Diclofenac 75mg IM BD) and use of epidural morphine as preemptive analgesic. Combination of NSAID with narcotic for improved analgesia had also been advocated by White PF37. Kundra P et al38 following use of single bolus dose of 3mg morphine before subjecting the patient for lumbar laminectomy (Preemptive analgesia) could achieve prolonged analgesia (19.9 ± 2.3h) as compared to 8.5 ± 1.0 h when same dose of epidural morphine was given at the conclusion of surgery. Giving morphine in the beginning of surgery had the additional advantage of anaesthetist getting a scope to watch for toxicity /untoward action while the patient is in the O.R.

Incidence of PDPH in this pilot series was nil which is consistent with the observation of Brownridge 39,40 who reported no incidence of PDPH in 200 obstetric patients following CSEA, although other authors 10,41 have observed 0.13 - 2.3% incidence of PDPH using 26/27G needle. None of our patient complained of pruritus. Reported incidence of pruritus varies with dose such as 1-10% with 2-3mg 31,34,42 and 5mg 43 and 40-100% with 10mg 43,44,45. Considerably less dose of morphine used in our series appears to be the reason for no incidence of pruritus. This is consistent with the finding of Rasch study where with similar dose (50micgm Kg-1 body weight) of epidural morphine in 30 infants, no incidence of pruritus was reported28a.

Ability to prolong analgesia by incremental dose of morphine through epidural catheter is a definite advantage of conventional CSEA over the technique advocated by us. This advantage is however associated with needle and catheter related complications mentioned earlier. High cost of CSEA kit is also another deterrent for using this technique as a routine. Moreover need for analgesia generally is maximum for initial 24 hours, subsequent need is usually taken care by NSAID adequately.

The technique advocated by us therefore is a suitable alternative to conventional CSEA, while providing reasonably prolonged post-operative analgesia, it eliminated catheter related complication and took care of the cost factor.

Conclusion

Modified CSEA through a single space technique using a spinal needle is a cost effective simple and less complication prone alternative to the conventional CSEA. A single bolus dose of morphine can be deposited through this technique in the epidural space for achieving nearly 24 hours of pain relief without any serious complications. However this technique needs to be further tried and mastered so that the incidence of inadvertent direct dural puncture could be further reduced to comparable levels.

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