### ABSTRACT

Peripheral nerve block provide effective analgesia with a lower incidence of autonomic side effects , less motor block and fewer serious neurological complications compared with epidural block. The present study was undertaken to compare continuous lumbar epidural(CEA) with continuous 3 in 1 block(C3in1NB) for postoperative pain control in lower limb surgeries and also with commonly practiced systemic analgesic regime.

### MATERIALS AND METHODS

#### Objectives:

- Pain score (VAS) preoperative were comparable in all the groups.
- The groups were comparable with respect to demographic data and side effects.
- Studies were done for 24 hrs postoperatively.

#### Materials and Methods:

- Ninety patients of either sexes of ASA physical status I and II aged 18-65 years weighing after taking due consent were randomly randomized into three treatment groups.

#### Results:

- Significant pain relief was obtained in both Group A and Group B.
- Pain relief was highly significant in both Group A and Group B during the first 12 hrs postoperatively.

#### Conclusion:

- C3in1NB provides postoperative analgesia equivalent to that obtained with a CEA but with fewer side effects.

### KEYWORDS

Anaesthetic technique, continuous 3-in-1 nerve blockade, continuous epidural block, postoperative analgesia.

### INTRODUCTION

Post operative pain after lower limb surgeries can contribute to immobility related complications, delay in hospital discharge and interfere with functional outcome. These lower limb procedures are amenable to regional anaesthesia techniques which reduce neuroendocrine stress responses, central sensitization of nervous system and muscle spasms which occur in response to painful stimuli.[2]

Epidural analgesia has been popular in the management of postoperative pain following orthopedic surgeries as a critical component of multimodal approach to achieve overall improved outcomes. Epidural analgesia provides good postoperative analgesia, but increases the incidences of side effects like autonomic disturbances, unintended motor blockade, urinary retention and pruritis (with opioids as adjuvants). risk of neurological complications related to anticoagulant therapy is also a cause of concern.

Continuous peripheral nerve block also known as “continuous perineural blocks” which offer tremendous advantage in the perioperative period, by providing effective unilateral analgesia with lower incidence of autonomic side effects, less motor block, and fewer serious neurological complications. There is increasing evidence to indicate that CPNB aid in early mobilization, decrease in the incidence of deep vein thrombosis in the perioperative period, aid better sleep pattern and decrease the incidence of cognitive dysfunction in the perioperative period.[4]

On this backdrop the study has been conducted to judge the efficacy of continuous lumbar epidural(CEA) and continuous 3 in 1 block (C3in1NB) for postoperative analgesia in patients undergoing lower limb surgeries with the following:

#### Aims and Objectives:

- To assess the pain relief between the two groups and also with commonly practiced systemic analgesic regime, side effects and complications and safety of the two procedures.

#### MATERIALS AND METHODS

The present study was a prospective, randomized control trial study, conducted in a tertiary care centre in north east India where sixty adult patients of age group 18–60 years with American Society of Anesthesiologists (ASA) I–II grade and undergoing lower limb procedure after taking due written consent were included in the study.

Ethical clearance was duly obtained from the Institute Ethical Committee for conducting the study. The study group was randomized into three groups of 30 patients each. Group A Patients received bupivacaine 0.125% at a fixed rate of 5ml/hr via a lumbar epidural catheter (placed preoperatively) for 24 hrs after surgery. Group B Patients received bupivacaine 0.125% at a fixed rate of 5ml/hr via a catheter placed in the femoral sheath 'Winnie Approach' preoperatively for 24 hrs after surgery. Group C patients received parenteral analgesic in the form of diclofenac 75mg 8 hourly.

In the operation theater, an intravenous (IV) access was secured and monitoring devices were attached which included electrocardiograph, pulse oximetry (SpO2), noninvasive blood pressure (BP) and the baseline parameters were recorded. Patients were administered epidural block with 18 gauge Tuohy Needle - Portal Continuous Epidural (Smith Med. Inc.) and catheter was secured 3-4 cm into the epidural space. The catheter was then anchored in place on the back of the patient using adhesive tape and a test dose of 3 ml of 2% lignocaine hydrochloride solution containing adrenaline 1:200,000 was injected. 3 in 1 block was done with a nerve stimulator with an insulated stimulating needle (Contiplex) by Winnie approach – patient in supine position puncture site located 1cm below inguinal ligament and 0.5cm lateral to the femoral artery. Correct needle placement obtained by contraction of quadriceps muscle group to a stimulating current of 0.3 -0.5 mA indicating proximity to the nerve. A 20 gauge nylon type catheter threaded through the cannula into the femoral sheath to a length of 14-15 cm, sutured in place.

All the patients in the three groups were administered spinal anesthesia with a standard technique using 0.5% hyperbaric bupivacaine.

Postoperatively, continuous local anesthetic (LA) infusion of 0.125% of bupivacaine was started at 5 ml/h with an elastomeric pump in both the groups. Postoperative hemodynamic monitoring continued, data on pain scores using Visual Analog Scale (VAS), and any adverse effects were noted for 24 h. Rescue analgesia in the form of injection tramadol 50 mg intravenously was given if the VAS was >3. The total dose of rescue analgesics administered to the patient in 24 h was noted.

#### RESULTS:

The groups were comparable with respect to demographic data and surgical characteristics.

Pain score (VAS) preoperatively were comparable in all the groups. Significant pain relief was obtained in both Group A and Group B. When compared with Group C pain relief was highly significant in both Group A and Group B (p<0.001) during the first 12 hrs post
operatively. At 18 hrs pain relief was definitely significant (p<0.01) and at 24 hrs it was just significant.

**Fig. Showing variation of VAS score with time**

All the groups had comparable vitals preoperatively (p>0.05). Groups A and B have no difference in parameters in the study period. Group C had a significant increase in MAP and pulse rate (p<0.001) as compared to Groups A and B.

**Fig. Showing variation of pulse rate with time**

Rescue analgesic requirement in Group C were higher than in Groups A and B.

**Table: Rescue Analgesic Requirement**

<table>
<thead>
<tr>
<th>Rescue analgesic requirement</th>
<th>Groups</th>
<th>Tramadol in mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upto 12 hrs post operative</td>
<td>A</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>150</td>
</tr>
<tr>
<td>From 12 hrs to 24 hrs</td>
<td>A</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>300</td>
</tr>
</tbody>
</table>

Significant nausea and vomiting and sedation occurred in Group C as compared with Group A and B as tramadol consumption was more. In comparison between Group A and B, nausea and vomiting was significant in Group A. sedation was comparatively same in both Group A and B.

**Fig: showing nausea and vomiting and sedation among the groups**

Complications in Group A were more than in group B and C. Of the total complications urinary retention was most common followed by shivering, hypotension and dizziness.

**Fig: showing complications**

In related to procedure related complications Group A had the highest number of complications. In Group B, difficulty in femoral catheter insertion occurred in 5 cases and in 4 cases multiple attempts were required for femoral catheterization.

**Fig: showing procedure related complications**

**DISCUSSION:**

Major orthopaedic surgeries are associated with moderate to severe postoperative pain which can contribute to immobility related complications, delay in hospital discharge, and interfere with functional outcome. These lower limb procedures are amenable to regional anaesthesia techniques which reduce neuroendocrine stress responses, central sensitization of the nervous system and muscle spasm which occur in response to pain stimuli. Epidural block has been popular over the recent decades as there is evidence of reduced blood loss and fewer thromboembolic complications using neuraxial techniques in orthopaedic surgery. Better dynamic pain scores are achieved with epidural analgesia as compared to systemic analgescics, however side effects like hypotension, urinary retention and pruritis are common with epidurals. An alternative regional anaesthesia technique is peripheral nerve block (PNB) or perineural nerve block of one or more major nerves supplying the lower limb. In contrast to epidural analgesia continuous PNB techniques do appear to provide pain relief superior to systemic opioid analgesia but with lower incidences of side-effects. Advances in nerve localization such as ultrasound imaging and continuous catheter technology have also helped to increase interest in PNB for lower limb surgery. In the present study continuous 3in1 block and continuous epidural analgesia was compared with systemic analgesia for lower limb surgeries.

The most significant finding in our study was the pain relief obtained by both continuous 3in1 and continuous epidural techniques as compared to conventional parenteral regime which is similar to different studies of Capdevilla 1999, Singelyn 1998, Chelly 2001, Kaloul 2004, Ganapathy 1999, Pham Dang 2005.

S.J. Fowler; J. Symons; S. Sabator; P.S. Myles 2008 did a meta analysis of epidural analgesia compared with peripheral nerve block for major knee surgery. They found that when all studies were combined, there was no difference in VAS scores between the epidural and PNB during the first periods (0-12 and 12-24 h) after operation. Of the three studies reporting patient satisfaction, two stated that patient satisfaction was higher in PNB group. (Aldahish M et al 2004, Davies AF et al 2004)

In our study, opioid consumption was higher in parenteral analgesic group which is similar to results of Capdevilla X et al 1999 and Chelly JE et al 2001 which showed both continuous 3in1 block and continuous epidural analgesia reduce post operative opioid consumption.
In our study hypotension occurred in epidural group as compared to 3in1 group and parental analgesic group which is similar to the results found in the meta-analysis of S.J. Fowler; J. Symons; S. Sabato; P.S. Myles 2008.

Complications like nausea, vomiting and urinary retention were significant in epidural group which were similar to the results found in the meta-analysis of S.J. Fowler; J. Symons; S. Sabato; P.S. Myles 2008. Singelyn, Gouverneur et al 1999, have concluded that PNB has lower incidence of urinary retention and hypotension than epidural analgesia.

Other procedure related complications were higher in the epidural group as compared to nerve block group. According to * National Confidential Enquiries into Patient Outcome and Death. Extremes of Age: NCEPOD London, 1999* hypotension associated with epidural analgesia may contribute to end organ ischaemia or infarction in person(s) of older age, degenerative spinal disorders, on anticoagulation if left untreated. According to *Procedure specific post operative pain management( PROSPECT)* recommendations if general anesthesia is not desirable, single shot spinal should be combined with PNB for total knee arthroplasty.

In our study, about 15% of the patients in the continuous 3in1 group withdrew from the study due to failure to demonstrate a existence of sensorial block in the obturator and lateral femoral cutaneous nerve dermatomes. This maybe due to the fact that 3in1 block is difficult to perform. Reported success rate of placing a catheter via the femoral nerve sheath range from 80-100% with most studies using peripheral nerve stimulator( Grant SA, Nielsel KC, Green grad RA, et al 2001). In most clinical trials the catheter was typically inserted to 10-15 cm into the femoral sheath to maximize the proximity to the lumbar plexus but only 40-90% of patients reported complete lumbar plexus block after 24-48 h of continuous analgesia (Capdevilla et al, Singelyn et al). Thus it is unclear where the femoral catheters travel with increased insertion depth and the optimal depth is unknown. In our study the catheter was inserted 14-15 cm to maximize the proximity to the lumbar plexus and patients who fail to demonstrate a existence of sensorial block in the obturator and lateral femoral cutaneous nerve dermatomes were withdrawn from the group.

**CONCLUSION:**
In our study we found that both continuous 3in1 block and continuous epidural provide excellent analgesia for lower limb surgeries as compared to systemic analgesics. Continuous 3in1 block may provide effective unilateral analgesia with lower incidence of opioid related and autonomic side effects and fewer serious neurological complications compared to lumbar epidural analgesia. However 3in1 block is difficult procedure to perform resulting in high failure rate and mostly sparing the obturitor nerve.

**REFERENCES:**