

## Effectiveness and Efficacy of Segmental Epidural Neural Blockage in Hernia Repair

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### Abstract

*Background:* As inguinal hernia is usually seen in elderly age group, so as to avoid or reduce the complications which could occur in the conventional dosages this clinical study of segmental epidural anesthesia was undertaken where the extent of block is limited to only few segments involved in the field of surgery. *Materials and Methods:* Study was conducted on 200 patients of ASA I and II posted for elective inguinal hernia repair. Segmental epidural block was performed with Ing. Bupivacaine 0.5% 5–6 ml. *Result:* In the present study, the mean onset of analgesia was 10.53 minutes. The quality of analgesia was excellent in 106 cases, good in 68 cases, fair in 20 cases and poor in 6 cases. *Conclusion:* Segmental epidural block with 5–6 ml of 0.5% Bupivacaine is found to be safe and fulfils the surgical requirement. Could be successfully employed for inguinal hernia repair with limited spread of analgesia involving only few segments.

**Keywords:** Bupivacaine; Epidural anesthesia; Inguinal hernia repair.

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### Introduction

Segmental Epidural Anesthesia (SEA) selectively blocks pain fibres from the surgical site. It limits sympathetic and motor block which could probably avoid hypotension and aid in easy positioning in PCNL surgery. Considering the potential advantages, the basis of the current study was to selectively block thoracic epidural segments from T<sub>6</sub> to T<sub>12</sub> for PCNL surgery. In this randomised controlled trial, our aim was to compare SEA and GA for PCNL with overall patient satisfaction as the primary end point.<sup>1</sup>

Inguinal hernia repair is one of the most commonly encountered surgical corrections in

men representing 12.5% of total surgical repair in Britain. In the international classification of diseases 9<sup>th</sup> division clinical manifestation, the number was 9 for hernias with relative value guide of 6.<sup>2</sup> In providing anesthesia for inguinal herniorrhaphy, the technique chosen must be cost effective with respect to speed of recovery, patient comfort, and associated incremental costs.<sup>3</sup>

Epidural anesthesia is suitable as a sole agent for lower abdominal surgery and on lower limbs. It has some definite advantages over spinal anesthesia like avoidance of post-spinal headache, minimal chances of meningitis, and minimal chances of nausea and vomiting in post-operative period.<sup>4</sup> But administration of conventional dosage of

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local epidural anesthetics (15 ml and above) for surgical anesthesia frequently results in multiple hemodynamic changes, including decreases in chronotropism, inotropism, dromotropism, systemic vascular resistance, cardiac output, and myocardial oxygen consumption. The economic consequences of these hemodynamic changes are far from being calculated.<sup>5</sup>

This study is undertaken to evaluate the advantages of segmental epidural anesthesia for inguinal hernia repair to reduce the conventional dosage of epidural anesthesia to block only the segments involved in the field of surgery.

### Materials and Methods

A clinical study was undertaken for anesthetising 200 patients aged between 18–70 years posted for elective inguinal hernia repair, agreeing and co-operative for epidural anesthesia. Study was conducted at Medical College and Research Hospital.

#### Selection of Patients

The patient undergoing inguinal hernia repair, of age range of 18–70 years and belonging to ASA Grade I and II were included in the study. Exclusion criteria were as follow: All the patients who were below 18 years and above 70 years, Patients with ASA Grade III and IV, patients who are allergic to local anesthesia, Presence of renal problems, bleeding disorders, patients on chronic drug medications such as MAO inhibitors, acute substance abuse, previous problem with anesthesia, obesity.

#### Pre-anesthetic Evaluation

Pre-anesthetic evaluation was done a day prior to the elective surgery. History of present complaints, duration of swelling and any co-existing disease, previous surgery were noted. A thorough physical, systemic examination was done which included the size of the swelling, type of hernia, weight of the patient, vital signs and airway assessment.

All patients were assessed and they were graded according to the ASA physical status I and II. They were educated regarding the anesthetic technique. Consent for the same was obtained. Local anesthetic test dose was carried out on the previous day of surgery. Patients were pre-medicated with oral Alprazolam 0.5 mg and Oral Ranitidine 150 mg on the night prior to surgery and 2 hours before the surgery.

The department of anesthesiology in which regional anesthesia is to be performed in a sophisticated fashion must have a significant inventory of regional anesthetic technique must be kept ready.

#### Drugs

Inj Bupivacaine 0.5% isotonic. To perform epidural analgesia, equipments and drugs for resuscitation and treatment of complications should be kept ready. This should include a means of administering oxygen by positive pressure, such as an anesthesia machine or an resuscitation bag and mask connected to a source of oxygen, airway equipment, working laryngoscope, oro-pharyngeal airways of several sizes, cuffed endotracheal tubes of appropriate sizes, a suction apparatus and labelled syringes that contain atropine and a dilute solution of vasopressors.

#### Procedure

Each patients selected for the study was positioned laterally (on affected side) on the operation theatre table. With all aseptic precautions the epidural space was identified at L1-L2 space, with 18G epidural needle 5 ml of 0.5% Bupivacaine is injected very slowly only to block the segments (T12-L2) involved in the field of surgery. Later epidural catheter was inserted and secured and patient positioned back to supine position.

Level of analgesia was checked by needle prick. After conforming the adequacy and level of analgesia, the surgery was commenced. If the patient complained of pain during needle prick, then injected local anesthetic (0.5% Bupivacaine) with an incremental dosage of 1 ml at a time, till the complete onset of analgesia.

Pulse Rate and Blood Pressure were recorded at an interval of 1 minute for first 5 minutes and then every 5 minutes till the end of the surgery. Oxygen saturation and ECG monitoring was done continuously. Onset of analgesia, level of analgesia (pre- & post-operatively), duration of analgesia, total dosage of local anesthetic used were recorded.

In the present study, the following scale was adopted to grade quality of analgesia and relaxation:

1. *Excellent*: Patient comfortable, analgesia and surgical relaxation adequate, no supplementation required during surgery;
2. *Good*: Analgesia and relaxation adequate, minimal discomfort present during surgical

procedure. Additional top-ups of local anesthetic at an incremental dose of 1 ml are given;

3. *Fair*: Analgesia and relaxation adequate, discomfort present even after additional top-up of epidural local anesthetic, this was alleviated by analgesic dose of Ing Fentanyl 1 Mcg/kg IV;

4. *Poor*: Patients complaining of severe intolerable pain during surgery without relaxation. These cases were supplemented with general anesthesia.

### Statistical analysis

Descriptive data included mean, standard deviation and percentage which were determined for the study group.

### Results

Segmental epidural anesthesia was given to two hundred patients undergoing inguinal hernia repair at Medical College and Research Hospital and the present cases were taken up for study as outlined in the methodology.

Age of the patients included in the study range from 18 years to 70 years. The mean age was found to be 43 years. The majority of the patients were in the age range of 31 to 40 years, (Table 1). Regarding the sex incidence it is the male who predominates as compared to females. Owing to the incidences of hernia there was 54 patients suffering from direct hernia and 146 patients had indirect hernia. The volume of bupivacaine required ranged from 5 ml to 8 ml. The mean of the volume required was 5.8 ml.

**Table 1:** Distribution of age among the patients

Age group	No of cases
18-29	42
30-39	60
40-49	44
50-59	34
60-70	20
Total	200

Table 2 shows, the quality of analgesia and relaxation in patients. Excellent type of relaxation and analgesia were found in 106 patients. All the patients were comfortable and there was no requirement of any supplementation during the surgery. Minimal discomfort was present in 68 patients, the analgesia and relaxation was adequate. 1 ml of additional anesthesia was given when required, (Table 3).

**Table 2:** Sex incidence present in the study

Sex	No of cases
Male	194
Female	6
Total	200

**Table 3:** Quality of analgesia present in the study

Quality of analgesia	No of cases
Excellent	106
Good	66
Fair	20
Poor	6
Cases excluded from the study	4
Total	200

There was discomfort found in 20 patients. Discomfort was present even after additional top-up of epidural local anesthetic; this was alleviated by analgesic dose of Ing Fentanyl 1 Mcg/kg IV. 6 patients had no analgesia at all, Patients were complaining of severe intolerable pain during surgery without relaxation. These cases were converted to general anesthesia. 4 cases were withdrawn from the study as there was an inadvertent dural puncture. Side effects were seen in some cases. Sweating was seen in 18 patients; in 10 patients shivering was present.

### Discussion

For the lower abdominal surgery and in lower limbs, the epidural anesthesia is the sole agent. There are advantages like avoidance of post-spinal headaches, minimal chances of nausea and minimal chances of meningitis over the spinal analgesia.<sup>6</sup> These works have given a useful suggestion for extending the technique as "Segmental Epidural Block" for Inguinal hernia repair as the nerve supply to this area is very suitable for carrying out this procedure and also has some attractive advantages over the conventional epidural block using larger doses.<sup>7</sup>

The study of Segmental Epidural Analgesia for inguinal hernia repair was carried out with an intension of administering limited quantity of drug required to make the procedure precise and safe. Segmental or conventional block can be performed at any region like cervical, thoracic, lumbar or caudal. However, the volume used in the segmental block is very small, so that, the block covers only the particular segments concern.<sup>8</sup>

Studies conducted by MH Rao and Phani Thota, on Segmental dose requirement of epidural lignocaine stated that dose required to block each segment in males was about 22.3 mg/segment and

in females about 19.7 mg/segment.<sup>3</sup> Based on these studies volume of the drug injected by us was 5 ml, so, as to limit the spread to only the segments involved in the field of surgery.

In this study, a majority of patients (106 patients) who received 5 ml the analgesic effect was found to be satisfactory. 44 patients received 6 ml, 32 patients 7 ml and 18 patients received 8 ml. It is observed that the majority of patients who required the additional top-ups upto 7 and 8 ml were younger age group. This can be explained by, in younger age group the spread is minimal due to spillage of drug through the patent intervertebral foramina. But escape of fluid is reduced to minimum in the elderly patients due to the stenosed intervertebral foramina which can be observed by the largest spread of volume as seen in two patient aged 70 and 65 years.

In a study by Prys Roberts and Andrew Black, stated that in 90% of the patients undergoing lower abdominal surgeries where block required is between T10-L2 the volume of local anesthetic required is 5 ml and the duration of block with Bupivacaine 0.5% is limited to 3–4 hours. In the present study, mean onset of analgesia was 8.09 minutes and mean duration of analgesia was 167.42 minutes (120 min–240 min).

### Conclusion

The segmental epidural block with 5–6 ml is found to be safe and it fulfils all the surgical requirement. For inguinal hernia 0.5% bupivacaine can be successfully employed with limited spread. There are minimal complications like fall in blood pressure. The present technique can be safely use in elderly patients.

*Conflict of Interest:* none

*Source of Support:* Nil

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