

# Management of Central Nervous System toxicity after Intercostal nerve block with bupivacaine

R Jain, S Mishra, G Goyal, H Chauhan, S Bhatnagar

## Citation

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## Abstract

A case report of convulsions followed by an intercostal nerve block for post operative analgesia for the management of post thoracotomy pain. The block was given by the resident on duty in the ward followed by generalized tonic-clonic convulsions with respiratory arrest but without any signs and symptoms of cardiac toxicity and managed successfully by resident anaesthesiologist without any post extubation neurological sequelae. The nerve blocks seems to be easy to perform but are associated with life threatening complications if performed without taking adequate precautions.

## INTRODUCTION

Regional anesthetics are appropriate for many surgical patients. The use of regional anesthesia in selected patients reduces morbidity, mortality, and incidence of reoperation after major surgical procedures and provides excellent postoperative analgesia. Post thoracotomy patients experience pain which causes deranged respiratory function and increases hospital stay and the total cost. Additionally, when anesthesiologists are questioned about their preferences for anesthetic prescription for elective and emergent surgical procedures, the majority choose a regional anesthetic. It may be some anesthesiologists modify their prescription of regional techniques fearing the consequences of local anesthetic-induced systemic toxicity, including seizures and cardiovascular collapse. The incidence of seizures associated with regional anesthesia reportedly ranges from 1 to 4/1000.

## CASE HISTORY

A 30 years old male patient weighing 55kg a diagnosed case of osteosarcoma left femur with B/L lung upper lobe metastasis, posted for right lung metastectomy. Pre-anaesthetic checkup was done showing no history of any other chronic medical illness, seizures or any other cardiac or neurological illness. He was posted for surgery and premedicated with glycopyrrolate 0.005 mg /kg, morphine 0.1 mg/kg, phenargan 0.5 mg/kg intramuscularly according to our institutional protocol. A thoracic epidural was planned for postoperative analgesia, and an epidural catheter was inserted at T7-8 interspace, test dose of 3 ml lignocaine with

adrenaline was given after aspiration and that was negative. The patient was induced with intravenous morphine 5mg, propofol 140 mg, vecuronium 6mg and 39 Fr left sided double lumen endotracheal tube was inserted. The right radial artery was cannulated with 20 G arterial cannulae and arterial blood gas analysis was done, which was normal. The intraoperative period was uneventful and patient was extubated uneventfully. During intraoperative period epidural bupivacaine 0.25% and morphine 3 mg was given. The patient was shifted to intensive care unit for monitoring. The patient was pain free in postoperative period for 24 hours and then shifted to ward. After 24 hours when patient complained of pain in the ward epidural top up was tried but was unsuccessful, catheter was found lying outside. For the next two days his pain was managed with intravenous morphine. The resident on duty in ward gave right sided intercostal nerve block at 5<sup>th</sup> and 6<sup>th</sup> intercostals space using 20 ml bupivacaine 0.5% on 3<sup>rd</sup> postoperative day when patient complained pain. After 45-60 seconds of injection the patient complained of peri oral tingling and 2 minutes later the patient developed generalized tonic clonic seizures. Immediately intravenous 10mg diazepam was given to control the convulsions. At that time the resident anaesthesiologist was called. After examination of the patient he found that there is no hypotension or arrhythmia but patient was unconscious and in respiratory arrest with generalized tonic clonic seizures. Immediately 200mg thiopentone and 100 mg succinyl choline was given and the patient was intubated and put on to mechanical ventilation and shifted to the ICU for monitoring and further care. An

immediate ABG was done which shows pH- 7.35, PaO<sub>2</sub>-156mmHg, PaCO<sub>2</sub>-38mmHg, HCO<sub>3</sub>-23 mmol/lit, SpO<sub>2</sub>-98% on FiO<sub>2</sub> 40% SIMV volume controlled mode . After 3 hour the patient regain consciousness and weaning started and extubation was done after 2 hours. Serial ABG analyses were done and were normal. The patient was kept in ICU for overnight and shifted to ward in the morning, post extubation period was uneventful and without any neurological sequelae. During that period his analgesia was maintained with intravenous morphine.

### DISCUSSION

The frequency of seizure associated with the use of regional anaesthesia in an academic training centre varied significantly between anaesthetic type with maximum incidence in caudal >brachial>epidural. <sup>1</sup> For post thoracotomy pain anaesthesiologist uses thoracic epidural, paravertebral, Intercostal, interpleural block. <sup>2,3,4</sup> .

This patient experienced a generalized tonic-clonic convulsion immediately after an injection of 20 ml of bupivacaine 0.5% solution after right sided intercostal nerve block at 5<sup>th</sup> and 6<sup>th</sup> intercostals space. The absence of a history of any illness in our patient, especially epilepsy, the nonrecurrence of the convulsions, and the timing of the seizures in relation to administration of the local anesthetic were suggestive of a toxic reaction to the drug. The cardiovascular toxicity was absent, and no arrhythmias were observed.

The potential interest of reporting the case is because of the large amount of local anesthetic solution {bupivacaine 0.5% 20ml} was injected by the resident surgery for post operative analgesia at a place where resuscitative measures were not available. This is the first report in which bupivacaine has been administered through an intercostal nerve block producing seizures without any manifestation of cardiac toxicity, and management of this complication without any neurological sequelae.

The convulsive plasma level of bupivacaine is 4mcg/ml or higher. <sup>5</sup> However this plasma level may be achieved at the dose of 150mg bupivacaine. <sup>6</sup> In previous studies convulsions have not been reported from absorption following peripheral nerve blocks using 0.25,0.5 % solutions with doses upto 600 mg. <sup>6,7</sup>

Brown et al results shows bupivacaine was the local anaesthetic most frequent associated with seizure and inspite of 16 patients developing seizures after bupivacaine blocks

,none experienced acute cardio-vascular collapse.it is important to note that none of the 16 patients developed seizures required haemodynamic support more intense than intravenous ephedrine or atropine,coupled with delivery of supplemental oxygen and controlled ventilation.No patient required epinephrine or antiarrhythmic therapy. <sup>1</sup>

CNS or cardiovascular toxicity may result from accidental IV injection, rapid systemic uptake, or relative overdosage of local anesthetics. <sup>8</sup> Reports of deaths after unintentional intravascular injection of local anesthetics, especially bupivacaine and etidocaine were present during attempted epidural anesthesia in obstetric patients. <sup>6</sup>

Kreitzer et al first reported case of CNS toxicity in a patient receiving a continuous intrapleural bupivacaine infusion. <sup>2</sup>

Systemic toxic reactions which have been reported were as a result of inadvertent intravascular injection during performance of peripheral nerve block and not from absorption. Using much larger doses does not show any evidence of systemic toxicity. <sup>8</sup>

Cardiovascular complications associated with local anesthetic-induced seizure have a much smaller incidence even when bupivacaine is used as the primary local anesthetic.The proper knowledge about the technique, the drug profile and the complications of the procedure and skill to manage them properly by taking adequate resuscitative measures, is the minimum requirement for performance of any regional anaesthetic procedures safely. Though these nerve blocks seems easy to perform but are associated with risk of life threatening complications if performed without taking adequate precautions in a place where resuscitative measures were not available.

### CORRESPONDENCE TO

Dr Seema Mishra, Assistant Professor Anaesthesia, F-33, All India Institute of Medical Sciences Residential Campus (West) Ansari Nagar, New Delhi, Pin: 110029. INDIA. Telephone: 91-9899061105, 91-11-26172131 Fax: 91-11-26588641 E-mail: mseema17@yahoo.co.in

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**Author Information**

**Roopesh Jain, MD**

Senior Resident, Department of Anesthesiology, Institute Rotary Cancer Hospital, All India Institute of Medical Sciences

**Seema Mishra, MD**

Assistant Professor, Department of Anesthesiology, Institute Rotary Cancer Hospital, All India Institute of Medical Sciences

**Guarav Nirwani Goyal, MD**

Senior Resident, Department of Anesthesiology, Institute Rotary Cancer Hospital, All India Institute of Medical Sciences

**Himanshu Chauhan, MD**

Senior Resident, Department of Anesthesiology, Institute Rotary Cancer Hospital, All India Institute of Medical Sciences

**Sushma Bhatnagar, MD**

Associate Professor, Department of Anesthesiology, Institute Rotary Cancer Hospital, All India Institute of Medical Sciences