UNINTENTIONAL PLEURAL PUNCTURE AFTER THORACIC EPIDURAL - A CASE REPORT
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Abstract: Thoracic epidural analgesia is one of the most effective and time tested modalities of providing effective post-thoracotomy pain relief. It also reduces postoperative pulmonary complications like atelectasis, impaired coughing, retention of secretions, infections etc. Nevertheless, being a blind procedure several complications have been associated with the technique. Pleural puncture is one rare complication that might occur following thoracic epidural catheterisation. This case report is about a 55yr old male who underwent thoracotomy for excision of right lung emphysematous bulla under general anaesthesia with thoracic epidural block. During surgery the catheter tip was found to be in the right pleural cavity. There was no evidence of bleeding or lung injury around the puncture site. The catheter was left in situ and was utilised to provide post operative intrapleural analgesia with local anaesthetic. We have discussed probable reasons for pleural puncture during epidural blockade and certain precautions which could possibly prevent technique related complications.

Keyword: pleural puncture, thoracic epidural catheter, complications, thoracotomy.

INTRODUCTION:
Epidural anesthesia was first reported by Sicard and Cathelin in France, in 1901. Thoracic epidural analgesia is a very efficient and time-tested method of providing intraoperative and postoperative pain relief for a wide range of surgical procedures including thoracotomy, thoracoscopy, sternotomy, upper abdominal surgeries. However, due to the blind nature of the procedure, it has been associated with several complications like failure to identify epidural space, dural perforation, post dural puncture headache, subdural placement of catheter, direct needle trauma to the nerve roots leading to radiculopathy, epidural hematoma, intravascular injection, venous air embolism, epidural abscess, total spinal/subdural anaesthesia, breakage of catheter, back ache, etc. Interpleural misplacement of a thoracic epidural catheter is one rare technique related complication (2-4% incidence). It may go unnoticed and uneventful or may produce life threatening complications such as hemothorax or pneumothorax. We have described one such case in which an intended epidural catheter was found to be misplaced in the pleural cavity.

CASE REPORT:
A 54yr old male patient, wt 70kg and ht 168cms and BMI 24.82 presented with chronic intermittent cough and breathlessness on exertion and was diagnosed to have an emphysematous bulla in the upper lobe of right lung based on his chest radiograph and CT chest findings. He had no comorbidities, no history of previous surgeries, his effort tolerance was 4 - 6 METS and his blood investigations were within normal limits. General and cardiovascular system examination were normal. Airway examination did not reveal any difficulty and his chest radiograph and CT chest findings. He had no pulmonary complications like atelectasis, impaired coughing, retention of secretions, infections etc. Nevertheless, being a blind procedure several complications have been associated with the technique. Pleural puncture is one rare complication that might occur following thoracic epidural catheterisation. This case report is about a 55yr old male who underwent thoracotomy for excision of right lung emphysematous bulla under general anaesthesia with thoracic epidural block. During surgery the catheter tip was found to be in the right pleural cavity. There was no evidence of bleeding or lung injury around the puncture site. The catheter was left in situ and was utilised to provide post operative intrapleural analgesia with local anaesthetic. We have discussed probable reasons for pleural puncture during epidural blockade and certain precautions which could possibly prevent technique related complications.

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A total of 3 boluses of 20ml bupivacaine 0.25% with tramadol 100mg were given every 8hrs for 24 hours, each time clamping the ICD for about 30mins after injection of drug. Patient was closely monitored for signs of local anaesthetic toxicity. Post operative analgesia in the patient was effective; with VAS scores between 1-3 and no additional analgesic was required. The patient's vitals were stable, except for once when he developed hypotension with systolic blood pressure of 90mmhg which responded to i.v. fluids and ephedrine 6mg administration. No side effects of local anaesthetic toxicity or related to opioid (tramadol) use such as nausea, vomiting, pruritus or respiratory depression was observed. The catheter was removed intact after 24hrs.

DISCUSSION:
A few such cases of misplacement of thoracic epidural catheter into the pleural cavity have been mentioned in literature(1-4). Such complications may be unnoticed and uneventful or may also produce life threatening hemothorax or pneumothorax.

(5) Generally, epidural catheterisation is instituted by introducing the catheter back into the paravertebral space with the paramedian approach than the median approach. The proposed reasons for the higher incidence of misplacement with this approach are inability to identify skin landmarks, inappropriate angle of insertion of the tuohy needle during paramedian approach, very thin individuals etc.(2,3) However, pleural puncture with the median approach have also been reported.(6,7) In our patient this complication could be recognise because the catheter tip was located in the ipsilateral pleural cavity. Cases of catheter misplacement into the contralateral pleural cavity have also been described, which might go unnoticed.

(8) Since there was no evidence of bleeding or lung injury around the puncture site, the catheter was retained to provide interpleural analgesia. Inoue et al (1) described three cases of pleural puncture during thoracic epidural. Catheter was retained in all three cases to provide interpleural analgesia. It is a better modality when compared to other routes of pain relief like paravertebral opioids, intercostal block etc. It has also been tried as a primary modality of analgesia in thoracotomy procedures with success(9,10). The analgesic effect of local anaesthetic in interpleural route is due to its diffusion through the parietal pleura and intercostal muscles causing blockade of paravertebral nerves. Opioids can be added as adjuvants to local anaesthetics as opioid receptors have been identified in the peripheral nervous system. However, the complications of interpleural analgesia have to be kept in mind, such as requirement of large doses of local anaesthetic leading to toxicity, and also inferior and unreliable analgesic effect compared to epidural administration(11).

PRECAUTIONS DURING EPIDURAL CATHETERISATION:
Both loss of resistance technique and hanging drop technique cannot distinguish the pleural cavity from the epidural space. Also at higher thoracic level, the ligamentum flavum may fail to fuse in the midline, hence the tactile sensation of piercing the ligamentum flavum cannot be relied upon as a means of assessing the optimum depth of needle penetration. Hence the following precautions are suggested to perform successful catheterisation:

a) Optimal positioning of patient,
b) Avoiding multiple punctures in the same space to prevent formation of a subcutaneous false track,
c) If a resistance is encountered during catheter insertion it should be withdrawn. The catheter should never be inserted forcefully.
d) Catheterisation should be done with the patient awake and sufficient time should be made available before proceeding with surgery to check sensory analgesia.
e) Injection of local anaesthetic and assessment of level of sensory analgesia should be done preoperatively - presence of bilateral sensory blockade would confirm epidural placement. If the blockade is unilateral then interpleural placement could be a possibility.
f) Determination of depth of epidural space from the skin can be done using ultrasound guidance, especially in patients who are obese and those with spine deformities.
g) Use of electrical stimulation has been shown to be a reliable real time technique to confirm catheter placement.

CONCLUSION:
We conclude by stating that while performing a thoracic epidural anaesthesia, it is important to keep in mind such rare technique related complications. If unintentional pleural puncture after epidural catheterisation is detected in a patient during surgery, administration of local anaesthetic through the intrapleural catheter could be considered as a potential alternative to the epidural route to provide postoperative analgesia after thoracotomy or thoracoscopy procedures, under stringent monitoring conditions.

REFERENCES:

pleural puncture following thoracic epidural