

# Bacterial Colonization of Thoracic Epidural Catheters For Post - Operative Analgesia

Naine Bhadrara, Shruti Gupta , Ashufa

## Abstract

The use of local anesthetics and opioids in thoracic epidural catheter for post-operative pain management has become an increasingly popular and well established modality in thoracic and upper abdominal surgeries. A potential risk of epidural catheter is epidural space abscess. This study is designed to determine the incidence of bacterial colonization of thoracic epidural catheter inserted and to find out the co-relation between colonization of epidural catheter tip; local infection at site of insertion and epidural space infection. Thoracic epidural catheters were inserted aseptically in ASA grade I & II patients undergoing elective upper abdominal & thoracic surgeries. Epidural analgesia using local anesthetics or /and opioids was used for post operative analgesia for a period of 72 hours after which the catheter was removed and sent for microbiological culture. A total of 80 epidural catheters were inserted. Out of these 76 were sterile & 4 were colonized out of which 2 were acinetobacter & 2 were citrobacteria species. None of the patients had evidence of epidural space infection. The results of this study suggest that epidural catheter tip culture is not a reliable predictor of epidural space infection and routine culture of epidural catheters is not advisable provided strict asepsis is maintained at time of insertion.

## Key Words

Prostaglandin (PGEI), Intermittent Claudication, Peripheral Vascular Disease

## Introduction

Managing post-operative pain is important and not always easy. Many patients receiving appropriate conventional analgesics for nociceptive pain experience inadequate pain relief and some suffer from intolerable side effects. Good quality epidural analgesia in post-operative period may ease patient suffering, improve respiratory function, decrease the perioperative cardiac complications, improve well being of patient and facilitate early ambulation. However these benefits are not without risks. A potential risk of epidural catheter is infection. It can be local infection, epidural space infection (epidural abscess) and infection of central nervous system

(meningitis and arachnoiditis). Local infection appears in the form of local erythema, tenderness and purulent discharge, etc. Epidural space infection is suspected if patients have pain in the back, tenderness, root pain sensory or motor deficit, fever, etc. Thoracic epidural catheter have been reported to have a higher rate of infection when compared to catheter sited at other levels. It is likely that patients who have undergone major thoracic or upper abdominal surgeries remain confined to bed for longer periods of time and hence have a greater growth of skin commensal, which may be reflected in higher positive cultural rates (1).

From the Deptt. of Anesthesiology & Critical Care GMC Jammu.(J&K), India

Correspondence to : Dr. Naine Bhadrara - Lecturer Deptt. of Anesthesiology & Critical Care GMC Jammu. (J&K), India

Although the epidural catheter tip is frequently colonized, progression to epidural space infection rarely occurs (2). So epidural analgesia is considered to be relatively safe with regard to infectious complications (3-5)

The purpose of this study was to determine the incidence of bacterial colonization of thoracic epidural catheter inserted for post-operative analgesia in thoracic and upper abdominal surgeries & to find out the co-relation between colonization of epidural catheter tip, insertion and epidural space infection.

### **Material and Methods**

The proposed study was conducted in post-graduate department of Anesthesiology and Intensive care, Govt. Medical College, Jammu on 80 adult patients with ASA grade I & II undergoing thoracic and upper abdominal surgeries after obtaining approval from local ethics committee & informed with consent from patients. There was no history of local or systemic infection.

Epidural catheter was inserted pre-operatively under local anesthesia using aseptic technique in sitting position. The back from the lower border of scapula to sacrum was prepared with 10% povidone-iodine which was allowed to dry, then swabbed with spirit which was also allowed to dry & then the entire back was draped with sterile towels.

The epidural space T10 - T11 was identified & 18G Tuohy needle was inserted by loss of resistance technique with the level of Tuohy needle in cephalic direction, epidural catheter is inserted 3.5 ml into epidural space. After negative aspiration of blooded cerebrospinal fluid, 10 ml of either ropivacaine 0.2% or bupivacaine 0.25% plus fentanyl 5 µg/ml will be injected. Bacterial filters were used on all the catheters. After placement of the catheter, the insertion site was swabbed with Betadin & sealed with dressing. After preoxygenation with 100% oxygen general anesthesia was induced with thiopentone sodium 5 mg/ kv I/V. Succinylcholine 1.5 mg/kg was given after loss of eyelash reflex and tracheal intubation was done.

Anesthesia was maintained with 0.6 - 0.8% isoflurane, 60% N<sub>2</sub>O in O<sub>2</sub>. Vecuronium 0.08 mg / kg was used for producing muscle relaxation. At the end of surgery

neuromuscular blockade was reversed with neosigmine 0.05mg / kg & glyco 0.01 mg/kg. Before transfer to recovery room 10 ml of solution of either 0.2% ropivacaine with fentanyl 5 µg/ml or 0.2% bupivacaine with fentanyl 5 µg/ml was injected over 5 minutes via epidural catheter. The patients were shifted to ICU for institution of post-operative analgesia and monitoring. All the patients received peri-operative antibiotics viz ceftriaxone, gentamycin/amikacin, ciprofloxacin, metronidazole in various combination. Intermittent top-ups were given when VAS = 4 & their dose and effects were recorded. Post-operatively each patient was evaluated once a day for the state of dressing. The pain score, sedation score & temperature were recorded. Drug related side effects like itching, nausea & vomiting were recorded.

The dressing was not changed and it remained in place for the duration of analgesic therapy i.e. 72 hours in absence of signs of local infection, erythema, oedema, purulent discharge and tenderness. The patients were asked about symptoms that suggested the presence of an epidural space infections (back or nerve root pain, back tenderness, urinary retention and other motor and sensory deficit).

The epidural catheters were removed after 72 hours of insertion and catheter tip was sent for culture in the following manner i.e. dressing was removed, the skin around the insertion site was cleaned with spirit swab and allowed to dry before the catheter was removed. Sterile gloves were worn to withdraw the catheter with sterile forceps and the externalized portion was directed upward and away from surface to avoid contamination by skin flora. The distal 3 - 4 cm of catheter was aseptically cut with sterile scissors. The cut portion was transported in a sterile tube for culture within 2 hours into the culture medium in microbiology laboratory.

All the patients on discharge were informed of signs and symptoms of epidural space infection with instruction to contact hospital immediately should these occur.

### **Results**

A total no. of 80 patients were inserted epidural catheters of ASA I, II status undergoing elective thoracic and upper abdominal surgeries.

Out of 80 patients, 7 went decortications, 36 open

**Table.1. Showing Demographic Data**

<b>Age in years median</b>	42 years
<b>Range</b>	26-60 years
<b>Sex 9M/F)</b>	37 / 43
<b>Weight (Kg)</b>	
<b>Median</b>	64 kg
<b>Range</b>	45 - 78 Kg
<b>Height (Cms)</b>	
<b>Median</b>	162 Cms
<b>Range</b>	150 - 180 Cms

cholecystectomy, 11 labarotomy and procedure, 6 excision and closure of defect of supraumbilical incisional hernia, 4 herniorrhophy with excision of unbilical hernia, 2 each of whipples procedure, oesopagectomy, splenectomy and distal radical gastrectomy, 3 incision and drainage of liver abscess, 3 case each of gastro-jejunosotomy, and lobectomy left lower lobe lung. Epidural catheter tips from 80 wre sent for microbiological culture out of these, 76 were sterile, 4 were colonized and the overall incidence is 5%.

None of the patients has signs of local or systemic infection, epidural abscess or meningitis indicated by fever, erythema, induration, discharge, etc. so incidence is 0%

Out of all catheter tip culture report, 76 were sterile, two tips were positive for acinelobacter and two tips were positive for citrobacter.

**Discussion**

In our study, thoracic epidural catheter colonization occurred with an incidence of 5%. Our finding is in agreement with studies conducted by Uma Srivastava *et al* 2010 (6) and Darchy *et al* 1996 (7), who reported the incidence of epidural catheter tip colonization to be 4.2% & 5.3% respectively.

Incidence of epidural catheter colonization usually varies from 0% to 28% as reported by Baretto R S 1962, James F M, Nickel Jh *et al* 1989 (8-10). One possible explanation for these differing results might be the great variation with respect to the density of sebaceous glands in the different insertion sites that has been shown to impact the ability of local disinfectants to reduce the number of micro - organisms.

Astrid *et al* 2005 (11), reported the incidence of epidural catheter colonization inserted at thoracic level (T3/4 - T12/L1) to be 13.6%. Thoracic epidural catheters have a higher rate of infection when compared to catheters

**Table.2 Incidence of Epidural Catheter Colonization Tip**

<b>Total no. of patients</b>	80
<b>Positive culture incidence</b>	4 5%

**Table.3 Incidence of any Infection**

<b>No. of patients</b>	80
<b>No. of patients with infection</b>	0
<b>Incidence</b>	0%

sited at other levels as reported by Kindler Ch *et al* 1998 (1), also. It is likely that patients who have undergone major thoracic or upper abdominal surgeries remain confined to bed for longer periods of time and hence have a greater growth of skin commensals, which may be reflected in higher positive culture rates. In our set up good analgesia was provided and early mobilization of patients was encouraged and this may have been a factor in lower positive culture rates. The lower incidence may also be because of strict attention given to sterile barrier precautions at time of insertion. Bacterial filters were used in all the catheters. All patients were on antibiotics throughout the duration that the catheters were insitu, as it was the practice of the surgical department to start the patient on prophylactic antibiotics before skin incision.

No patients in the study had signs of local infection such as erythema, tenderness or discharge etc at the site of catheter. However none of the patients in our setup developed an epidural space infection including those with positive cultures so the incidence was 0%. The incidence of epidural space infection has been reported in various series as 0% to 0.06% Kane *et al* 1981(5), did not find a single case of epidural infection in review of 50,000 epidural anesthetics. Dehigren *et al* 1995 (12), also reported no case of epidural abscess among 13,000 epidural procedures. James *et al* 1997 (9), reported no case of epidural space infection with thoracic epidural catheter used in post-operative patients.

The commonest organisms found in intensive care unit patients receiving epidural analgesia were staphylococcus epidermidis in a study conducted by Darchy *et al* 1996

(7). Micro-organism infecting epidural catheters were staphylococcus aureus, staphylococcus epidermidis, pseudomonas aeruginosa, coagulase negative staphylococcus in studies done by Kindler *et al* 1996 (1) and Srivastava *et al* 2010 (6). However the findings of the cultures of acinetobacter and citrobacter in our study and pseudomonas and E-coli in study of Darchy *et al* 1996 (7) and Mishra *et al* 2006 (13), emphasize the possibility that more virulent micro-organisms could colonize easily leading to epidural space infection.

Despite colonization of catheter tip with micro-organisms we did not encounter any patient with clinical findings of epidural space infection or with local infection at site of insertion, suggesting routine culture of catheter tip is not advisable provided strict asepsis is maintained at the time of insertion and the patients are constantly monitored for early signs of epidural space infection.

### Conclusion

The results of this study suggest that epidural catheter tip culture is not a reliable predictor of epidural space infection and routine culture of epidural catheters is not advisable provided strict asepsis is maintained at time of insertion.

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