

Adherence to Practice Guidelines for Postoperative Epidural Analgesia

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ABSTRACT

Objective: To evaluate the adherence to practice guidelines for epidural insertion along with the medicines used for postoperative analgesia and the incidence of complications.

Study Design: Clinical audit.

Place and Duration of the Study: Doctors Hospital and Medical Centre, Lahore, Pakistan, from January 2021 to December 2023.

Methodology: Non-probability consecutive sampling technique was used to collect the data. After the approval to conduct this audit was obtained from the Ethical Committee of the hospital, data were collected from Surgical Epidural Registers of the anaesthesia department. All calculations were done manually and then put in Microsoft Word Document.

Results: A total of 308 surgical epidurals were inserted over the period of three years. Procedures constituted 125 (40.6%) orthopaedic procedures, 41 (13.31%) thoracic surgery procedures, 36 (11.7%) general surgery procedures, 25 (8.11%) hepatobiliary procedures, 14 (4.54%) urology procedures, and 12 (3.89%) gynaecological procedures. Level of insertion was as per the recommended guidelines in 200 (64.9%) patients out of 308. Bupivacaine was the most commonly used medicine, with 0.1% concentration generally preferred in the authors' setup. Among the adjuvants, fentanyl, dexmedetomidine, and tramadol were used. Overall complication rate was 40 (12.98%), with motor blockade being the most common, followed by nausea/vomiting, hypotension, dural tap, and blood tap.

Conclusion: This audit will help in rectifying the loopholes in the surgical epidural analgesia services provided by the authors' study centre, but also other epidural analgesia service providers to make changes in their practices for better outcomes in future.

Key Words: Epidural analgesia, Dural tap, Blood tap, Motor blockade, Bupivacaine.

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INTRODUCTION

Postoperative pain control following any surgical procedure is very crucial, and it is associated with increased patient satisfaction, better analgesia, improved pulmonary function,¹ early return of bowel function,^{2,3} reduced incidence of thromboembolic events,^{4,5} reduced hospital stay, early mobilisation,⁶ early recovery, less bleeding,⁷ and decreased financial strain, both on the patient and the health system.⁸ Parenteral opioids not only decrease colonic motility but also increase the chances of postoperative ileus.⁹ Multimodal analgesia is the fundamental component of enhanced recovery after surgery.^{10,11}

In epidural analgesia (EA) practice, a catheter is inserted into the epidural space at an appropriate level and a local anaesthetic is given *via* the catheter either in the bolus form or as a continuous infusion.¹²

Different concentrations, volumes, doses, and adjuvants are being used *via* epidural depending on the pain scale, and the patient's haemodynamic status, and the practice varies from one hospital setting to another.

The major complications associated with EA are dural tap, blood tap, motor or sensory blockade, nausea/vomiting, hypotension, and shivering.¹³ A study conducted by Scherer *et al.*¹⁴ showed no permanent neurological deficit in 4,185 patients, with a dural tap rate of 1 in 140 patients.

This study aimed to look at the performance of surgical EA other than labour epidurals, in terms of success and failure, and the factors involved in it. This study will help in improving the surgical EA practice, not only at the authors' institute but also around the globe.

METHODOLOGY

This retrospective cross-sectional study was done over three years period from January 2021 to December 2023, at the operation theatres (OTs), postoperative care units (PCU), and wards of Doctors Hospital and Medical Centre, Lahore, Pakistan. Data collection included demographics of patients, levels of insertion of epidural catheters, compliance with recommended levels of insertion as per guidelines,¹⁵ technique of insertion, medicines

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used, concentrations used, adjuvants used along with local anaesthetics, pain relief satisfaction of patients, and complications of surgical epidurals. Those patients were excluded from the study who expired or were shifted to the intensive care unit (ICU). The inclusion criteria included all the patients who were inserted epidural in the OTs and shifted to PCU. After the approval to conduct this audit was obtained from the Ethical Committee of the hospital, data were collected from the Surgical Epidural Registers of the anaesthesia department of all the patients over the previous three years. All the calculations were done manually and then put in Microsoft Word Document.

RESULTS

A total of 308 surgical epidurals were inserted over a period of three years. Procedures constituted 125 (40.6%) orthopaedic procedures, 41 (13.31%) thoracic surgery procedures, 36 (11.7%) general surgery procedures, 25 (8.11%) hepatobiliary procedures, 14 (4.54%) urology procedures, and 12 (3.89%) gynaecological procedures, as shown in Table I. The technique used for epidural insertion was loss of resistance to air and the midline approach was used for all the epidurals. Both 18G and 16G Tuohy's epidural needles were used as per the consultant's preference. The highest level of insertion was for thoracic surgeries which were at T2-3 level and the lowest one was at L4-5, while no record of the level of insertion was found for 17 (5.51%) patients. The levels of insertion are given in Table II. Two hundred (64.93%) patients were inserted epidurals correctly as per the recommended guidelines, while the level of insertion in 108 (35.08%) patients was not in accordance with the guidelines, as shown in Table III. In almost all of the cases, parenteral paracetamol and parenteral non-steroidal anti-inflammatory drugs (NSAIDs) were given from the start along with epidural infusion. Parenteral opioids were given only on the complaint of pain, along with a bolus dose from the epidural catheter. Different concentrations of bupivacaine and adjuvants were used depending on the preference of the consultant anaesthetist based on the size of the incision, haemodynamic status, and threshold of pain for specific patients.

Bupivacaine alone as an infusion *via* the epidural catheter was used in 151 (49.02%) patients, ropivacaine alone in 37 (12.01%) patients, bupivacaine with fentanyl in 35 (11.36%) patients, and bupivacaine with dexmedetomidine in 44 (14.28%) patients (Table IV).

The most common concentration used was 0.1% in 293 patients (95.12%), while the other concentrations used were 0.05% and 0.125%. Visual analogue scores (VAS) were not recorded for these different concentrations in this audit due to incomplete documentation of VAS scoring. Bolus doses were used as 0.15%, 0.2%, and 0.25% as incremental dose of 5 to 10 ml, keeping in view the haemodynamics of the patients. All of the 308 epidurals were inserted by consultants. Out of 308, 109 (35.38%) epidurals were kept for two days (the day of insertion was counted as day zero), and 1 (0.32%) catheter was kept for 12 days (Table V). Patient satisfaction for pain control was recorded as poor, satisfactory, or excellent response by the

patients at the time of epidural removal. Excellent pain relief response was recorded in 194 (62.98%) patients, satisfactory, in 94 (30.5%) patients, and poor in one patient (Table VI).

Table I: The types of surgeries over the period of study.

Types of surgeries	Number (percentage)
Orthopaedics procedures (total knee replacement/total hip replacement, etc)	125 (40.6%)
Thoracic surgery	41 (13.31%)
General surgery (laparotomy / abdominal perineal resection / oesophagectomy / hernia repair)	36 (11.7%)
Hepatobiliary surgeries (whipple procedure, liver resection / hepato-jejunostomy)	25 (8.11%)
Urology (nephrectomy)	14 (4.54%)
Gynaecology (total abdominal hysterectomy / adnexal mass removal)	12 (3.89%)
Vascular surgeries (lower limb revascularisation / aortic aneurysm repair)	6 (1.94%)
Plastic surgery (abdominoplasty / reconstruction surgeries)	6 (3.89%)
Above knee amputation	1 (0.32%)

Table II: The levels of epidural insertion used during the study period.

Levels of block given	Number (percentage)
T2-3	3 (0.97%)
T3-4	7 (2.27%)
T4-5	12 (3.89%)
T5-6	8 (2.59%)
T6-7	4 (1.29%)
T7-8	7 (2.27%)
T8-9	1 (0.32%)
T9-10	2 (0.64%)
T10-11	26 (8.44%)
T11-12	2 (0.64%)
T12-L1	29 (9.41%)
L1-L2	10 (3.24%)
L2-L3	69 (22.40%)
L3-L4	109 (35.38%)
L4-L5	12 (3.89%)
Not mentioned	17 (5.51%)

Table III: The appropriateness of the level of insertion as per recommended guidelines.¹⁵ (Level of insertions should be as follows: T6-8 for high abdominal incisions, T8-12 for low abdominal incisions, and L2-L3 for lower limb procedures).

Levels of insertion appropriate for surgery	Number (percentage)
As per guidelines	200 (64.93%)
Not inserted at the level recommended by standard guidelines	108 (35.06%)

Table IV: Different medicines and concentrations used for epidural analgesia.

	Number (percentage)
Medicine used for Infusions	
Bupivacaine alone	151 (49.02%)
Ropivacaine alone	37 (12.01%)
Bupivacaine with fentanyl	35 (11.36%)
Ropivacaine with fentanyl	12 (3.89%)
Bupivacaine with tramadol	29 (9.41%)
Bupivacaine with dexmedetomidine	44 (14.28%)
Concentration used for infusion	
0.05%	1 (0.32%)
0.1%	293 (95.12%)
0.125%	14 (4.54%)
0.2%	Nil
Performed by	
Consultants	308 (100%)
Residents	Nil

Table V: The number of days the epidural catheter remained *in situ*.

Catheter removed by (No. of days from epidural insertion)	Numbers (percentages)
1	78 (25.32 %)
2	109 (35.38%)
3	56 (18.18%)
4	49 (15.9%)
5	9 (2.92%)
6	2 (0.64%)
>1 week	1 (0.32%)
No record of removal	6 (1.94%)

*Day of insertion was counted as day zero.

Table VI: The patient satisfaction for pain control among all patients having epidurals inserted for postoperative analgesia.

Patient satisfaction	Numbers (percentage)
Poor	1 (0.32%)
Satisfactory	94 (30.5%)
Excellent	194 (62.98%)
No documentation	19 (6.16%)

Table VII: The percentages of different complications.

Complications	Numbers (percentage)
Dural tap	5 (1.62%)
Blood tap	2 (0.64%)
Motor block	19 (6.16%)
PDPH	Nil
Chronic pain/neuraxia	Nil
Nausea/vomiting	9 (2.92%)
Pruritus	Nil
Hypotension	2 (0.64%)
Sedation	Nil
High block	Nil
Failure	Nil
Catheter pulled out	3 (0.97%)

PDPH, Post-dural-puncture headache.

Among the complications (Table VII), the most common was motor blockade in 19 (6.16%), nausea/vomiting in 9 (2.92%), hypotension in 2 (0.65%), dural tap in 5 (1.62%), followed by accidental removal of catheter in 3 (0.97%), and blood tap in 2 (0.64%) cases.

DISCUSSION

EA is considered the gold standard analgesia for postoperative pain following abdominal and thoracic procedures.¹⁶ EA is superior to parenteral opioid analgesia.¹⁷ This audit was done to point out the areas demanding improvement and to make the practice of postoperative EA even better. As already stated above, postoperative pain relief attenuates the complication rate postoperatively.^{1,18}

The most common medicine concentration used *via* epidural was 0.1% bupivacaine (96.12%), followed by 0.125% bupivacaine (4.54%). In an audit done by Shafiq *et al.*,¹³ the most common concentration used was 0.125% bupivacaine (63.5% among 1708 patients), followed by 0.0625% bupivacaine with fentanyl (19.1%), and 0.1% bupivacaine (17.29%). In this clinical audit, the authors had used fentanyl as an adjuvant in 47 (15.3%) out of 308 patients, dexmedetomidine in 44 (14.28%), and tramadol in 29 (9.41%). Two hundred (64.93%) out of 308 epidurals were inserted in accordance with the recommended guidelines.¹⁵ This level of insertion needs to be corrected by

making stringent protocols for epidural insertions as per the surgery. In another audit done by Siddiqui *et al.*,¹⁹ 81% of epidurals were inserted as per recommended insertion levels.

In most patients, most epidural catheters were kept for two days in 109 (35.38%) patients, followed by one day in 78 (25%) patients, and three days in 56 (18%) patients. One epidural catheter was kept for 12 days following an exploratory laparotomy. This practice was a bit different from Shafiq *et al.*¹³ where 50% of catheters were kept for three days, 33% for two days, and 17% for one day. It was usually decided on the basis of pain relief and surgical procedures.

Patient satisfaction in this study was 93.5%. With further division, it was satisfactory in 30.5% and excellent pain relief in 62.98%. The results of this study correlate to a study done in Sweden, where patient satisfaction was 87.9%.²⁰ Thus, an epidural catheter is only a part of the multimodal pain treatment plan.

The overall complication rate in this study was 12.98% (40 out of 308). The most common complication was a temporary motor blockade in 19 (6.16%) patients, which was relieved by holding the local anaesthetic infusion. There was no permanent neurological deficit. Dural tap occurred in 5 (1.62%) patients, accidental removal of catheter in 3 (0.97%), and blood tap in 2 (0.64%) patients. Incidence of nausea / vomiting was noted in 9 (2.92%) patients in this clinical audit, and it was higher than a study done by Manassero *et al.* that showed an incidence of 1.8%. They used 0.2% ropivacaine with fentanyl 2 µg/ml.²¹ Out of 9 (2.92%) patients with nausea/vomiting complaints, four were general surgery patients, two were gynaecology patients, and one of the orthopaedic, vascular surgery, and thoracic surgery patients each. In these patients, five were given 0.1% bupivacaine, two were given 0.1% ropivacaine, and the remaining two were given 0.15% bupivacaine. In one patient who had a dural tap, the epidural catheter was kept intrathecal intentionally by the consultant, and an infusion at 0.05% was started to relieve pain for knee replacement. This patient had no other complications. This is in comparison to an audit done by Shafiq *et al.*,¹³ where the complication rate was 26.5%, where dural tap occurred in 1.2% patients, catheter pulled out in 3.75%, and motor blockade (including both unilateral and bilateral) in 13.2% patients. In another study, the dural tap percentage was about 1.7%.²² The incidence of hypotension as per literature is 6.6%²³ and 4.8%,²¹ but in this audit, it was 0.65%. Motor block was 3% as per Scott *et al.*²³ It was not documented whether it was unilateral or bilateral motor block. Epidural catheter was kept at 3-5 cm above the needle point at which epidural space came. A test dose of lidocaine 2% with adrenaline was given after epidural insertion and also aspiration was done from the catheter before every dose to prevent intravascular injection of local anaesthetic.

The limitation of this audit is its retrospective nature, so there is missed data in the epidural registers that included no record of catheter removal in 6 (1.94%) patients, and no record of patient satisfaction in 19 (6.16%) patients. The compliance of documen-

tation in epidural registers is also noted to be average, that needs stringent protocols to show compliance. Recommendations are made to document VAS in registers on eight-hourly basis for future studies and practice improvement. This audit will help in improving the authors practice regarding surgical EA services.

CONCLUSION

This audit will help in rectifying the loopholes in the surgical EA services provided and will be helpful in making amendments to improve the epidural services not only at the authors hospital level but also globally. Stringent protocols are needed to make people follow these recommended guidelines for epidural insertion and the dose used in it. It also highlights the need for proper documentation and follow-up of surgical epidural patients.

ETHICAL APPROVAL:

Ethical approval was obtained from the Ethical Committee of the Doctors Hospital and Medical Centre, Lahore, Pakistan.

PATIENTS' CONSENT:

Not applicable due to the retrospective nature of the study.

COMPETING INTEREST:

The authors declared no conflict of interest.

AUTHORS' CONTRIBUTION:

SUR: Conception of the study, introduction writing, data analysis, and drafting of the work for important intellectual content.

MM: Data collection and data analysis.

AS: Data analysis and drafting of the work for important intellectual content.

AR: Discussion, writing, and proofreading.

ER: Data analysis.

All authors approved the final version of the manuscript to be published.

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