

COMPLICATIONS AND INTERVENTIONS ASSOCIATED WITH EPIDURAL ANALGESIA FOR POSTOPERATIVE PAIN RELIEF IN A TERTIARY CARE HOSPITAL

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Introduction

Epidural analgesia is one of the commonly used methods of postoperative pain control despite its associated complications. Early recognition and intervention is required to minimize the effect of these complications. Present audit was conducted to find out the incidence of complications and type of interventions required to change the outcome.

Methodology

The record of all the patients who had epidural catheter placed for postoperative pain management reviewed from the departmental acute pain management register. Parameters included level of insertion, drugs used, number of days infusion continued and complications like nausea, vomiting, motor block, sedation, dural tap, catheter pull out, hypotension and itching. In addition, the intervention done to manage these complications was also recorded.

Results

Total 1706 entries of epidurals were recorded in study period 2001 to 2007. The overall incidence of the complication was 26.6%. The common complications were motor block (13.4%), dural tap (1.2%), ineffective pain control (2.4%), accidental catheter pull outs (3.8%) and problems associated with the delivery system of drug (1.7%).

The 12% of patients required intervention for the particular complications. The regime was discontinued in 28%, drug concentration changed in 21.5% while the other modes of pain management were used in 19% of patients. 0.9% of patients required epidural blood patch while 2% of patients required catheterization for urinary retention.

Conclusion

This audit shows the importance of regular assessment and early intervention to manage epidural related complications in improving outcome.

Key words: Pain management, epidural, complication.

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Introduction

Acute pain may be defined as pain that is present in patients because of preexisting diseases, the surgical procedure or the combination of disease or surgery related sources¹. Acute pain in the postoperative period may be the worst experience in a life of patient, as most of them perceive it as one of the most ominous aspect of surgery. Inadequate postoperative pain relief is associated with increase in morbidity and mortality after surgery². At our institution, we are using different modalities for acute pain management in the postoperative surgical patients. The epidural analgesia is the frequently used modality amongst them.

Epidural analgesia is used for continuous administration of local anesthetic (LA) agent alone or in combination with narcotic agents in the epidural space. It has got the potential to reduce or eliminate the perioperative stress responses to the surgery. It also decreases the incidence of post operative surgical complications³ leading to the better outcome⁴. Pain management with the epidural analgesia is not free from side effects. The therapy can be made effective and safe by giving particular attention to the clinical assessment of the patient in terms of pain control and complications. Importance should be given to the educational and organizational aspects related to the delivery of pain relief modality. Regular audits and review of problematic areas are helpful in the identification and reduction of complications associated with the technique.

The objective of the audit was to identify the complications associated with epidural analgesia in the postoperative period and interventions required for the associated complications by acute pain management service (APMS).

Material and Methods

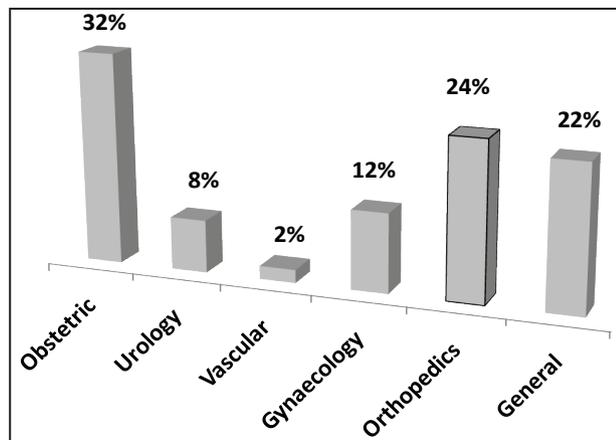
The data of patients having epidural analgesia was reviewed retrospectively. It included all patients enrolled in the acute pain service from 2001 to 2006, requiring epidural catheter placement for postoperative pain management. Thoracic, labor and caudal epidurals were excluded. Similarly pediatric patients and data which was incomplete or missing was also excluded.

The record of all the patients who had epidural catheter for postoperative pain management was reviewed from the departmental APMS register by the primary investigator. The dedicated APMS organized the rounds, patients' evaluation and other organizational aspects of the acute pain service in our hospital. The departmental APMS register is helpful in organizing patient's record keeping in terms of medical record number, location and comorbid. The parameters which we recorded in the register also includes surgical procedure, level of catheter insertion, concentration of LA used. In our setup pharmacy prepared 100 ml piggy bags of three different concentrations of bupivacaine that is, M1-0.1%, M2-0.125%, M3-0.0625% with 2µg/ml of fentanyl respectively. Complications like nausea, vomiting, sedation, and unilateral/bilateral motor blocks which are common, have dedicated columns for their entries. Other complications which are rare or unusual as ineffective pain control, accidental catheter pull outs, hypotension, itching etc. are recorded in the miscellaneous column if they occurred. The assessment of pain, nausea, vomiting and sedation is based on the fixed proctols designed by the acute pain management service. Numerical pain rating scale of 0-3 is used to evaluate these parameters with 0 being no occurrence while the score of 3 indicates severity of the mentioned problem. Similarly numerical score of 0-3 is used for the evaluation of unilateral motor block (UMB) or bilateral motor block (BMB). The score of 0 indicates no motor block, while score of 3 is the motor block impairing the movement of limbs. Nurses record the patient's status in dedicated monitoring forms. The APMS is 24hrs on call service, available to manage any particular complication associated with the pain relief modalities. Interventions and necessary action taken for the particular complications are also mentioned in the register. The team manages the particular complications on predesigned protocols as decreasing the concentration or rate of LA for BMB or pulling out of epidural catheter to a certain extent in the presence of UMB. Patient tilting to a lateral position that is the block side up is also followed for the UMB. Other complications are usually managed according to the cause and at the discretion of physician judgment.

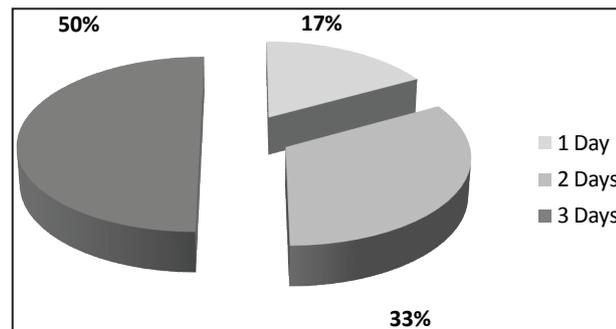
Results

Total 1706 entries of epidurals were recorded. The lumbar intervertebral space was selected in 88% patients while the thoracic level was used in 11% of patients. Epidural was inserted for the perioperative pain management in different surgical procedures as shown in figure 1. The obstetric patients were the largest among group that receive epidural that is 32%. The different concentrations of LA were used as mentioned in table 1. Over all 63.54% of patients received M 2 regime in the infusion form. In 50% of patients the epidural was continued for 3 days, in 33% of patients it was continued for 2 days while in 17% the epidural was discontinued after 1 day, see figure 2. The regime was discontinued prematurely for different reasons in 3.8% of patients. The overall incidence of the complications as shown in table 2, in our audit was 26.5%. Common complications were UMB and BMB. Dural tap was occurred in 1.2% of patients while 0.17% of patients complained of moderate to severe post dural puncture head ache

*Fig. 1
Different Surgical Procedures*



*Fig. 2
Number for days for which epidural used*



*Table 1
Concentration of LA used*

Epidural Drug	Percent%	No. of Pts (n)
M1	17.29	295
M2	63.54	1084
M3	19.1	327

*Table 2
Complications of epidural Analgesia*

Complications	Percentage %	Number (n) 453
Unilateral motor Block (RT)	5.33	91
Unilateral motor Block (LT)	4.74	81
Bilateral motor Block	3.04	52
Dural Tap	1.23	21
Pull out	3.75	64
Filter Dislodgement	0.82	14
Hypotension	1.34	23
Nausea and Vomiting	0.29	5
Itching	0.35	6
Ineffective	2.4	41
Severe pain	0.4	7
Urinary retention	0.4	7
Head ache	0.17	3
System faults	1.69	29
Others	0.52	9

*Table 3
Interventions done by APMS team*

Intervention	Percentage %	Number (n)
Total	12.77	218
Discontinued	28.4	62
Change of regime	19.2	42
Change in concentration	21.55	47
Pull out of catheter	6.42	14
Rate decrease	3.21	7
Holding of infusion	5.0	11
Positioning	5.96	13
Epidural Bolus	6.42	14
Blood patch	0.9	2
Catheterization	1.83	4
Others	0.9	2

(PDPH). In 2.4% of patients epidural analgesia was ineffective. Systems fault leading to ineffective drug delivery were present in 1.7% of patients. The epidural catheter pull outs and filter dislodgement were the common causes of premature discontinuation of epidural infusions.

Overall 12.1% of patients in the audit required intervention by the APMS team for the particular complications. Interventions done are shown in table 3 UMB and BMB were the common reasons for intervention. 21.5% of patients required change of LA regime to a lower concentration for this reason while 6.4% of patient required epidural catheter pulls out for unilateral motor blockade. 5.9% of patients require change of positioning for UMB. 19.2% of patients require change of regime due to ineffective pain relief.

Discussion

The epidural analgesia is the commonly used modality for the perioperative pain management and it has shown proven benefit particularly in dynamic pain control. The effective use of epidural analgesia in the postoperative period requires careful assessment of the patient physiological status, pain control and associated complications. It is also very important to monitor the functioning status of epidural drug delivery system and the location of catheter tip in the epidural space. The audit helped in the identification of common technical problems and complications in local population.

Unilateral or bilateral motor block, hypotension, nausea, vomiting and itching were the frequent complications found. The problems associated with the epidural drug delivery system like catheter dislodgment and the filter disconnection were also identified.

Use of LA agents in epidural space cause differential nerve blockage depending upon the concentration of LA agent and the fibers blocked. The more dilute the agent the chance of getting motor blockade will be low. The target is to achieve pain control in terms of minimal motor blockade. The motor block interfering with the lower limbs movement may be associated with higher incidence of pressure sores and deep vein thrombosis and if remain persist, despite of appropriate intervention may be the indicator of epidural hematoma or abscess. The overall incidence of BMB in our study was 3.0%. The incidence reported

by Scott DA et al in their prospective study was 3.0%⁵, with the combination of fentanyl and bupivacaine infusion. The incidence of UMB was higher in our patients as compared to bilateral (4.74-5.33 vs. 3.0%). The cause of which may be the increased length of catheter in epidural space. The usual practice in our hospital is to have a length of 3-5 cm of catheter in epidural space.

The neuronal blockade at the level of T1-T4 involving cardiac sympathetic chain may be associated with the occurrence of hypotension and bradycardia. The concentration of LA agent and height of block which is planned to be achieved are additional factors associated with this hemodynamic instability. The reported incidence in literature is 0.7-3%⁶. In our patients the incidence was comparable that is 0.7%. The 63.5% of patients in our audit received bupivacaine 0.125%, which may be reason of lower incidence of hypotension and bradycardia in this audit.

Epidural administered opioids achieve analgesia via pre and post synaptic effects in dorsal horn of spinal cord. They also interfere with the nociceptive input but do not cause neuronal blockade. The use of opioids in epidural infusion is responsible for effects like respiratory depression, sedation, nausea, vomiting and itching. The reported incidence of respiratory depression is 0.24%⁷ depending upon the type of narcotic used. The incidence reduces with the use of more lipophilic agents like fentanyl. In our audit we didn't find any report of respiratory depression due to the epidural infusion. We routinely monitor the sedation level and respiratory rate of the patients having epidural analgesia in progress. The narcotic we use in combination of LA is fentanyl 2µg/ml which may be the reason of undetectable incidence of respiratory depression in our patients.

The nausea and vomiting associated with the opioids is the major cause of patient dissatisfaction. The opioid present in the epidural infusion stimulates the chemoreceptor trigger zone which in turn causes nausea and vomiting. The incidence was 0.24% in our patients which may be due to the low dose of fentanyl used. Itching is mu receptor mediated adverse effect of epidurally administered opioids. It involves usually the face and upper chest. The incidence in our postoperative patients was 0.35%.

The rare but most feared complications of epidural analgesia are epidural abscess, meningitis and epidural hematoma. No such cases were detected in this audit. The reported incidence in literature is 1-1000 to 1-50000⁸. In a retrospective audit of 8100 epidural during six year period Christiet al⁹ identified six cases of epidural abscess, three of meningitis and three of epidural hematoma. Symptoms of epidural abscess or meningitis developed a median of 5 days after epidural catheter removal. Methicillin resistant Staphylococcus aureus was the predominant pathogen. In our hospital we usually discontinued epidural at the third postoperative day. Detection of motor power of leg is crucial in the presence of epidural analgesia¹⁰ which may be the sign of impending neurological deficit.

The other area of concern was the premature catheter pull outs and filter disconnections due to negligence in catheter management. Alternate analgesia in the form of PCIA or intravenous narcotics was provided to these patients. The APMS service is actively involved in the teaching of paramedics and nursing staff to prevent such complications. But the compliance during different period varied. 2.4% of patients had ineffective pain relief for which regime was changed. The cause of which may be multi factorial including technical errors the findings of

which was not our objective.

Different interventions were done for particular complications specially those for which APMS service was called. Over all 12.77% of patients required interventions. The motor block was the most common complication in our study for which the step wise approach has been followed as mentioned in the methodology like change of positioning or pulling out of epidural catheter to a certain length. For severe PDPH not responding to the conventional therapy only 0.9% of patients required epidural blood patch.

The limitation of this study was the retrospective review, so the chance of getting missed data and incomplete information may be the source of error as the compliance of maintaining the pain management register is also noted to be varied at different times, but again the common problems were highlighted.

Conclusion

This audit helped us in identification of problems associated with epidural analgesia technique and emphasizes the effectiveness of early interventions done by APMS team. It also shows the importance of regular monitoring, multidisciplinary approach and early intervention to reduce disastrous complication and improve patient satisfaction.

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