Conversion of Labour Epidural Analgesia to Anaesthesia for Emergency Caesarean Section: A Retrospective Audit

Abstract

Aim: to determine the rates of failed conversion of EA to surgical anaesthesia for patient and clinician information and benchmarking, and to develop an algorithmic approach for safe conversion of EA. **Materials and Methods:** A retrospective audit of parturients who had labour epidural analgesia (EA) at an advanced tertiary care institute for women and newborn health in south India. Information on EA, caesarean sections, conversion of EA, failure of regional anaesthesia, use of general anaesthesia, alternate techniques and supplemental medications were retrieved from electronic medical records. **Results:** Emergency cesarean section (CS) was performed for 4,259 (26.93%, 95% CI: 26.25, 27.63) of 15, 812 parturients that had EA at the study institute between Jan 2012 and December 2016. The EA was successful in 4,078 (95.75%, 95% CI: 95.11, 96.32) of these 4,259 women. Seventy three (1.71%, 95% CI: 1.37, 2.15) of the 4,259 women reported mild discomfort on the VAS for pain and required supplemental sedation for the emergency CS and 108 (2.53%, 95% CI: 2.11, 3.05) of the 4,259 women needed alternate techniques. The failure rate of EA was thus 4.25% (95% CI: 3.68, 4.89, n = 181) in this audit. **Conclusions:** The failure rates of EA at the study institute are well within the recommended standards of the RCA (Royal College of Anaesthesiologists – UK). This audit helped us to develop an algorithmic approach to further improve performance based on problems identified during the audit.

Keywords: *Caesarean section, epidural analgesia, failed epidural, labour, pregnancy*

Sunil Thakorbhai Pandya[1,2,3], Jyotsna Mikkilineni[4], Manokanth Madapu[4]

[1]Department of Anaesthesia, Pain Medicine and Critical Care, Fernandez Hospital, Hyderabad, [2]Department of Anaesthesia, Pain Medicine and Surgical and Obstetric Critical Care, Century Hospital, Hyderabad, [3]Founder Director, Prerna Anaesthesia and Critical Care Services, [4]Hyderabad, Fernandez Hospital, Unit II, Hyderabad, Telangana, India

Improved safety and the ability to provide relief from pain or minimize pain during labour and childbirth has led to an increasing use of Epidural Analgesia (EA) in Obstetric Units.[1-3] Previous studies have reported a differential preference for EA among pregnant women with rates of EA use higher among older women, nulliparous women and women with a higher body mass index (BMI), a large for birth weight baby, with oligohydramnios, premature rupture of membranes (PROM) and induction of labour.[4-8] Previous studies have also reported an association of EA with higher instrumental rates of vaginal delivery and an increased duration of second stage of labour, which has now been mitigated with low dose mixtures.[9-12] Previous studies have reported a potential association with caesarean section (CS) in both directions but recent meta-analysis suggested no additional risk and even a protective effect, especially in high risk pregnant women in labour.[4-12]

An additional benefit from EA is the potential to provide surgical anaesthesia if the pregnant women needs an emergency CS. Best Practice guidelines for anaesthesia for CS report that rates of General Anaesthesia (GA) for parturients receiving EA should be <3%.[13] Regional anaesthesia is considered to have failed if existing EA catheter is not used to provide surgical anaesthesia or if GA has to be administered.[14-18] The primary objective of this retrospective audit was to determine the rates of failed conversion of EA to surgical anaesthesia for patient and clinician information and benchmarking. Additional objectives were to determine processes that may help improve conversion rates and to develop an algorithmic approach for safe conversion of EA.

Materials and Methods

The study was done at an advanced tertiary care institute for maternal and new born health in Hyderabad, in south India. The study protocol, which adhered to the tenets of the Declaration of Helsinki, used a retrospective audit design and did not require Institutional Ethics Committee approval as per the study institution norms. Individual informed

How to cite this article: Pandya ST, Mikkilineni J, Madapu M. Conversion of labour epidural analgesia to anaesthesia for emergency caesarean section: A retrospective audit. J Obstet Anaesth Crit Care 2021;11:5-8.

Received : 21-Aug-2020
Revised : 30-Aug-2020
Accepted : 01-Sep-2020
Published : 16-Apr-2021

Address for correspondence:
Dr. Sunil Thakorbhai Pandya, Department of Anaesthesia, Pain and Critical Care, Fernandez Hospital, Department of Anaesthesia, Pain Medicine and Surgical and Obstetric Critical Care, Century Hospital, Prerna Anaesthesia and Critical Care Services, Hyderabad, Telangana, India.
E-mail: suniltp05@gmail.com

Access this article online

Website: www.joacc.com

DOI: 10.4103/joacc.JOACC_91_20

Quick Response Code:

consent was not sought due to the retrospective nature of the audit that did not collect individual identifiers. At the study institute, each parturient is counselled on the potential benefits and risks of EA at registration. The data of each parturient registered and examined at the study institute is recorded in an electronic database. The data of parturients who consented to an EA during the period January 2012 to December 2016 was retrieved from this electronic database using a predetermined form. Parturients who did not consent to an EA were excluded from the study. The study did not exclude parturients based on gestational age at delivery, multiple pregnancy, fetal abnormalities including positional abnormalities, or other medical comorbidities during pregnancy as the primary focus was on the conversion rates of EA to surgical anaesthesia.

Data including details on adequacy of block with modified Bromage scores, sensory levels at D_5, use of supplemental analgesics and sedatives, vertebral level of epidural insertion, volume and concentration of local anaesthetic used for EA bolus and maintenance, and pain score assessments using a Visual Analogue Scale, the conversion of EA to spinal, Combined Spinal Epidural Anaesthesia (CSEA) or general endotracheal anaesthesia (GETA), and category of Caesarean Section Urgency[19] was collected from the electronic database.

At the study institute, a team of dedicated obstetric anaesthetists (OA) provide all anaesthesia services relating to childbirth. EA is performed using a standardized protocol that does take into account individual considerations as appropriate. An intravenous infusion of Ringers Lactate is started and the parturient is placed in the lateral position. The lower lumbar epidural space is identified using tactile loss of resistance technique with 18 G Tuohy's needle and an epidural catheter is inserted into the epidural space. Analgesia is provided using low dose mixtures of bupivacaine with fentanyl (0.0625% to 0.125% bupivacaine with 2 micrograms/cc of fentanyl volumes of 15-20 ml are injected in a graded manner) and monitoring of the vital parameters of mother before and every five minutes after every top-up for 30 minutes. An additional bolus of 8 -20 ml may be administered as a top up, if the VAS is >3/10 after checking the functionality of the block. The EA is continued during the second stage of labour. Decisions regarding the mode and timing of child birth were made by the attending obstetricians. Decisions on conversion of EA and supplementation and alternate techniques were made by the attending OA. Categories 1 to 3 of the CS urgency indicated maternal or fetal distress.[19] Category 1 included immediate threat to the life of the woman or fetus; Category 2 included no immediate threat to life of woman or fetus, and Category 3 included woman requires early delivery.[19] Category 4 included no maternal or fetal compromise and CS done at a time to suit the woman and maternity services.[19]

A formal testing for statistical significance was not attempted as the study was designed as an audit. Proportions of outcome measures that included number of subjects needing an emergency CS, proportion of successful conversions, and proportion of conversions that required supplemental sedation or alternate methods were estimated. The different alternate techniques and their rates were determined. The different problems during conversion of EA were analysed and documented. An EA conversion was considered as failed if there was a conversion to general anaesthesia, or to alternate methods of anaesthesia or pain during surgery or failure to achieve a defined degree of nerve block adequate for CS.

Results

A total of 15,812 parturients had EA at the study institute between Jan 2012 and December 2016. Emergency CS was performed for 4,259 (26.93%, 95% CI: 26.25, 27.63) of these 15,812 women. The EA was considered to be successful in 4,078 (95.75%, 95% CI: 95.11, 96.32) of these 4,259 women. Seventy three (1.71%, 95% CI: 1.37, 2.15) of the 4,259 women reported mild discomfort on the VAS for pain and required supplemental sedation for the emergency CS and 108 (2.53%, 95% CI: 2.11, 3.05) of the 4,259 women needed alternate techniques. The overall failure rate of EA was thus 4.25% (95% CI: 3.68, 4.89, n = 181) in this audit. Details of the failed EA is presented in Table 1. The comparison of rates at our institute, as determined by the audit, with the standards set by the Royal College of Anaesthetists is presented in Table 2.

Discussion

This audit reports on the anaesthetic practice at an advanced tertiary care women and newborn care institute and compared

Table 1: Details of alternate techniques after failed Epidural Analgesia in the study

Condition	*n*, %	Solution
Catheter Falling Out	63, 58.10%	Gave Spinal Anaesthesia, Changed the fixing pattern of epidural catheter, supporting the back of the parturient while CTG monitoring/and transfer
Inadequate epidural block	22, 17.56%	Gave Spinal Anaesthesia
Inadequate epidural block	3, 4.05%	Gave Combine Spinal Epidural Anaesthesia
Inadequate epidural block	11, 9.45%	Gave GETA
Inadequate epidural block	2, 2.7%	Gave Spinal Anesthesia, Gave General Endotracheal anaesthesia after failed spinal, Training and Education
STAT LSCS (working epidural)	6, 8.10%	Gave General Endotracheal anaesthesia, Early activation of surgical EA, sodium bicarbonate + Fentanyl + 2% Xylocaine with Adrenaline
High Spinal requiring airway support	1, 0.45%	Titrated Low Dose Spinal/Combined spinal epidural anaesthesia

then with the standards recommended by The Royal College of Anaesthetists (RCA).[13] The RCA recommends >95% regional anaesthesia (RA) for elective CS and >85% RA for emergency CS.[13] The RCA also recommends <3% conversion rate form RA to GA in emergency CS.[13] At the study institute, 99% of elective CS and 97% of emergency CS were performed under RA. The conversion rate from RA to GA was 0.18%. The overall failure rate of EA was 4.25% (95% CI: 3.68, 4.89). The audit was primarily meant to develop benchmarks to assess performance, to develop teaching points including potential algorithms to help improve processes and to have data that can provide information to patients. Additionally, the results of the audit are used to provide a framework to standardize processes related to anaesthesia for childbirth at the study institute.

Several studies have reported on associations of EA with increased operative vaginal delivery, possible increased CS rates associated with EA and factors associated with failed

Table 2: Comparing outcome rates at the study institute with the Royal College of Anaesthetists Standards

	Study Institute Rates	Royal College of Anaesthetists standard
Regional Anaesthesia for elective CS	99%	>95%
Regional Anaesthesia for Emergency CS	97%	>85%
Conversion from Regional to General Anaesthesia for emergency	0.18%	<3%

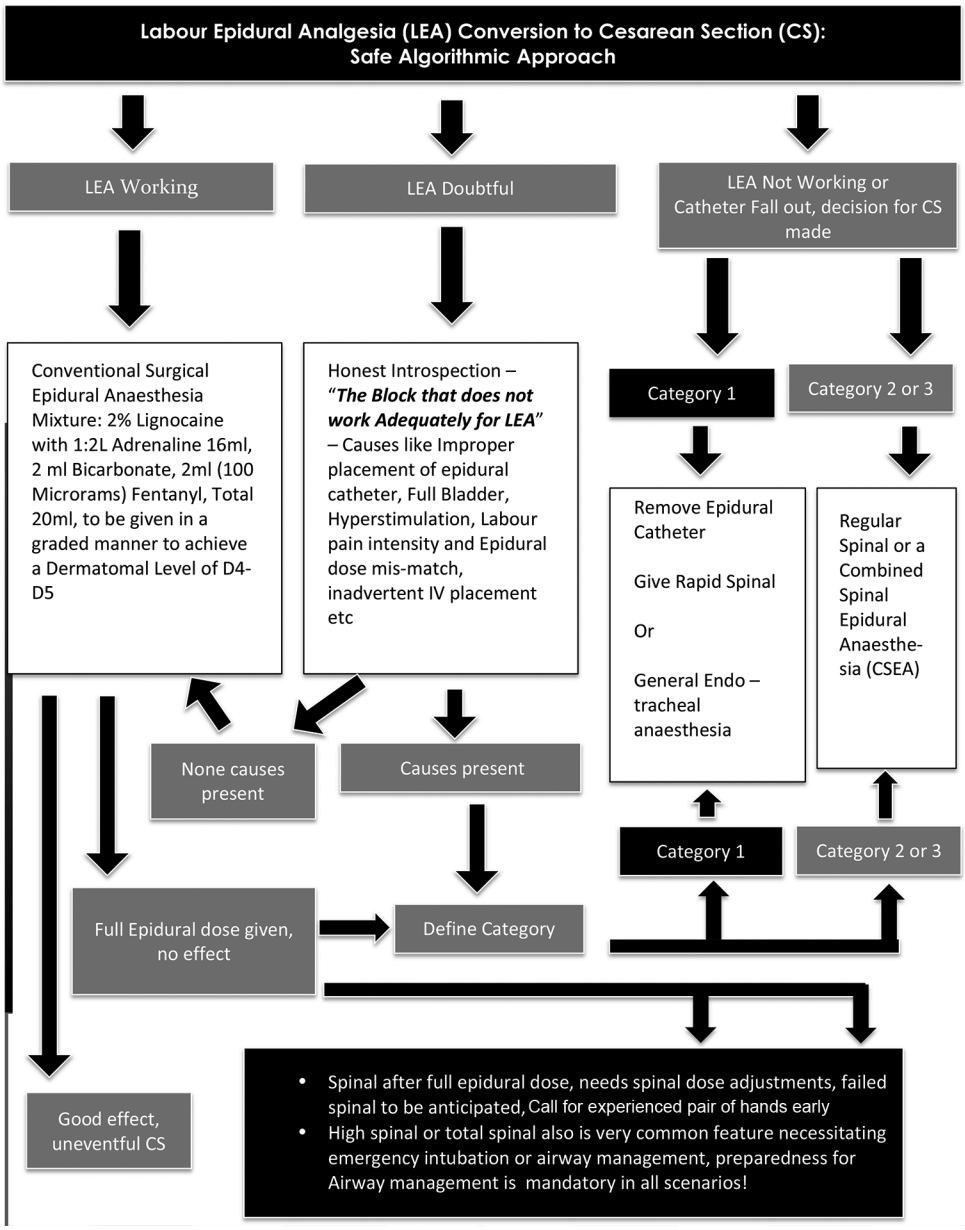

Figure 1: LEA to CS, Algorithm

conversion of EA for CS anaesthesia.[3-12] These studies have reported on the impact of variations in practices and processes on the success of conversion of EA. We did not focus on potential associations as part of the scope of this audit. The audit identified incomplete categorization of CS based on CS urgency categories as a limitation to improved upon. Caesarean sections were documented as elective and emergency caesarean sections with indications for CS documented. The OA unit at the study institute have decided to implement the CS urgency categorization as a result of this audit.

The study institute has a dedicated obstetric anaesthesia (OA) team and non-obstetric anaesthesiologists are not involved with care during pregnancy and childbirth. Several studies have found a high failed conversion rate when non-obstetric anaesthesiologists are involved.[17,20] The difference in conversion rates may be attributed to the increased awareness of the dedicated OA regarding the quality of EA, the ability to identify and replace or manipulate the position of dysfunctional catheters at an early stage before CS, and to provide or use alternate techniques.[17,20] Previous studies have reported on the consequences of poor recognition of incomplete EA and failed conversion.[17,20] The OA is also more aware of the childbirth process and may allow more time for appropriate sensory block to develop. The familiarity with the obstetric process and obstetric colleagues will also allow a consultation and consensus on the urgency of delivery.[21] It is possible that these factors have impacted on the rates found in this audit.

The OA unit at the study institute already employs a clinical audit dashboard that allows all members of the unit to see performance indicators in almost real time from a centrally accessible location. The audit resulted in the additional development of an algorithm to minimize failures and to provide safe alternate techniques for successful conversion [Figure 1]. The algorithmic approach, besides providing a teaching and training opportunity, can help reduce failures in conversion of EA. When coupled with the clinical audit dashboard, it allows foe early identification of problems and the ability to identify solutions, including additional training, earlier.

To summarize, the audit at this advanced tertiary care institute in south India found rates of EA conversion consistent with the recommended standards of the RCA. The audit helped identify areas to address to further improve the conversion rates leading to the development of an algorithm.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Hawkins JL. Epidural analgesia for labor and delivery. N Engl J Med 2010;362:1503-10.
2. Jones L, Othman M, Dowswell T, Alfirevic Z, Gates S, Newburn M, *et al*. Pain Management for women in labour: An overview of systematic reviews. Cochrane Database Syst Rev 2012;3:CD009234.
3. Wong CA, Scavone BM, Peaceman AM, McCarthy RJ, Sullivan JT, Diaz NT, *et al*. The risk of caesarean delivery with neuraxial analgesia given early versus late in labor. N Engl J Med 2005;352:655-65.
4. Halpern SH, Abdallah FW. Effect of labor analgesia on labor outcome. Curr Opin Anaesthesiol 2010;23:317-22.
5. Anim-Somuah M, Smyth RM, Jones L. Epidural versus non epidural or no analgesia in labour. Cochrane Database Syst Rev 2011 Dec 7;(12):CD000331. doi: 10.1002/14651858.CD000331.pub3.
6. O'Hana LP, Levy A, Rozen A, Greemberg L, Shapira Y, Sheiner E. The effect of epidural analgesia on labor progress and outcome in nulliparous women. J Matern Fetal Neonatal Med 2008;21:517-21.
7. Worstel T, Ahsan AD, Cahill AG, Caughey AB. Length of the second stage of labor: What is the effect of an epidural? Obstet Gynecol 2014;123(Suppl 1):84S.
8. Hasegawa J, Farina A, Turchi G, Hasegawa Y, Zanello M, Baroncini S. Effects of epidural analgesia on labor length, instrumental delivery and neonatal short term outcome. J Anesth 2013;27:43-7.
9. Liu EH, Sia AT. Rates of caesarean section and instrumental vaginal delivery in nulliparous women after low concentration epidural infusions or opiod analgesia: Systematic review. BMJ 2004;328:1410.
10. Decca L, Daldoss C, Fratelli N, Lojacono A, Slompo M, Stegher C, *et al*. Labor Course and delivery in epidural analgesia: A case control study. J Matern Fetal Neonatal Med 2004;16:115-8.
11. Indraccolo U, Ripanelli A, Di lorio R, Indraccolo SR. Effect of epidural analgesia on labor times and mode of delivery: A prospective study. Clin Exp Obstet Gynecol 2012;39:310-3.
12. Eriksen LM, Nohr EA, Kjaergaard H. Mode of delivery after epidural analgesia in a cohort of low risk nulliparas. Birth 2011;38:317-26.
13. Colvin JR. Raising the Standard. A compendium of Audit Recipes for Continuous Quality Improvement in Anaesthesia. 2nd ed. London: The Royal College of Anesthetists; 2006.
14. Habib AS, Dale M, Emerson C, Allsager C, Victoria A, Bourne TM. Reduction in pain during caesarean section following the addition of neuraxial opiods: A closed loop audit. Int J Obstet Anesth 2002;11:1-38.
15. Shibli KU, Russell IF. A survey of anesthetic techniques used for caesarean section in the UK in 1997. Int J Obstet Anesth 2000;9:160-7.
16. Jenkins JG, Khan MM. Anaesthesia for caesarean sections: A survey in a UK region from 1992 to 2002. Anaesthesia 2003;58:1114-8.
17. Riley ET, Papasin J. Epidural catheter function during labor predicts anesthetic efficacy for subsequent caesarean delivery. Int J Obstet Anesth 2002;11:81-4.
18. Garry M, Davies S. Failure of regional blockade for caesarean section. Int J Obstet Anesth 2002;11:9-12.
19. Lucas DN, Yentis SM, Kinsella SM, Holdcroft A, May AE, Wee M, *et al*. Urgency of caesarean section: A new classification. J R Soc Med 2000;93:346-50.
20. Campbell DC, Tran T. Conversion of epidural analgesia during labour analgesia to epidural analgesia for intrapartum caesarean delivery. Can J Anesth 2009;56:19-26.
21. Bauer ME, Kountanis JA, Tsen LC, Greenfield ML, Mhyre JM. Risk factors for failed conversion of labour epidural analgesia to caesarean delivery anesthesia: A systematic review and meta analysis of observational trials. Int J Obstet Anesth 2012;21:249-309.