

Success rate of epidural labor analgesia service at a tertiary care hospital in Nepal : An observational study

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ABSTRACT



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BACKGROUND

Pain experienced during childbirth is one of the most intense forms of pain that many women encounter during their lifetime. Epidural Labor Analgesia (ELA) is widely embraced as an effective technique for pain management during childbirth. The Department of Anesthesiology at Nepal Medicit has been providing ELA service since November 2017. We conducted this study for ELA services in our institute from 1st January to 31st December 2022 to find out the success rate of the present ELA service at Nepal Medicit.

METHOD

This observational study was conducted at Nepal Medicit by reviewing data for Epidural Labor Analgesia from 1st January to 31st December 2022.

RESULT

In the year 2022, total deliveries at Nepal Medicit were 886 of which normal deliveries were 193 (21.78%), and delivery via Cesarean Section was 693(78.22%). A total of 105 (54.40%) epidurals were inserted in the labor suit, of which 94 parturients had a normal delivery and 11 had Cesarean Section.

CONCLUSION

In our study, we found the success rate of normal delivery with ELA at Nepal Medicit was 97.9%. The acceptance rate of ELA was 41.2%.

KEYWORDS

Acceptance Rate; Epidural Labor Analgesia ; Normal Delivery; Cesarean section; Success Rate; Nepal.

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INTRODUCTION

Pain experienced during childbirth is one of the most intense forms of pain that many women encounter during their lifetime. Epidural Labor Analgesia (ELA) is widely embraced as an effective technique for pain management during childbirth. Looking back to history, labor analgesia began in 1847 with James Young Simpson, when he administered ether to a woman with a deformed pelvis during childbirth.¹ In 1853, John Snow administered chloroform to Britain's Queen Victoria during the birth of her eighth child.² In 1943, Hingson and Edwards were the first to report continuous caudal labor analgesia.³ In the 1950s, neuraxial techniques were introduced for pain relief in labor. Labor analgesia has had a long journey from days of ether till the present day with advances in technology and medications. There are various methods to relieve pain during labor:

1. Nonpharmacological methods: Transcutaneous electrical nerve stimulation (TENS), continuous support in labor, touch and massage, water bath, intradermal sterile water injections, acupuncture, and hypnosis
2. Parenteral narcotics: pethidine, tramadol, butorphanol, fentanyl, remifentanyl.
3. Inhalational methods: Entonox
4. Neuraxial Analgesia: Continuous spinal epidural analgesia, Epidural analgesia, Continuous spinal analgesia.

Neuraxial analgesia in the form of epidural analgesia with a low concentration of local anesthetic and lipid-soluble opioid is considered to be the most effective analgesic strategy for the laboring mother causing little maternal and fetal sedation. The Department of Anesthesiology at Nepal Medicity has been providing ELA service since November 2017. Since the Standard Operating Procedure (SOP) for labor analgesia was not defined in the initial period, the success rate of ELA in our institution was variable. We undertook the development of a SOP for our ELA service in January 2019. Then, we conducted an interrupted time series analysis for our ELA service as a quality improvement initiative in Nepal Medicity in December 2019. The study was conducted to quantify the impact of formulated SOP. The result of the study showed a 24.77% relative increase in success rate with a p-value <0.001.⁴ We conducted this study for ELA service in our institute from 1st January to 31st December 2022 to find out the success rate of the present ELA service at Nepal Medicity.

METHODS

This study was conducted at Nepal Medicity by reviewing data for Epidural Labor Analgesia from 1st January to 31st December 2022. As per Standard Operating Procedure, all expecting mothers were counseled regarding labor analgesia after 28 weeks of gestation allowing them time for psychological preparation. The counseling addressed advantage, side effects and any queries from parturients regarding epidural analgesia and numerical rating scale. The call for labor analgesia was made by treating Obstetrician once the cervical dilatation is 1-4 cm and the parturient is willing for ELA. An anesthesiologist would attend the call for labor epidural within 30 min. Anesthesiologist would review the parturient and obtain the informed written consent for the ELA. After Standard ASA monitoring, under all aseptic precautions, a 20 G soft tip epidural catheter is secured at L2-L3 or L3-L4 intervertebral space. A test dose of 3 ml of 2% lignocaine with adrenaline (1:200000) was administered via the epidural catheter after negative aspiration for cerebral spinal fluid and blood to exclude intrathecal or intravascular placement. After the test dose, 15 ml of loading dose of 0.1 % bupivacaine with 2.6 microgram per ml of fentanyl is administered via an epidural catheter. Maintenance dose of 10 ml of 0.12% bupivacaine with 0.5 microgram per ml fentanyl was given as per protocol.

Assigned nurse in the labor room would complete the Regional Analgesia Record form till the delivery of the baby and keep it in the parturient's file. A register is maintained at the labor suit for the record of every parturient's details. A pain linked nurse is assigned to collect the Regional Analgesia Record form everyday during pain rounds to keep the record in the Anesthesia Department.

Data relevant in this study are defined as follows. Elective normal deliveries would include the parturients prepared for vaginal delivery with or without ELA. Normal deliveries would include parturients who had normal delivery with or without ELA. Elective Cesarean Section (CS) would include parturients who were prepared for elective CS. Emergency Cesarean Section would include parturients who had indications for CS while presenting in hospital. Parturients having CS after an attempt for normal delivery would be included in the total number of Cesarean Section. Total number of parturients delivering via a CS would include elective CS, emergency CS and CS after an attempt for normal delivery.

The success rate of ELA was measured as the percentage of parturients who accepted ELA and subsequently had a normal delivery maintaining numerical rating score (NRS) of 3 or less. The successful ELA included all the parturient who accepted ELA, had onset of pain relief within 45 minutes from the procedure's commencement. The incidents of inadequate pain control (NRS of 4 or more), unintended dural puncture, use of pethidine as rescue analgesia, the need for reinsertion of the

epidural, and premature removal of epidural catheter due to any causes were recorded as anesthetic causes of the failure. For the purpose of calculating the success rate of ELA, cases where a conversion to cesarean section (CS) was performed solely due to obstetrics indications would be excluded from the analysis.

The acceptance rate of ELA was calculated as the percentage of parturients who, during their counseling at 28 weeks of gestation, prepared for normal delivery accepted ELA as part of their childbirth care.

The primary objective of this study was to find out the success rate of the current ELA service at Nepal Medicit, while the secondary objective was to evaluate the acceptance rate of ELA among parturients who opted for vaginal delivery. The desired threshold for success was set at a minimum of 90% as per previous study. In the event that the calculated rate fell below 90%, a thorough analysis of the reasons for the failure and proposed solutions to address the identified issues should be submitted to the department of anesthesia.

STATISTICAL ANALYSIS

For this study, we collected, reviewed and analyzed monthly data and recorded it into Microsoft Excel.(Microsoft Corp., Redmond, WA, USA). All categorical data was presented as absolute numbers and their percentages.

RESULT

In the year 2022, total deliveries at Nepal Medicit were 886 of which normal deliveries were 193 (21.78%), delivery via Cesarean Section were 693(78.22%). A total of 105 (54.40%) epidurals were inserted in the labor suit, of which 94 parturients had normal delivery and 11 had Cesarean Section. 2 out of 11 parturients who had CS, demanded surgery due to inadequate pain control (NRS >4). Of the 105 parturients, 61(58%) were primigravida and 44 (42%) were of greater parity. There were no recorded major adverse outcomes among parturients.

The result of this study is summarized in Table1. and Figure 1.

Table 1. Summary of the result

Total number of deliveries	886
Total number of parturients who underwent CS	693
Total number of normal deliveries	193
Total number of parturient who opted for elective CS	371
Total number of parturient who undergone emergency CS on presentation	260
Total number of parturient planned for Elective normal delivery	255
Total number of parturient of who refused for ELA for Elective normal delivery	150
Total number of who accepted ELA for Elective normal delivery	105
Total number of parturient who refused ELA and had normal delivery	99
Total number of parturient who accepted ELA and had normal delivery	94
Total number of parturient who refused ELA for normal delivery and converted to CS	51
Total number of parturient who accepted ELA for normal delivery and converted to CS	11
Parturient who accepted ELA for normal delivery and converted to CS due to obstetric indications.	9
Parturient who accepted ELA for normal delivery and converted to CS due to failure of ELA	2
Acceptance rate	41.2%
Success rate	97.9%
Incidence of vacuum assisted delivery in parturients with ELA for normal delivery	6 (6.4%)
Incidence of vacuum assisted delivery in parturients without ELA for normal delivery	1(1%)

Acceptance rate is calculated from the total number of parturients who accepted ELA for normal delivery from the total number of parturients who were prepared for normal delivery and counseled at 28 wks of gestation. Success rate is calculated from the total number of parturients who had accepted ELA and had normal delivery. Parturients who had accepted ELA and had CS due to obstetric indications are excluded from the analysis.

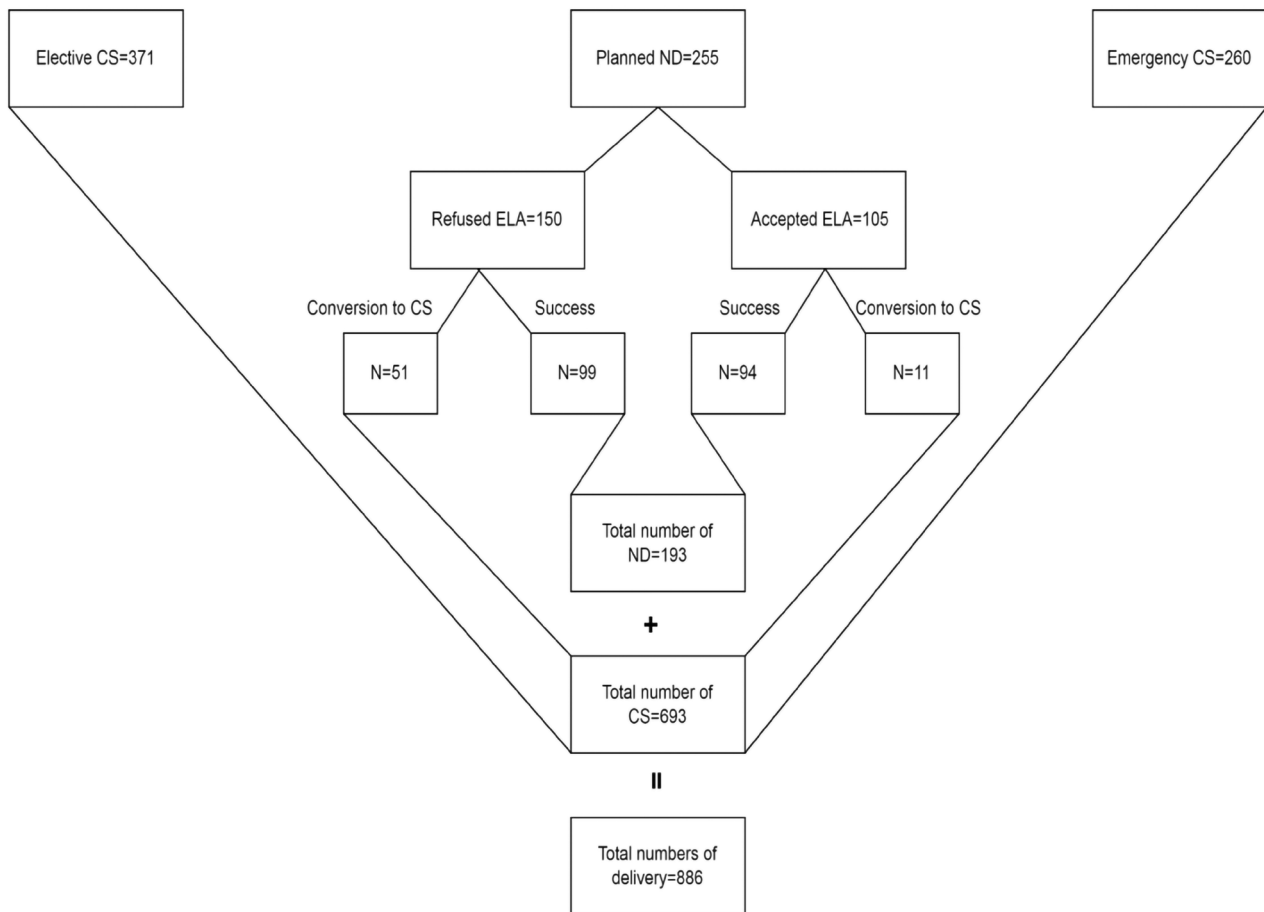


Figure 1. Flowchart showing the mode of delivery

DISCUSSION

In our study we found the success rate of normal delivery with ELA was 97.9% out of 105 parturients who accepted ELA and the acceptance rate for ELA was 41.2% out of 255 parturients who were planned for ND. The incidence of Assisted Vaginal Delivery (AVD) in parturients with ELA was 6.4% whereas the incidence of AVD in parturients without ELA was 1%.

In our study we found that the failure rate was 2.1%. Thangamuthu A et al showed an epidural failure rate of 23%, which is very high in comparison to our study.⁵ In their study they included the case performed by trainees whereas in our institute epidural for labor analgesia were inserted by trained anesthesiologists. Similarly, Agaram R et al calculated failure rate as inadequate pain relief of parturient as 9.6%.⁶ They suggested cervical dilatation more than 7 cm during epidural insertion, parturients having a history of opioid tolerance, parturients having history of previous failed epidural and insertion of the epidural by a trainee anesthesiologist as reasons of the failure. We had a success rate of 97.9%. There could be many reasons for the good success rate. We have developed standard operative protocol (SOP) for the ELA program since 2019. The primary objective of the SOP was to

eliminate interpersonal variations, evaluate the effectiveness of the labor analgesia method, identify any issues, and make necessary amendments. To achieve this, we established a labor analgesia team consisting of obstetricians, anesthesiologists, labor nurses, and pain link nurses. This collaborative effort had fostered the development of the ELA program.

To ensure parturients were well-prepared to enroll in the ELA program, we implemented counseling for parturients after the 28th week of gestation. This counseling aimed to provide psychological preparation and educate parturients about what they can expect from the labor analgesia process. The SOP included a continuous review of drug dosing and troubleshooting procedures to minimize interpersonal variation among the anesthesiologists. This process ensured consistency in the administration of medications and troubleshooting techniques, thereby improving the overall quality of care. Furthermore, the nurse-led team maintained regular follow-up with parturients, allowing them to identify and address any additional problems that may arise. Overall, the SOP focused on standardizing procedures, promoting teamwork, counseling parturients, maintaining consistent drug dosing and troubleshooting approaches, and facilitating continuous parturient follow-up. These measures might have

contributed to a more streamlined and effective success rate labor analgesia service at our center.

Approximately 23.4% of UK parturients received epidural analgesia.^{7,8} A USA survey indicated that 61% of parturients in large maternity hospitals received neuraxial analgesia during labor.⁹ Ninety per cent of women received labor neuraxial analgesia at Prentice Women's hospital in Chicago.¹ In many countries today, the availability of regional analgesia for labor is considered a reflection of standard obstetric care. The National Health Services Maternity Statistics of 2005–2006 in the UK reported that one-third of the parturients chose epidural analgesia.⁸ According to the 2001 survey, the epidural acceptance is up to 60% in the major maternity centers of the US.⁹ In Our study we calculated the acceptance rate for the ELA program was 41.2%. Despite high success rates we had a low acceptance rate for the program. In our country, there is still a significant lack of awareness regarding pain-relieving options for women in labor. While a few centers have implemented comprehensive labor analgesia programs, the most of the centers lacked infrastructure, facility and resources. Additionally Cultural and traditional beliefs surrounding childbirth can also influence the availability and acceptance of labor epidurals. In some communities, there may be a preference for natural childbirth or a belief that experiencing labor pain is a normal part of the birthing process. These cultural factors may discourage the routine use of epidurals. The cost of providing labor epidurals, including anesthesia drugs, equipment, and healthcare personnel involved, may be a significant factor. Affordability could limit the availability of epidurals in certain healthcare settings, particularly for low-income individuals. Misconceptions such as the belief that ELA could cause delivery delays and have negative consequences for both the baby and the mother continue to exist in our society. These could be several reasons why labor epidurals are not readily offered in Nepal; the overall national awareness and acceptance of these options is virtually non-existent.

In our study, incidence of AVD in parturients with ELA is found to be 6.4% and in parturients without ELA is found to be 1%. Mebratu A. et al found an overall pooled prevalence of assisted vaginal delivery of 7.98% in Sub Saharan Africa.¹⁰ Our result on AVD seems to be comparable with study by Mebratu A. et al. Advancement in ELA has shown no higher risk of assisted vaginal delivery compared to non epidural (as reported in meta-analysis).¹¹

It is essential to improve education and awareness initiatives nationwide to ensure that all parturients have the opportunity to make informed decisions about pain relief during labor. By promoting comprehensive labor analgesia programs and disseminating information about the benefits and safety of pain-relieving options, we can enhance the overall quality of care for women during childbirth in our country.

To our best knowledge there were no major adverse events. Our medical recordings lack the process to capture complications and problems like motor blockade tingling sensation, numbness, nausea, vomiting etc.

We found a place to improve our recording protocols. We recommended our department to have the monthly success rate be determined by assessing parturient satisfaction through Patient Reported Outcome Measures (PROM) and parturient satisfaction index. It is deemed necessary to record the percentage of assisted vaginal delivery and outcomes of the baby .

The low number of participants could have limited the generalizability of the findings. The discrepancy in the incidence of AVD is significantly affected by the low number of data. The documentation of certain problems experienced by parturients during labor analgesia, such as tingling sensation, pins and needles, motor blockade, nausea and vomiting, was not well-recorded. The long-term monitoring would have allowed for the identification of parturients satisfaction or any delayed complications.

CONCLUSIONS

In our study we found the success rate of normal delivery with ELA at Nepal Medciti was 97.9%. The rate was satisfactory. The acceptance rate of ELA was 41.2%. This was lower than international standards. There were no major complications during that period. This is an area for further research and quality improvement in practice of ELA at Nepal Medciti

ABBREBRATION

AVD - Assisted Vaginal Delivery

CS - Cesarean Section

ELA -Epidural Labor Analgesia

ND - Normal Delivery

NRS Numerical rating score

SOP - Standard Operating Protocol

USA - United States of America

REFERENCES:

1. Wong CA. Advances in labor analgesia. *Int J Womens Health* 2009 May;10(1):139–54. [Taylor & Francis Online], [Google Scholar]
2. Snow J. On administration of chloroform in during parturition. *Assoc Med J.* 1853;1:500–2. [PMC free article] [PubMed] [Google Scholar]
3. Hingson RA, Edwards WB. Continuous caudal analgesia: An analysis of the first ten thousand confinements thus managed with the report of the authors' first thousand cases. *JAMA.* 1943;123:538–546. [Google Scholar]
4. SB Pant, PR Bhattarai, A Sharma, U Basnet, R Khadka, K Pradhan. Impact of standard operating procedures guided epidural labour analgesia programme: an interrupted time series analysis. <https://epostersonline.com/oaa2020/node/218>
5. Thangamuthu A, Russell IF, Purva M. Epidural failure rate using a standardised definition. *Int J Obstet Anesth.* 2013 Nov;22(4):310-5. doi: 10.1016/j.ijoa.2013.04.013 . Epub 2013 Aug 6. PMID: 23932551.
6. Agaram R, Douglas MJ, McTaggart RA, Gunka V. Inadequate pain relief with labor epidurals: a multivariate analysis of associated factors. *Int J Obstet Anesth.* 2009 Jan;18(1):10-4. doi:1016/j.ijoa.2007.10.008. Epub 2008 Nov 28. PMID: 19046867.
7. Cook TM, Counsell D, Wildsmith JAW. Major complications of central neuraxial block: report on the Third National Audit Project of the Royal College of Anaesthetists. *Br J Anaesth.* 2009;102:179–90. [Crossref], [PubMed], [Web of Science @], [Google Scholar]
8. Richardson A, Mmata C. National health service maternity statistics 2005–06. National Statistics 2007. [Google Scholar]
9. Bucklin BA, Hawkins JL, Anderson JR, et al. Obstetric anesthesia workforce survey, twenty year update. *Anesthesiology* 2005;103(3):645–53. [Crossref], [PubMed], [Web of Science @], [Google Scholar]
10. Mebratu, A., Ahmed, A., Zemeskel, A.G. et al. Prevalence, indications and fetal outcomes of operative vaginal delivery in Sub-Saharan Africa, systematic review, and meta-analysis. *BMC Women's Health* 23, 95 (2023). <https://doi.org/10.1186/s12905-023-02224-3>
11. Callahan EC, Lee W, Aleshi P, George RB. Modern labor epidural analgesia: implications for labor outcomes and maternal-fetal health. *Am J Obstet Gynecol.* 2023 May;228(5S):S1260-S1269. doi: 10.1016/j.ajog.2022.06.017. Epub 2023 Mar 20. PMID: 37164496.