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A Study of the Mode of Delivery in Parturient Mothers Receiving Epidural Labour Analgesia or Systemic Labour Analgesia in a Tertiary Care Centre - A Case Control Study

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Abstract:
Background: *Studies prove that epidural analgesia is superior to other modes of labour analgesia. However the rising concerns of side effects has overshadowed its merits.*
Objectives: *Study A: To compare the cases of assisted vaginal delivery and matched controls of spontaneous vaginal delivery and to study its association with mode of analgesia. Study B: To compare the cases of caesarean section delivery and matched controls of Spontaneous vaginal delivery and to study its association with mode of analgesia.*
Methodology: *A case-control study on 122 parturients was conducted. Two study groups were considered: cases were assisted vaginal deliveries in group A and caesarean section in group B while controls were spontaneous vaginal deliveries in both groups. The exposure factor is epidural analgesia and the unexposed received systemic opioid. The associations of other parameters such as maternal age, BMI, height, gestational age, intra-partum complications with mode of delivery were also evaluated.*
Results: *Significant association was found between short stature, epidural analgesia and assisted vaginal deliveries. No association was found with caesarean section.*
Conclusion: *Compared to systemic analgesia, the risk of having assisted vaginal delivery with epidural analgesia is nearly 4 times than spontaneous vaginal delivery with epidural analgesia*
Keywords: *assisted vaginal delivery, caesarean section, epidural analgesia, systemic opioids*

I. Introduction

It is a universally accepted fact that labour induces considerable pain and is regarded as one of the most painful experiences in a woman's life. As quoted by Moir, "the delivery of an infant into the arms of a pain free and conscious mother is perhaps the most exciting and rewarding moments in medical science".[1]The philosophy of labour analgesia noted by ASA and ACOG (1992) is 'Labor causes severe pain for many women. There is no other circumstance where it is considered acceptable for a person to experience severe pain, amenable to safe intervention while under a physician's care'.[2] Maternal request for pain relief is a sufficient justification for administering analgesic techniques. While providing high quality pain relief, it is important to ensure the safety of the mother and foetus. The age old practice of pain relief in labour is by using Systemic Opioid Analgesia (SOA). However, the rising concerns of inadequate analgesia, maternal and neonatal side effects has led to the quest for a better quality of analgesia like Epidural labour analgesia (ELA) which is now regarded as the gold standard for pain relief during labour.[3]The effects of ELA on the progress of labour and mode of delivery has generated considerable controversy. The motor block caused by the local anaesthetic used for ELA may affect the rotation of the presenting part and the maternal expulsive forces resulting in increased incidence of operative deliveries.[4]Low concentration of local anaesthetic with lipophilic opioids is assumed to provide good analgesia while causing less motor block leading to better progression of labour with less operative deliveries.[5] In COMET study, a large randomized trial involving 1,054 patients the introduction of a low dose of epidural infusion was associated with a 25% decrease in the instrumental vaginal delivery.[6]The search for the ideal concentration of local anaesthetic and opioid which provides optimum pain relief with minimum risk for Caesarean section (CSD) and Assisted Vaginal Delivery (AVD) but ensures both maternal and foetal well-being is still continuing.

From an Indian context there is only limited evidence on the association between epidural analgesia and mode of delivery. Hence this study was planned to get more information about epidural analgesia and its effect on labour among Indian women.

II. Materials And Methods

1.1. Type of study: This is a case control study which was approved by the institutional review board and received the ethics committee approval from the institutional ethics committee.

1.2. Study population: All primi-parturients admitted in the labour room of the hospital who have fulfilled the inclusion criteria.

1.3. Inclusion criteria:

Cases

All primi-parturients of age 20 to 35 years, ASA (American society of Anaesthesiology) physical status of grade 1 (normal) having singleton foetus with cephalic presentation and of gestational age 36 weeks who underwent operative deliveries (AVD or CSD).

Controls

All primi-parturients of age 20 to 35 years, ASA (American society of Anaesthesiology) physical status of grade 1 (normal) having singleton foetus with cephalic presentation and of gestational age 36 weeks or more who underwent spontaneous vaginal deliveries (SVD).

1.4. Exclusion criteria:

- All who had elective caesarean
- All those who did not confine to one mode of analgesia
- Incomplete data

1.5. Groups compared
Case A: All assisted vaginal deliveries
Case B: All Caesarean deliveries
Control: All spontaneous vaginal deliveries
Exposed: Epidural analgesia
Unexposed: Systemic opioid analgesia

1.6. Labour Suite Protocol: All parturient mothers receive either ELA or SOA according to the patient's choice. The protocol for ELA is 0.0625% Bupivacaine with 1ug/ml Fentanyl. The protocol for systemic analgesia is Tramadol 2mg/kg and Phenergan- 0.5mg/kg IM 6 hourly.

1.7. Sample size:The sample size was calculated by nMaster Sample Size Calculation computer software version 2.0 produced by the Department of Biostatistics, Christian Medical College Vellore 632011, Tamil Nadu.[7]

- Sample size A: Based on a pilot study with matched controls, alpha error of 5% and power of study 90%, the number of cases (assisted vaginal) required was found to be 36 and the number of controls (spontaneous vaginal) to be 36.
- Sample size B: Based on a pilot study with matched controls, alpha error of 5% and power of study 90%, the number of cases (caesarean section) required was found to be 25 and the number of controls (spontaneous vaginal) to be 25.

1.8. Data collection procedure:

The required data was accessed from the patient's records available in the labour suite of the hospital and entered in the case study form.

III. Confidentiality

Strict confidentiality is ensured by keeping the records anonymous with study numbers and the information gathered will only be used for scientific publication.

IV. Ethical Issues

The proposal of the study was presented in front of the Institutional Review Board and the approval for the study was obtained from the Institutional Ethics Committee on 15.01.2014 with waiver of informed consent as retrospective data is to be used and the student investigator will not come in contact with the patient.

V. Analysis Of Data

The data collected in the case study form is entered into a Microsoft Excel spreadsheet. All data were collated with the help of tables, pie charts, bar diagrams and was analysed using statistical program for social sciences (SPSS) for windows operating system, to look for any association between type of analgesia and mode of delivery.

VI. Results

Table 1 illustrates the percentage analysis of the parameters considered under the study.

6.1 Study-A: Assisted vaginal delivery versus spontaneous vaginal delivery Among the parturients who underwent assisted vaginal delivery it was found that 58.33% were given epidural and 41.67% were given systemic analgesia as modality of pain relief,47.22% belonged to 20-25 years and 52.78% belonged to 26-35 years, 5.56% belonged to 36-37 weeks of gestation, 69.44% belonged to 38-39 weeks of gestation and 25% belonged to more than 39 weeks of gestation, 2.78% had BMI <18.5, 36.11% had BMI of 18.5-24.99, 47.22% had BMI of 25-29.99, 13.89% had BMI of >=30.None had any intra partum complications

Among the parturients who underwent spontaneous vaginal delivery it was found that 36.11% were given epidural and 63.89% were given systemic analgesia as modality of pain relief, 52.78% belonged to 20-25 years and 47.22% belonged to 26-35 years, 11.11% belonged to 36-37 weeks of gestation, 63.89% belonged to 38-39 weeks of gestation and 25% belonged to more than 39 weeks of gestation, 2.78% had BMI <18.5, 33.33% had BMI of 18.5-24.99, 50% had BMI of 25-29.99, 13.89% had BMI of >=30. None had any intra partum complications.

Univariate analysis of maternal age, gestational age, BMI didn't show any significance in parturients who underwent assisted vaginal delivery (p=0.814, p=0.807, p=1). However, univariate analysis and multivariate logistic regression of epidural analgesia showed significance (p=0.098,p=0.014) in those who had assisted vaginal deliveries as shown in Table 1 and Table 4 respectively. As illustrated in Table 2, it was also noted that maternal height also influenced assisted vaginal delivery (p=0.022).

6.2. Study-B: Caesarean section delivery versus spontaneous vaginal delivery

Among the parturients who underwent caesarean section delivery it was found that 12% were given epidural and 88% were given systemic analgesia as modality of pain relief,56% belonged to 20-25 years and 44% belonged to 26-35 years, 8% belonged to 36-37 weeks of gestation, 64% belonged to 38-39 weeks of gestation and 28% belonged to more than 39 weeks of gestation, none had BMI <18.5, 28% had BMI of 18.5-24.99, 56% had BMI of 25-29.99, 16% had BMI of >=30.20% had moderate MSAF (meconium stained amniotic fluid),12% had protracted active phase, 32% had foetal distress,12% had failed induction and 8% had thick MSAF while 16% did not have any intra partum complication

Among the parturients who underwent spontaneous vaginal delivery it was found that 12% were given epidural and 88% were given systemic analgesia as modality of pain relief, 68% belonged to 20-25 years and 32% belonged to 26-35 years, 20% belonged to 36-37 weeks of gestation, 40% belonged to 38-39 weeks of gestation and 40% belonged to more than 39 weeks of gestation, 4% had BMI <18.5, 32% had BMI of 18.5-24.99, 36% had BMI of 25-29.99, 38% had BMI of >=30. None had any intra partum complications.

In univariate analysis of the parameters (analgesia, age, gestational age, BMI, height) considered in the study none showed any significance (p=1, p=0.509, p=0.206, p=0.399, p=0.111).

VII. Discussion

The primary aim of the study was to find out whether administration of epidural analgesia as a modality of pain relief in labour influenced the mode of delivery. In addition to this, the study also took into consideration the other possible risk factors that may influence the mode of labour such as maternal age, gestational age, height of the mother, BMI of the mother and intra partum complications.

7.1Analgesic technique and mode of labour

More than half of the parturients who underwent assisted vaginal delivery had opted for epidural analgesia while only a few (12%) parturients who underwent caesarean section had received epidural analgesia. A univariate analysis showed significant association between epidural analgesia and assisted vaginal delivery (p=0.098) and a multivariate logistic regression showed that compared to systemic analgesia, the risk of having an assisted vaginal delivery is nearly 4 times greater than spontaneous vaginal delivery with epidural analgesia(p=0.014)while no association was found between analgesic technique and caesarean section.

7.2. Maternal age and mode of labour:

A slightly higher proportion (52.78%) of the parturients who underwent assisted vaginal delivery belonged 26-35 years while a slightly higher proportion (52.78%) of the parturients who underwent caesarean

section delivery belonged 20-25 years. No significant association between maternal age and mode of labour was noted in either of the study groups.

7.3. Gestational age and mode of labour:

In those who had assisted vaginal delivery majority belonged to 38-39 weeks of gestation (69.44%), followed by 39-40 weeks and 36-37 weeks of gestation while in those who had caesarean section delivery majority belonged to 36-37 weeks of gestation (44%), and followed by 39-40 weeks and 38-39 weeks. No significant association between gestational age and mode of labour was noted in either of the study groups.

7.4. Maternal Body Mass Index and mode of labour:

In those who had assisted vaginal delivery majority had BMI of 25-29.99 (47.22%), followed by BMI of 18.5-24.99 and >=30. Only 2.8% had BMI <18.5. In those who had caesarean section delivery more than half had BMI of 25-29.99 (56%), followed by BMI of 18.5-24.99 and >=30 while none had BMI<18.5.No significant association between maternal BMI and mode of labour was noted in either of the study groups.

7.5. Intra partum complications and mode of labour:

None of the parturients who underwent assisted vaginal delivery had any kind of intra partum complications while 84% of parturients who underwent caesarean section had intra partum complication.

7.6. Maternal height and mode of labour:

In parturients who underwent assisted vaginal delivery, a univariate analysis of height showed significant association with mode of labour (p=0.022). Short stature individuals (<158cm) often tend to undergo assisted vaginal delivery while no such association noted among caesarean section deliveries. As illustrated in Table 3, no significant association between maternal height and caesarean section was noted.

VIII. Conclusion

The study highlights that there is a four times risk of having assisted vaginal delivery in those receiving epidural analgesia compared to those receiving systemic analgesia. It also points that short maternal stature also increases the risk of assisted vaginal deliveries.

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Table 1. Percentage analysis of different parameters in study A and study B

	Study - A		Study - B	
	AVD	SVD	CSD	SVD
Analgesia Analysis				
Epidural	58.33%	36.11%	12%	12%
Systemic	41.67%	63.89%	88%	88%
Age Analysis				
20 – 25 years	47.22%	52.78%	56%	68%
26 – 35 years	52.78%	47.22%	44%	32%
Gestational Age Analysis				
36 to 37 weeks	5.56%	11.11%	8%	20%
38 to 39 weeks	69.44%	63.89%	64%	40%
> 39 weeks	25.00%	25.00%	28%	40%
Maternal BMI Analysis				

< 18.50	2.78%	2.78%	-	4%
18.50 - 24.99	36.11%	33.33%	28%	32%
25 – 29.99	47.22%	50.00%	56%	36%
>= 30	13.89%	13.89%	16%	28%
Intra Partum Complication				
Moderate MSAF	-	-	20%	-
Protracted Active Phase	-	-	12%	-
Foetal Distress	-	-	32%	-
Failed Induction	-	-	12%	-
Thick MSAF	-	-	8%	-

Table 2. Univariate analysis of height- study A

	Mean	Std. Deviation	Std. Error Mean	Std. Error Difference	T value	95% confidence limit	
						Upper	Lower
SVD AVD	160.652	4.72957	.78826	1.09211	2.340	0.37740	4.73371
	158.102	4.53529	.75588				

Levenes test for equality of variances gives p value = 0.022

Table 3. Univariate analysis of height- study B

	Mean	Std. Deviation	Std. Error Mean	Std. Error Difference	T value	95% confidence limit	
						Upper	Lower
SVD CSD	158.36	5.850	1.170	1.747	1.625	-.673	6.353
	155.52	6.490	1.298				

Levenes test for equality of variances gives p value = 0.111

Table 4. Multivariate logistic regression of significant variables i.e. height of mother and type of analgesia

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Height of mother (cm)	-.164	.061	7.258	1	.007	.849	.753	.956
	Analgesia(1)	1.362	.553	6.074	1	.014	3.905	1.322	11.538
	Constant	25.528	9.628	7.031	1	.008	1.221E11		