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Emergency LSCS for moderate to severe mitral stenosis in pregnancy- A comparision between graded epidural vs general

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Abstract: ***Mitral stenosis is the most common heart disease associated with pregnancy in developing countries like India in spite of the decrease prevalence of rheumatic heart disease. majority of deaths occur during labour or in the peripartum period due to unique physiological change in pregnancy in a fixed cardiac output state. 50 parturients with moderate to severe mitral stenosis under-going caeserean section were devided into two groups of 25 each. one group received general anaesthesia and the other group received graded epidural. It was found that both the groups maintained the vitals quiet well. But the was a higher incidence of pulmonary oedema in general anaesthesia group (9out of 25) as compared to graded epidural group (3 out of 25) and hence the duration of ICU stay was prolonged in general anaesthesia group. The fetal outcome was also better in graded epidural group as compared to the general anaesthesia group (APGAR score was high in graded epidural group, P value≤0.001).***

Introduction

Rheumatic heart disease is a major heart problem associated with pregnancy in India, despite its declining trend. The incidence of rheumatic mitral stenosis in pregnancy is 100 to 200 per one lakh pregnant women. Rheumatic mitral stenosis forms 90% of the heart diseases complicating pregnancy in the tertiary referral centre in India. The unique physiological changes in pregnancy and the pathological impact of mitral stenosis over pregnancy and labour complicate the peripartum period. Maternal death mostly occur during labour and peri-partum period. The mortality and morbidity are considerably reduced by better perinatal care, where the anaesthesiologist plays a major role in the multidisciplinary approach. Though various anaesthetic methods like general anaesthesia, CSE technique, spinal anaesthesia, epidural anaesthesia have been tried, we have here tried to compare graded epidural vs general anaesthesia in moderate to severe mitral stenosis in pregnancy posted for emergency LSCS.

Materials and Methods

We conducted a prospective, randomized study in 50 patients of moderate to severe mitral stenosis in pregnancy posted for emergency LSCS. All the patients were randomly divided into two groups (epidural group and general anaesthesia group).Patients with established pulmonary edema, critical mitral stenosis, associated other heart disease and rhythm disturbances, other associated systemic diseases like diabetes or pregnancy induced hypertension, pregnancy with intrauterine death, INR ≥2.5 etc were excluded from the study.

The epidural group received a 20G epidural catheter in L2-L3 interspace. Through the catheter 10 ml of 0.25% Ropivacaine with 2µgm/ml of fentanyl. After 10 minutes the height of block was observed and 2ml of the above mixture was administered at 5minutes interval till T8 block was achived. Intra-operative hypotension was managed with 25µgm of phenylephrine. The general anaesthesia group received 2µgm/kg of fentanyl, followed by thiopentone 5mg/kg and vecuronium 0.1mg/kg for intubation. Xylocaine

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spray 10% was used prior to tracheal intubation with appropriate sized cuffed endo-tracheal tube. Anaesthesia was maintained with O2:N2O=50:50 with isoflurane 0.5% till baby delivery and then the dose of opioid and isoflurane was increased according to requirement. The heart rate, blood pressure, development of pulmonary oedema, post operative ventilator support, apgar score of baby, need for nicu care of the baby were recorded. In the operation theatre fluid was administered judiciously . After delivery of the fetus, oxytocin 20 IU in 500 ml of NS was run at the rate of 40-80 microdrops per minute.

Observation

table-1

	EPI	GA	P-VALUE
MV AREA	1.204±0.2226	1.156±0.2599	0.224
GA(WEEKS)	36.28±0.843	36.44±0.651	0.195
DYSPNOEA	0.44±0.507	0.48±0.510	0.249
NYHA CLASS	2.88±0.726	3.08±0.812	0.616
SKIN INCISION TIME	20.04±3,470	00±000	≤0.001

The table shows that the two groups are comparable except the skin incision time which is significantly prolonged in epidural group.

Table-2: PULSE RATE

TIME	EPI	GA	P- VALUE
PRE OP PR	82.320±11.767	81.440 ± 9.138	0.210
0	84.360±12.6718	83.280±8.294	0.062
5	84.960±12.538	99.040±12.508	0.881
10	85.960±13.264	97.520±8.392	0.034
15	87.640±11.506	96.640±15.598	0.418
20	89.320±12.009	96.440±15.663	0.689
25	90.640±15.513	96.800±16.255	0.943
30	92.440±16.005	98.920±17.757	0.334
45	92.680±15.627	101.440±21.227	0.070
60	90.080±16.985	104.520± 19.004	0.238
75	89.960±15.677	103.560±19.198	0.076
90	89.640±15.942	99.120±21.158	0.015

Table-3: SYSTOLIC BLOOD PRESSURE

TIME	EPI	GA	P- VALUE
PRE OP PR	108.960±9.1400	108.640±8.245	0.534
0	110.560±9.097	109.200±8.827	0.626
5	110.440±9.028	119.960±7.780	0.316
10	110.320±9.902	112.920±6.473	0.070
15	109.040±9.997	112.120±8.870	0.358
20	108.520±10.267	111.52±11.064	0.949
25	106.800±11.565	114.880±12.911	0.515
30	109.600±11.968	115.760±13.836	0.474
45	110.240±11.609	115.760±13.836	0.058
60	110.400±10.661	121.520±13.210	0.044
75	110.16±11.925	118.720±13.399	0.330
90	111.640±10.606	120.320±12.304	0.072

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TABLE-4: DIASTOLIC BP

TIME	EPI	GA	P-VALUE
PRE OP PR	69.240 ±8.298	70.520 ±7.665	.668
0	67.480±14.563	69.360 ±7.729	.286
5	70.000 ±6.904	73.720 ±8.095	.824
10	68.880 ±7.304	70.240 ±8.442	.875
15	65.640 ±6.818	70.120 ±8.603	.368
20	65.360 ±6.237	71.040 ±7.732	.186
25	64.840 ±6.932	72.640 ±8.514	.122
30	66.000 ±7.686	73.120 ±8.978	.211
45	66.600 ±8.568	73.720 ±8.643	.939
60	66.320 ±7.814	74.040 ±9.680	.212
75	67.200 ±9.269	74.560 ±8.935	.765
90	68.400 ±9.060	74.560 ±7.692	.422

TABLE-5: MEAN ARTERIAL PRESSURE

IME	EPI	GA	P-VALUE
PRE OP PR	80.320±6.7127	82.600 ±7.251	.839
0	81.2180±7.003	82.160 ±7.520	.806
5	80.960±6.9790	87.120 ±8.022	.848
10	80.480±7.3605	83.040 ±7.339	.415
15	78.480±6.8927	82.920 ±7.973	.620
20	77.680 ±6.618	83.720 ±7.379	.838
25	76.880 ±7.628	86.080 ±7.863	.924
30	77.640±8.0098	87.080 ±8.184	.970
45	77.920±9.8781	87.440 ±9.363	.928
60	78.240±7.9754	88.160 ±10.04	.143
75	88.160±10.048	88.640 ±8.994	.963
90	80.200±9.4074	88.320 ±8.209	.671

TABLE-6: POST-OPERATIVE PULMONARY EDEMA

	ABSENT	PRESENT	TOTAL
EPI	24	3	25
GA	16	9	25
TOTAL	40	12	50

P- VALUE 0.047

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TABLE-7: POST OPERATIVE VENTILATORY SUPPORT

	NOT REQUIRED	REQUIRED	TOTAL
EPI	24	1	25
GA	16	9	25
TOTAL	40	10	50

P-VALUE 0.005

TABLE-8: PACU STAY

	DAY-1	DAY-2	DAY-3	DAY-4
EPI	13	2	0	0
GA	23	14	9	9

P-VALUE ≤0.005

TABLE-9: BABY CRY AFTER BIRTH

	NOT CRIED	CRIED	
EPI	3	22	25
GA	19	6	25
TOTAL	22	28	50

P-VALUE≤0.001

TABLE-10: APGAR SCORE OF BABY

TIME	EPI	GA	P-VALUE
1	8.16 ± 1.972	5.36 ± 1.221	≤.001
5	9.80 ± .500	7.28 ± 1.370	≤.001
10	10.00 ± .000	8.04 ± 1.207	≤.001
15	10.00 ± .000	8.52 ± .963	≤.001

TABLE-11: NICU REQUIREMENT

	NOT REQUIRED	REQUIRED	TOTAL
EPI	23	2	25
GA	9	16	25
TOTAL	32	18	50

P-VALUE≤0.001

Discussion

Mitral stenosis is the most common heart disease associated with rheumatic heart disease. Different anaesthetic techniques have been tried for caeserean section in pregnancy with mitral stenosis. Here we have tried to compare general anaesthesia and graded epidural anaesthesia in moderate to severe mitral stenosis with pregnancy posted for LSCS.

It was found from table-1 that the two groups are comparable in all aspect except the skin incision time which was significantly prolonged in the epidural group. It was because of the the time taken by the local anaesthetic ropivacaine and opioid fentanyl to act at the nerve roots. The principal sites of action of epidurally administered local anesthetics are thought to be the spinal roots as they traverse the epidural space and the spinal cord itself. According to Hanson A. et al the small postganglionic sympathetic fibres are blocked most readily, followed by sensory and finally motor fibres. The degree of block depends on the concentration and volume of local anaesthetic used. Fentanyl is 800 times more lipid soluble than morphine and rapidly is absorbed

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from the epidural space and CSF. The two drugs act by different mechanisms and so a combination of both types of drugs should lead to synergism of effect, a reduced dose of each drug and therefore fewer side effects. Rudolf Stienstra,et al stated that the principle sites of action of epidurally administered local anesthetics are thought to be the spinal roots as they traverse the epidural space and the spinal cord itself. Relevant amounts of local anesthetics injected into the epidural space have been shown to appear in the cerebrospinal fluid (CSF) with peak concentrations occurring 10- 30 minutes after injection. Epidurally administered local anesthetics are thought to enter the subarachnoid space by diffusion through the sleeves of duramater that cover the spinal roots as they pass through it. Diffusion of local anaesthetic from the epidural to sub-arachnoid space probably plays a marginal role in establishing initial sensory and motor blockade after a single epidural injection, however it has been suggested that the presence of local anaesthetic in the CSF may explain the augmenting effect on sensory and motor blockade when an epidural top-up is used. In general anaesthesia group the incision time was immediate as the intravenous drug effect was immediate.

The vitals like the pulse rate, systolic, diastolic and the mean arterial pressure are comparable in both the groups. In general anaesthesia group the maintenance of vitals is because of the opioid based anaesthesia technique. Though general anaesthesia can have no contraindication as it can be instituted in anticoagulated patients, cardiac failure, in symptomatic heart disease patients, it has the disadvantage of increased pulmonary arterial pressure and tachycardia during laryngoscopy and tracheal intubation and adverse effects of positive-pressure ventilation on the venous return ultimately leading to cardiac failure[4]. In graded epidural group the maintenance of vitals is due to use of 0.25% ropivacaine with 2µgm/ml of fentanyl and up to T8 block by a graded epidural method and the total dose could be titrated to the desired sensory level. The slower onset of anaesthesia, allows the maternal cardiovascular system to compensate for the occurrence of sympathetic blockade, resulting in a lower risk of hypotension and decreased uteroplacental perfusion. Moreover, the segmental blockade spares the lower extremity "muscle pump," aiding in venous return, and also decreases the incidence of thromboembolic events. Avoiding high neuraxial block, judicious intravenous administration of crystalloid and administration of small bolus doses of phenylephrine maintain maternal haemodynamic stability .

Due to fixed cardiac output state, the heart cannot cope up with situations warranting increased metabolic demand or increased blood volume. When the stenosis progresses, the left atrium dilates and the left atrial pressure increases. This pressure gradient is the haemodynamic hallmark of mitral stenosis. Hence, the back pressure on the pulmonary vessels leads to pulmonary congestion and, in severe cases, pulmonary oedema. The increased volume load and tachycardia of pregnancy together cause the patients to deteriorate in such a fixed output state and may precipitate pulmonary edema. Here in graded epidural group due to decrease in preload due to peripheral pooling of blood, decrease in the incidence of tachycardia due to neuraxial block and less incidence of autotransfusion decreases the incidence of pulmonary oedema and ICU stay. One of the major advantage is the incremental doses and the total dose could be titrated to the desired sensory level. This helps in slower onset of anaesthesia and the maternal cardiovascular system to compensate for the occurrence of sympathetic blockade, resulting in a lower risk of hypotension and decreased uteroplacental perfusion. But in general anaesthesia group the stress response to laryngoscopy, increase in systemic vascular resistance, high incidence of autotransfusion during delivery, positive pressure ventilation may precipitate pulmonary oedema and prolong ICU stay.

In a study by Goldszmidt and others,[5] only 29–31% of the 522 women with heart disease required caesarean section and nearly 70% of them underwent vaginal delivery under epidural analgesia. Tachycardia, secondary to labour pain, increases flow across the mitral valve, producing sudden rises in left atrial pressure, leading to acute pulmonary oedema. This tachycardia is averted by epidural analgesia without significantly altering

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the patient haemodynamics. . According to Desai DK et al, when valve area is reduced to <2.0 cm^2, a pressure gradient develops across the valve. This increase in left arterial pressure is reflected back into the pulmonary venous circulation and increases the risk of pulmonary edema. Untreated, this results in pulmonary arterial hypertension that may lead to increase in right ventricular pressures and possibly, to right ventricular failure

The fetal outcome in the two groups shows that 19 out of 25 babies did not cried after delivery in general anaesthesia group as compared to 3 out of 25 in graded epidural group. The APGAR score at 1,5,10,15 minutes shows significant difference as p value is ≤0.001. A significant portion 16 out of 25 babies required NICU support as compared to graded epidural group where 2 out of 25 required the NICU care. The above finding could be due to transplacental transfer of drugs, decrease utero-placental blood flow because of fixed cardiac output state.

Factors affecting drug transfer across the human placenta include lipid solubility, protein binding, tissue binding, pKa, pH, and blood flow. High lipid solubility may readily enable cell membrane (lipid bilayer) penetration but may also cause the drug (e.g., sufentanil) to be trapped within the placental tissue. Highly proteinbound drugs are affected by the concentration of maternal and fetal plasma proteins, which varies with gestational age and disease.). Although the free, unbound fraction of drug equilibrates across the placenta, the total drug concentration is greatly affected by both the extent of protein binding andthe quantity of maternal and fetal proteins; fetal blood typically contains less than half the concentration of AAG than maternal blood.

Morphine rapidly crosses the placenta. One study demonstrated a mean feto- maternal, F/M ratio of 0.61, a mean umbilical venous blood concentration of 25 ng/mL, and a significant reduction in the biophysical profile score (primarily as a result of decreased fetal breathing movements and fewer fetal heart rate accelerations) within 20 to 30 minutes of maternal administration. . Fentanyl has a high lipophilicity and albumin binding (74%). Maternal dministration results in an F/M ratio between 0.37 and 0.57. The high F/M ratio between 0.4 to 1.1 suggest that thiopental is freely diffusible; however, there is wide intersubject variability in umbilical cord blood concentration at delivery. Both maternal-fetal and fetal-maternal transfer of thiopental are strongly influenced by maternal and fetal protein concentrations. When administered during cesarean delivery, **halothane** is detectable in both umbilical venous blood and arterial blood within 1 minute. Even with a relatively short induction-to-delivery time, an F/M ratio of 0.71 to 0.87 is established. **Isoflurane** distributes rapidly across the placenta during cesarean delivery, resulting in an F/M ratio of approximately 0.71 . The administration of nondepolarizing muscle relaxants results in low F/M ratios: 0.19 to 0.26 for **pancuronium,** 0.06 to 0.11 for **vecuronium,** 0.16 for **rocuronium,** and 0.07 for **atracurium.**

Most of the literatures state that general anaesthesia has no significant adverse fetal outcome compared to regional anaesthesia in patients undergoing LSCS, but few literatures still support that fetal outcome is superior in regional anaesthesia group. According to Zhu CX et al singleton pregnant women for whom elective cesarean sections were planned after 37 gestational weeks, the mean Apgar score at 1 min for the general anesthesia group was 9.5 +/- 1.1 and 9.8 +/- 0.7 for the epidural anesthesia group, without significant difference (P > 0.05). The Apgar scores at 5 min of all newborns were 10. The mean umbilical arterial and venous blood pH for the general anesthesia group were 7.31 +/- 0.06, 7.31 +/- 0.04, and 7.28 +/- 0.07, 7.32 +/- 0.05 for the epidural anesthesia group respectively. No significant difference was found between the two groups (P > 0.05). According to Sener EB et. al 1-min Apgar scores were significantly higher in group EA (p < 0.001). Neurologic and Adaptive Capacity scores at 2 and 24 h were higher in group EA (p < 0.001). In terms of blood gas values, umbilical arterial pH and pO(2) values were higher in group EA (p < 0.05 and p < 0.001, respectively). The first breast-feeding intervals were found to be shorter in group EA (p < 0.001).

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Bibiliography

1.Hanson, A.L., Hanson, B., Matousek, M., 1984. **Epidural anesthesia for cesarean section. The effect of morphine-bupivacaine administered epidurally for intra and postoperative pain relief.**

2. Rudolf Stienstra, MD, PhD, Albert Dahan, MD, PhD Mechanism of Action of an Epidural Top-Up in Combined Spinal Epidural Anesthesia, (Anesth Analg 1996;83:382-6)

3. Langesaeter E, Dragsund M, Rosseland LA. Regional anaesthesia for a Caesarean section in women with cardiac disease: A prospective study. Acta Anaesthesiol Scand. 2010;54:46–54. [PubMed]

4. Blaise G, Langleben D, Hubert B. Pulmonary arterial hypertension: Pathophysiology and anesthetic approach. Anesthesiology. 2003;99:1415–32. [PubMed]

5. Gomar C, Errando CL. Neuroaxial anaesthesia in obstetrical patients with cardiac disease. Curr Opin Anaesthesiol. 2005;18:507–12. [PubMed]

6. Desai DK, Adanlawo M, Naidoo DP, Moodley J, Kleinschmidt I. Mitral stenosis in pregnancy: A four-year experience at King Edward VIII Hospital, Durban, South Africa. BJOG 2000;107:953-8.

7. [Comparison of the effects of general and epidural anesthesia for cesarean section on fetuses].[Article in Chinese] Zhu CX[1], Chen H, Huang HF. Zhonghua Fu Chan Ke Za Zhi. **2005 Apr;40(4):253-5.**

8. Sener EB[1], Guldogus F, Karakaya D, Baris S, Kocamanoglu S, Tur A Comparison of neonatal effects of epidural and general anesthesia for cesarean section. Gynecol Obstet Invest. 2003;55(1):41-5.

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