Original Research Paper

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STUDY OF EFFECTS OF INJ. ETOMIDATE IN NORMOTENSIVE AND PIH PATIENTS POSTED FOR LSCS UNDER GENERAL ANAESTHESIA

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ABSTRACT **Introduction:** In literature there are very few studies regarding use of Etomidate as an inducing agent in patients of PIH and eclampsia. So, we want to study and compare haemodynamic effects of Inj. Etomidate in normotensive and PIH patients at our tertiary hospital. Our aim was to study of effects of Inj. Etomidate in normotensive and PIH patients posted for LSCS under general anaesthesia. **Material and methods:** Present study was a prospective, comparative & interventional study conducted in department of anaesthesiology of a tertiary care teaching hospital. Study duration was of 2 years (September 2018 to August 2020). Institutional ethical committee approval was taken prior to start of study. All pregnant females belonging to ASA Grade 1-3 undergoing elective or emergency caesarean section under general anaesthesia. Total 60 subjects were recruited & divided into two groups i.e. 30 subjects in each group. **Results:** In the normotensive group, mean arterial pressure values were significantly ($p < 0.05$) higher as compared to start values after scoline , immediately after intubation and at 3 min, 4 min, 20 min, 25 min, 30 min and 45 min values were significantly reduced. In the hypertension group, mean arterial pressure values at 1 min,2 min, 3 min, 4 min, 5 min, 10 min, 15 min, 20 min, 25 min, 30 min and 45 min were significantly reduced compared to start values ($p<0.001$). APGAR score was excellent (7-10) in 27 patients (90%) from normotensive group &in 28 patients (93.33%) from patients with hypertensive disorders of pregnancy group. **Conclusion:** Etomidate provides a better haemodynamic stability in normotensive as well as hypertensive patients posted for LSCS under general anaesthesia. Thus, etomidate can be recommended to use as an induction agent in normotensive as well as hypertensive patients posted for LSCS under general anaesthesia.

KEYWORDS :

Introduction:

Hypertensive disorders of pregnancy (HDP) remain among the most significant and intriguing unsolved problems in obstetrics. PIH (Pregnancy Induced Hypertension) is a major cause of maternal, fetal and newborn morbidity and mortality. Women with PIH are at greater risk of abruptio placentae, cerebrovascular events, organ failure and disseminated intravascular coagulation. Foetuses of these mothers are at greater risk of intrauterine growth retardation, prematurity and intrauterine death.[1,2]

Etomidate, the new imidazole i.v. induction agent, has an action rapid in onset and of short duration. Etomidate produces rapid anaesthesia in one arm-brain circulation time and, unlike thiopentone, it is hydrolysed rapidly to an inactive substance so that recovery is faster than that following barbiturates. There is minimal alteration in cardio-respiratory function and recovery is uneventful &it does not cause detectable histamine release.[3] In literature there are very few studies regarding use of Etomidate as an inducing agent in patients of PIH and eclampsia. So, we want to study and compare haemodynamic effects of Inj. Etomidate in normotensive and PIH patients at our tertiary hospital. Our aim was to study of effects of Inj. Etomidate in normotensive and PIH patients posted for LSCS under general anaesthesia.

Material and methods:

Present study was a prospective, comparative & interventional study conducted in department of anaesthesiology of a tertiary care teaching hospital. Study duration was of 2 years (September 2018 to August 2020). Institutional ethical committee approval was taken prior to start of study.

All pregnant females belonging to ASA Grade 1-3 undergoing elective or emergency caesarean section under general anaesthesia.
Total 60 subjects were recruited & divided into two groups i.e. 30 subjects in each group.

INCLUSION CRITERIA

Group I : Normotensive patients

- Pregnant females belonging to ASA Grade 1-3 undergoing elective or emergency caesarean section under general anaesthesia.
- Age 18 – 35 yrs
- BMI≤ 35 kg/m2
- Systolic blood pressure less than 140 mm hg & diastolic blood pressure less than 90 mm hg
- Willing to participate

Group II : PIH patients

- Pregnant females belonging to ASA Grade 1-3 undergoing elective or emergency caesarean section under general anaesthesia.
- Age 18 – 35 yrs
- BMI≤ 35 kg/m2
- Patients with PIH, eclampsia without HELLP syndrome, receiving or not receiving drugs – Magnesium sulfate/Anti- hypertensives
- Willing to participate

EXCLUSION CRITERIA:

1. Age below 18yrs or more than 35yrs.
2. Patients with ASA grade 4 or more.
3. Patients with HELLP syndrome.
4. BMI > 35 kg/m2
5. Uncontrolled diabetes mellitus
6. History of hepatic , renal , cardiac , CNS , respiratory insufficiency.
7. Patients not willing to give consent.
8. Known allergy to study drug.

Results:

Most common age group in present study for normotensive patients, patients with hypertensive disorders of pregnancy & total patients were 21-25 years followed by 26-30 years. In total 21-25 years age group patients were 48.33% followed by 26-30 years age group patients (38.33%). After statistical analysis, difference between normotensive & hypertensive group was not significant statistically. According to maternal weight, most common group in total was 51-55 kg (36.67%) followed by 56-60 kg (28.33%), In normotensive patients most common group was 51-55 kg (33.33%) & 56-60 kg (33.33%).

After statistical analysis a statistically significant difference between mean values at various intervals (at before induction, after induction, after scoline, immediately after intubation, 1 min, 2 min, 3 min, 4 min, 5 min, 10 min, 15 min, 20 min, 25 min, 30 min, 45 min, 60 min) from normotensive & hypertensive groups was noted. In the normotensive group, mean arterial pressure values were significantly ($p < 0.05$) higher as compared to start values after scoline , immediately after intubation and at 3 min, 4 min, 20 min, 25 min, 30 min and 45 min values were significantly reduced. In the hypertension group, mean arterial pressure values at 1 min,2 min, 3 min, 4 min, 5 min, 10 min, 15 min, 20 min, 25 min, 30 min and 45 min were significantly reduced compared to start values ($p<0.001$).

APGAR score was calculated at birth & at 5 minutes. APGAR scores were comparable in normotensive & in patients with hypertensive disorders of pregnancy group, difference was statistically not significant.

In the hypertensive group heart rate values after scoline, immediately after intubation were higher and 3 min, 4 min,10 min,15 min, 20 min, 25 min and 30 min were significantly reduced compared to start values ($p < 0.05$). In the normotensive group, heart rate values immediately after intubation were higher and at 2 min, 10 min, 15 min, 20 min, 25 min, 30 min were significantly reduced compared to start values ($p<0.001$)

After statistical analysis a significant difference between mean values at various intervals (at before induction, after induction, after scoline, immediately after intubation, 1 min, 2 min, 3 min, 4 min, 5 min, 10 min, 15 min, 20 min, 25 min, 30 min, 45 min, 60 min) from normotensive & hypertensive groups was noted. In the hypertension group, systolic blood pressure values – 1 min, 2 min, 3 min, 4 min, 5 min, 10 min, 15 min, 20 min, 25 min, 30 min, 45 min were significantly reduced compared to values at the start ($p<0.001$) In the normotensive group, systolic blood pressure values after scoline, immediately after intubation were higher and 3 min, 4 min, 5 min, 10 min, 15 min, 20 min, 25 min, 25 min, 30 min, 45 min were meaningfully reduced compared to the start values ($p<0.05$).

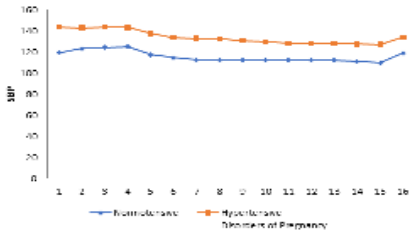

Fig 1 - Distribution according to systolic blood pressure

After statistical analysis a significant difference between mean values at various intervals (at before induction, after induction, after scoline, immediately after intubation, 1 min, 2 min, 3 min, 4 min, 5 min, 10 min, 15 min, 20 min, 25 min, 30 min, 45 min, 60 min) from normotensive & hypertensive groups was noted.

In the hypertension group, diastolic blood pressure values at 2 min, 3 min, 4 min, 5 min, 10 min, 15 min, 20 min, 25 min, 30 min and 45 min were significantly reduced compared to start values ($p<0.001$). Diastolic blood pressure values immediately after intubation and at 1st minute were meaningfully higher compared to start values ($p<0.05$). In the normotensive group, diastolic blood pressure values were significantly ($p < 0.05$) higher as compared to start values after scoline , immediately after intubation and at 3 min, 20 min, 25 min and 30 min values were significantly reduced.

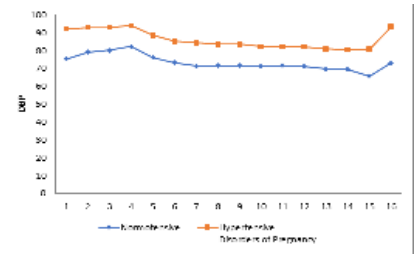

Fig 2 - Distribution according diastolic blood pressure

After statistical analysis a statistically significant difference between mean values at various intervals (at before induction, after induction, after scoline, immediately after intubation, 1 min, 2 min, 3 min, 4 min, 5 min, 10 min, 15 min, 20 min, 25 min, 30 min, 45 min, 60 min) from normotensive & hypertensive groups was noted. In the normotensive group, mean arterial pressure values were significantly ($p < 0.05$) higher as compared to start values after scoline , immediately after intubation and at 3 min, 4 min, 20 min, 25 min, 30 min and 45 min values were significantly reduced. In the hypertension group, mean arterial pressure values at 1 min,2 min, 3 min, 4 min, 5 min, 10 min, 15 min, 20 min, 25 min, 30 min and 45 min were significantly reduced compared to start values ($p<0.001$).

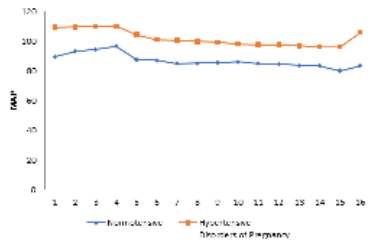

Fig 3 - Distribution according to Mean arterial pressure

APGAR score was calculated at birth & at 5 minutes. APGAR scores were comparable in normotensive & in patients with hypertensive disorders of pregnancy group, difference was statistically not significant.

Table 1 – changes in mean arterial pressure

Time	Normotensive		Hypertensive Disorders of Pregnancy		Difference	Standard error	t-statistic	p value
	Mean	SD	Mean	SD				
Before Induction	89.6	7.3	109.4	6.6	-19.7	1.8	-10.95	<0.001
After Induction	93.3	10.5	109.5	6.1	-16.2	2.2	-7.326	<0.001
After scoline	94.5	8.4	109.7	6.0	-15.2	1.9	-8.029	<0.001
Immediately after Intubation	96.5	8.3	110.0	6.2	-13.5	1.9	-7.144	<0.001
1 min	87.5`	16.7	104.5	5.6	-17.0	3.2	-5.304	<0.001
2 min	87.1	8.2	101.0	5.9	-13.8	1.8	-7.499	<0.001
3 Min	84.8	6.0	100.5	6.1	-15.7	1.6	-9.985	<0.001
4 min	85.2	6.6	99.7	5.6	-14.5	1.6	-9.244	<0.001
5 Min	85.3	7.8	99.2	5.6	-13.8	1.7	-7.913	<0.001
10 Min	86.0	8.7	98.1	5.7	-12.1	1.9	-6.358	<0.001
15 Min	84.8	6.8	97.5	5.9	-12.7	1.6	-7.754	<0.001
20 Min	84.7	6.1	97.5	5.9	-12.8	1.5	-8.261	<0.001
25 min	83.8	6.0	96.9	5.6	-13.1	1.5	-8.623	<0.001
30 Min	83.4	5.9	96.2	5.1	-12.8	1.4	-8.891	<0.001
45 Min	79.9	7.6	96.0	5.7	-16.0	2.2	-7.146	<0.001
60 Min	83.5	10.6	106.0	1.4	-22.5	7.6	-2.974	0.097

Table 2 – Side effects

Side effects	Normotensive		Hypertensive Disorders of Pregnancy		Total		P value
	No of Patients	Percentage	No of Patients	Percentage	No of Patients	Percentage	
Myoclonus	8	26.7%	10	33.3%	18	30.0%	0.573
Tachycardia	4	50.0%	4	50.0%	8	13.33 %	0.51
Hypotension	4	13.3%	2	6.7%	6	10.0%	0.389
Bradycardia	2	6.7%	2	6.7%	4	6.67%	1.000

Discussion:

Etomidate is an ultrashort-acting, hypnotic intravenous anaesthetic agent and does not have any analgesic properties. It is administered only by intravenous route. Etomidate has a very favourable hemodynamic profile on induction, with a minimal amount of blood pressure depression making it an ideal choice for shock trauma, hypovolemic patients, or patients with significant cardiovascular disease.[4]

In our study, we studied 60 pregnant females divided into two groups (30 normotensive, 30 pregnancy induced hypertension) belonging to ASA Grade 1-3 undergoing elective or emergency caesarean section under general anaesthesia. After anti-emetic prophylaxis and preoxygenation for 5 min, induction was done by Inj. Etomidate (dose-0.3mg/kg i.v.). Inj. Succinylcholine 1.5 – 2 mg/kg was given for intubation. Maintenance of anaesthesia was done by Inj. Succinylcholine, Nitrous oxide, Isoflurane and Oxygen. After delivery

of baby Inj. Fentanyl 2µ/kg and Inj. Midazolam 1mg i.v. bolus was given in both groups. Pulse rate, systolic BP, diastolic BP, MAP was noted in both groups, before induction, immediately after induction, after scoline administration, immediately after intubation, every 1min for next 5 min, every 5 min for next 30 min, every 15 min till the end of procedure. Also APGAR score immediately and after 5 min will be noted and compared[5,6,7]

The choice of anaesthetic technique for caesarean delivery should be determined with consideration of the degree of emergency in relation to maternal and foetal status and comorbidities, as well as of the difficulty or expected duration of procedures.[8,9]

Regional anaesthesia is the most common method of providing anaesthesia for Caesarean section. When general anaesthesia is used, the most common indications are urgency (35% of cases in a non-teaching hospital), maternal refusal of regional techniques (20%), inadequate or failed regional attempts (22%), and regional contraindications including coagulation or spinal abnormalities (6%).[10]

According to P J Houlton et al.,[3] the infants in the patients induced with etomidate were usually extremely lively after delivery, and generally sustained respiration in a shorter time than those after thiopentone. In addition, maternal-to-fetal base excess gradients were narrower with etomidate than with thiopentone. They stated that etomidate may offer some advantage over thiopentone for anaesthetic induction at elective caesarean section. Similar effects with Etomidate were observed in our study.

Monica Muti et al.,[11] stated that there was no statistically significant difference in delivery before 37 weeks gestation between women with PIH and those without PIH amongst the women delivered by caesarean section. Similar findings were noted in our study.

Boysen et al.[12] in their study concluded that there was no significant difference between two groups (propofol and etomidate) as regard to apnea following induction. The only negative characteristic noted with etomidate was high incidence of myoclonic jerks. Etomidate is often used for induction of general anaesthesia because of its very stable hemodynamic profile. Myoclonus is common problem with induction of anaesthesia with etomidate, which may be a problem in non - fasting patients, open eye injury and epileptic patients. Incidence of myoclonus shown to be reduced by variety of opioid agents. Butorphanol is strong analgesic with both narcotic agonistic and antagonistic properties. In our study, opioids could not be administered before induction as there were concerns with fetus.

In present study, incidence of myoclonic movements observed among two groups. Miner et al.[13] was also concluded high incidence of myoclonus (20% vs. 1.8%) in etomidate and propofol group respectively. They found that out of 110 patients randomized in etomidate group 20% had myoclonic movements depicting that myoclonus was observed much more frequently in patients receiving etomidate. Fatma S, et al.,[14] noted a higher incidence of myoclonic activity was seen in etomidate group (93.4%) as compared with propofol group. Study done by Aggarwal Supriya et al.74 also showed that myoclonic movements were only seen in etomidate group and patients induced with propofol did not show any sign of myoclonus. Our results are comparable with both the above studies. Incidence of myoclonus was 30%. It might be due to rapid sequence induction and avoidance of sedative and opioids prior to delivery of the baby.

Other major adverse effect associated with etomidate is the reversible adrenocortical suppression, although cortisol levels do not fall below the normal physiologic range. We did not find any statistically significant difference in adverse effects like tachycardia, hypotension, bradycardia in both the groups.

Conclusion:

Etomidate provides a better haemodynamic stability in normotensive as well as hypertensive patients posted for LSCS under general anaesthesia. Thus, etomidate can be recommended to use as an induction agent in normotensive as well as hypertensive patients posted for LSCS under general anaesthesia.

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