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INTRAVENOUS LOW DOSE KETAMINE INFUSION FOR LABOUR ANALGESIA - A Prospective Interventional Clinical Trial

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ABSTRACT

BACKGROUND: Ketamine is a short acting anesthetic with excellent analgesic property,and has been widely used for short surgical procedures like wound suturing and dressing. It has been shown that in low doses, intravenous ketamine provides good intraoperative and postoperative analgesia. This prospective interventional study was an effort to evaluate the efficacy of low dose ketamine as a labour analgesic, thereby providing a safe and inexpensive alternative, especially for the developing countries with limited resources and economical constraints.

AIM: The aims of this study are:

1. To evaluate the efficacy of low dose intravenous ketamine in providing analgesia during labour.
2. To assess the safety of low dose intravenous ketamine on the parturient and the fetus, and its effect on the progress of labour.
3. To standardise a "low dose ketamine" regimen for labour analgesia.

METHODS: Parturients with no antenatal risk factors and expected to have normal vaginal delivery were eligible to be included in the study. Women with known cardiac disease, gestational hypertension, epilepsy or known psychiatric disorder were excluded, as were parturients with multifetal pregnancy, suspected cephalopelvic disproportion and those who have had previous caesarean section.

RESULTS: All the parturients experienced adequate analgesia within 1-2hrs of administration of ketamine infusion. The infusionrate of ketamine during the course of labour was also calculated and the average infusion required was 0.17 +/- 0.06mg.kg-1.hr-1 (range 0.08-0.32). The parturients who had a spontaneous onset of labour required a lower dose of ketamine when compared to those who had induction of labour.The changes in heart rate and blood pressure were statistically insignificant.

CONCLUSION: Ketamine, a NMDA receptor antagonist, is shown to be an excellent analgesic. Although it is associated with unpleasant side effects, these can be minimised when ketamine is administered slowly in very low doses (0.1-0.2mg.kg-1.hr-1) while retaining its analgesic property. Since, the efficacy and safety of low dose intravenous ketamine as a labour analgesic has been established, a regimen, with slight modification, would be ratified on a larger population, before being recommended as a standard technique of labour analgesia.

KEYWORDS :

INTRODUCTION

Pain during labour and delivery is intense, although there is considerable variability in its perception. (1) The commonly employed methods of pain relief in labour include systemic analgesics, inhalational anaesthetics, and regional techniques. Pethidine is the most commonly used systemic analgesic which provides moderate analgesia, but it causes sedation, nausea and vomiting in the mother and respiratory depression in the neonate. (2) Inhalation of a mixture of nitrous oxide and oxygen (Entonox) provides analgesia, but it requires good maternal co-operation to be effective. (3) An epidural local anaesthetic with opioids provide good relief of pain during labour, but is associated with prolongation of the second stage of labour and an increased incidence of instrumental vaginal delivery. (4) It is also relatively expensive and needs an expert to initiate the block.

Ketamine is a short acting anesthetic with excellent analgesic property, and has been widely used for short surgical procedures like wound suturing and dressing in the out patient department. It has been safely used in obstetrics as an induction agent for caesarean section, manual removal of placenta, and for forceps delivery. (5) It has been shown that in low doses, intravenous ketamine provides good intraoperative and postoperative analgesia. (6, 7)

This prospective interventional study was an effort to evaluate the efficacy of low dose ketamine as a labour analgesic, thereby providing a safe and inexpensive alternative, especially for the developing countries with limited resources and economical constraints.

STUDY INTERVENTION: All the parturients eligible for the study were explained about the procedure and a written consent obtained from the volunteers. A 20G intravenous cannula was inserted into the forearm which was used only for the infusion of ketamine. Racemic ketamine (AneketR, Neon Laboratories) was loaded in a 50ml syringe in a concentration of 2mg.ml-1and connected to this intravenous cannula. A bolus dose of 0.1mg.kg-1 of ketamine was administered. This was followed by an infusion of ketamine at the rate of 0.2mg.kg-1.hr-1 .The rate of the infusion was adjusted according to the pain perceived by the parturient during the uterine contraction and was altered as and when required. The infusion was stopped after the baby was delivered.

INCLUSION CRITERIA

- ASA Status I & II
- Females in the age group from 18 to 30 years
- Adequate gynaecoid pelvis
- Cervical dilatation less than 4 cm

EXCLUSION CRITERIA

- Patient refusal
- Patients with pregnancy induced hypertension, heart disease, anaemia and other complications of pregnancy
- Multiple pregnancy
- previous caesarean section.
- Patients unwilling or unable to comply with the study procedures

MONITORING

The baseline parameters of the parturient such as the heart rate, the systolic and diastolic blood pressure, the pain score, the sedation score, the duration and frequency of uterine contractions and the fetal heart rate were recorded. These parameters were continuously recorded at regular intervals during the study period. The patients were asked to grade the severity of their pain during contractions, on a Visual Analogue Scale from 0-10, with 10 being severe.

The sedation was graded on a 4 point scale as,
0 - Awake
1- Drowsy, but responsive to verbal stimuli
2– Drowsy, but responsive to physical stimuli
3– Unresponsive to physical and verbal stimuli

The duration of the second stage, the type of delivery, the amount of blood loss and any complications during the third stage were noted. Side effects like vomiting, hallucinations, unpleasant dreams, nystagmus and light headedness were also looked for and recorded.

The newborn was clinically assessed by a neonatologist. The Apgar score at 1 and 5 min after birth, and the pH of the umbilical cord blood were recorded.

The parturients were interviewed by the investigator a couple of hours after the delivery and were asked to grade their perception of the pain relief and their satisfaction with the overall care on a scale 0-10, with 10 being excellent.

The obstetricians were asked to comment on this study intervention, with regard to efficacy of ketamine as a labour analgesic, its affect on the progress of labour and maternal co-operation during delivery. The mother and the baby were observed for 48hrs after delivery or till the time of discharge from hospital. The following variables were recorded during the study period and analysed:

- Total duration of labour, duration of second stage
- Total dose of ketamine required and the rate of infusion per hour
- Pain score
- Type of delivery
- Side effects in the parturient such as, sedation, nausea and vomiting, unpleasant dreams, nystagmus and light headedness
- Maternal hemodynamic parameters such as the heart rate and blood
- pressure and their fluctuations from the baseline
- Neonatal assessment
- Patient's satisfaction with regard to relief of pain and the overall care
- Obstetrician's comments.

STATISTICS

Since, continuous infusion of low dose ketamine has not been used during labour before, this pilot study was undertaken to assess its efficacy as a labour analgesic and to standardise a regimen. It was decided to do the initial evaluation on 30 parturients, and then ratify the dose regimen in a larger population, if ketamine was found to be effective. The results of the pilot study on 30 patients are presented. The statistical analysis was done using the Statistics Package for Social Sciences (SPSSR version 11).

RESULTS

Thirty parturients in active labour were consented to participate in the study. The characteristics of the patients are described in Table -1.

TABLE -1 The demographic details of the patients in the study population

Age (yrs) Mean $\pm$ SD	245 $\pm$ 4.0 (Range 17-31)
Weight (Kg) Mean $\pm$ SD	65.1 $\pm$ 8.7 (Range 51-85)
Gravida	Primigravida -12 Multigravida -18
Onset of labour	Sponteneous -16 Induced -14

DURATION OF LABOUR

The duration of labour for each parturient was recorded, as the time from the onset of active labour to the delivery of the baby. This was 260 +/- 167min in the study group, with it being longer in the primigravida (307 +/- 150min) as compared to the multigravida (200 +/- 175min). This difference was statistically significant (p =0.005). The duration of labour was shorter in those parturients who had a spontaneous onset of labour(239 +/-160min) as compared to those who had to have their labour induced (304.35 +/- 163.5min) although, this was not statistically significant (p=0.166).

DURATION OF SECOND STAGE

The duration of second stage namely, the time from the full dilatation of the cervix to the delivery of the baby was 38 +/- 35.2min. This was longer in the primigravida women (46.2 +/- 33.2 min) as compared to the multigravidae (29.5 +/-36.9 min) and was statistically significant (p= 0.037)

TYPE OF DELIVERY

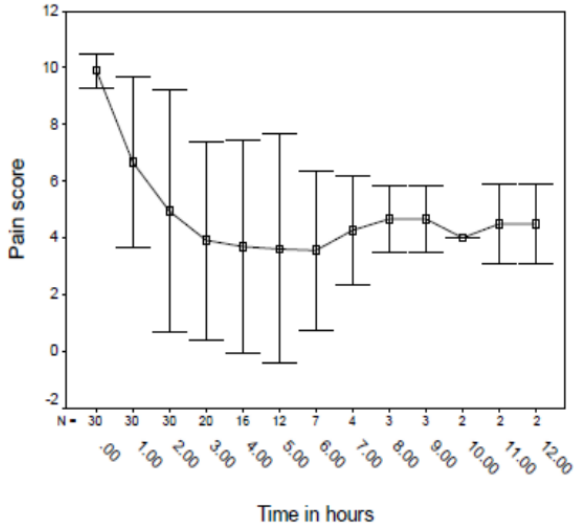
Of the 30 women who participated in the study, 21 (70 %) had normal vaginal delivery, 6 (20%) had assisted delivery and 3 (10%) had to be delivered by caesarean section. The indications for caesarean section were arrest of cervical dilatation in one and non-reassuring fetal status, in the other two. Of the women who had assisted delivery, 2 had prolonged second stage (145 and 116min), while the others had non-reassuring fetal status. All the 3 women who had caesarean section and 5 out of 6 women who had assisted delivery were primigravida.

BLOOD LOSS

The average blood loss during delivery in the study group was 184.17 +/-85 ml with it being 206.9 +/-86.5ml in the primigravida and 150.0 +/- 73.8ml in the multigravida. This was statistically significant (P = 0.007). None of the parturients, included in the study had postpartum hemorrhage.

PAIN SCORE

During the course of labour the parturients were asked to grade the severity of their pain on a visual analogue scale with scores from 0-10 and this was recorded at hourly intervals. All the parturients experienced adequate analgesia within 1-2hrs of administration of ketamine infusion as shown in figure.



Pain score at hourly intervals during the study. N denotes the number of patients at each hour.

INTRAPARTUM REQUIREMENT OF KETAMINE

The total dose of ketamine required by each parturient was calculated and the average dose was found to be 57 +/- 37.5mg (range 18-160mg). The infusion rate of ketamine during the course of labour was also calculated and the average infusion required was 0.17 +/- 0.06mg.kg-1.hr-1 (range 0.08-0.32).

TABLE .2 The Dose Of Ketamine and Gravida

Gravida	Primigravida	Multigravida	P-value
Total (mg)	68.5 $\pm$ 35.9	39.6 $\pm$ 34.2	0.002
Average ($mg.kg^{-1}.hr^{-1}$)	0.18 $\pm$ 0.06	0.16 $\pm$ 0.05	0.5

Although the total dose of ketamine required among the primigravida was significantly more than that required for the multigravida, this was not so when the infusion rates were compared. (Table -2)

TABLE –3 The dose of ketamine and onset of labour

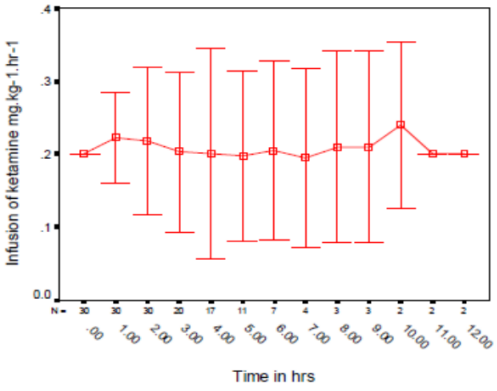
Oneset of labour	Spontaneous	Induced	P-value
Total (mg)	45.5 $\pm$ 33.1	70.14 $\pm$ 39.1	0.02
Average ($mg.kg^{-1}.hr^{-1}$)	0.16 $\pm$ 0.06	0.19 $\pm$ 0.06	0.20

The parturients who had a spontaneous onset of labour required a lower dose of ketamine when compared to those who had induction of labour (p=0.02)

However, the rate of infusion, did not differ between these two groups. (Table -3)

INFUSION RATE OF KETAMINE

The infusion of ketamine was started immediately after the bolus dose. The infusion was initially started at the rate of 0.2mg.kg-1.hr-1 and was adjusted based on the pain perceived by the parturient. The infusion rate had to be increased in the initial couple of hours and was reduced by the third hour.



The infusion rate of ketamine at hourly intervals. N denotes the number of parturients at each hour.

RESCUE ANALGESIC

According to the study protocol, any parturient who did not achieve adequate analgesia with ketamine were to be administered an intramuscular dose of Pethidine (50mg) and Promethazine (25mg). This rescue analgesic was needed in only one parturient.

COMPLICATIONS

Ketamine is known to cause side effects such as hallucinations, unpleasant dreams, nystagmus, light-headedness, nausea and vomiting.

Therefore, these complications were looked for in all the parturients in the study. None of the women had hallucinations or unpleasant dreams. 2 women had vomiting but they had episodes of vomiting before the ketamine administration was started, and there was no worsening of symptom.

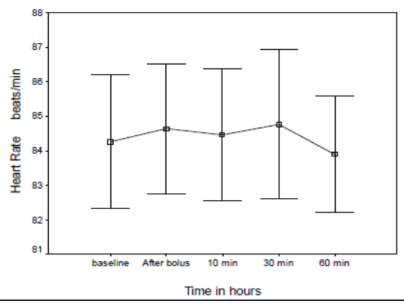
Immediately following the administration of the bolus dose of ketamine, 16 women complained of light headedness which lasted for about 3-5min, and 7 women had jerky, to and fro movement of their eyeballs (nystagmus) which lasted for nearly a minute. These findings did not recur during the study period when the ketamine infusion was being administered. Since ketamine causes sedation, the level of wakefulness was graded on a four point scale during the study period. All the women were awake during labour, except for 8 women who were drowsy but responded to verbal stimuli(Grade 1).

HEMODYNAMIC CHANGES

Since intravenous administration of ketamine causes transient sympathetic stimulation, the heart rate and the blood pressure were monitored during the first one hour after the administration of the bolus dose of ketamine.

CHANGES IN THE HEART RATE

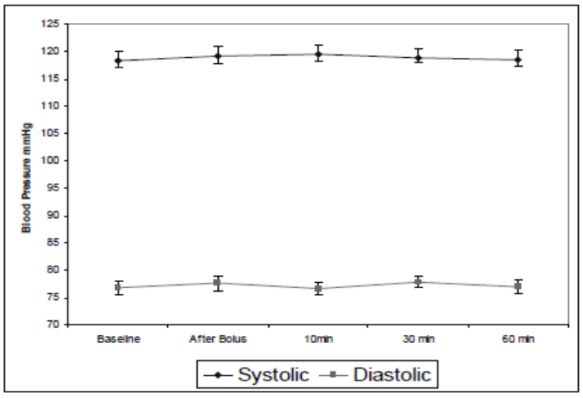
The baseline heart rate was 84.56 +/- 4.6 beats per minute and there was a clinically insignificant increase in heart rate (4.96%) above the baseline value and this was seen within 10min after the bolus dose.



The heart rate (mean and 95% Confidence interval) during the initial one hour of study intervention.

CHANGES IN THE BLOOD PRESSURE

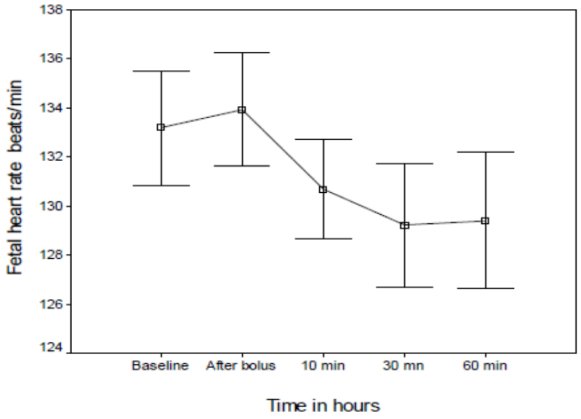
The baseline systolic and diastolic blood pressure was 118.4 +/- 8.9mmHg and 76.8 +/- 6.8mmHg respectively. There was a clinically insignificant increase in the systolic (5%) and diastolic (6.3%) blood pressure above the baseline and this was observed soon after the bolus dose.



Systolic and diastolic blood pressure (mean and 95% confidence interval) during the initial one hour after the bolus dose of ketamine.

FETAL HEART RATE

The fetal heart rate was monitored throughout the study period. There was a drop in the fetal heart rate of about <5 beats per minute after the bolus dose of ketamine. However, this was not clinically significant.



The fetal heart rate (mean and 95% confidence interval) during the initial one hour after the bolus dose of ketamine.

ASSESSMENT OF THE NEW BORN

All the neonates were assessed by a neonatologist at birth. The Apgar score at the first and fifth minute of birth, and the pH of the cord blood were recorded.

NEONATOLOGIST'S ASSESSMENT

Three babies were found to be clinically depressed at birth. Two of them had irregular respiratory efforts which improved with gentle throat suctioning and mask ventilation with oxygen. One neonate was floppy at birth with severe respiratory depression and required intubation and assisted ventilation for 1min, after which the respiratory efforts became regular and was extubated. Five neonates were transfered to the nursery for observation. Of these, 3 were delivered by caesarean section, one had an Apgar score of 1 at the first minute of birth but recovered later, and the mother of the fifth neonate had an altered glucose tolerance test and a history of early neonatal death during previous pregnancy.

APGAR SCORE

The Apgar score of two neonates were less than 8 at the first minute but they improved, and all had a score of more than 8 at 5 minutes.

TABLE – 4 Apgar score at 1min and 5min

Score	<8	≥8
1 min	2	28
5 min	0	30

pH OF CORD BLOOD

A sample of blood was taken from the umbilical artery of the neonate for blood gas analysis. The pH ranged from 7.05–7.35 with a mean of 7.207+/-0.007.

PATIENT'S SATISFACTION

The parturients were interviewed within couple of hours of delivery and asked to comment on their perception of the degree of pain relief and their satisfaction with the overall care. All the parturients graded the level of analgesia as a percentage relief of pain. Twenty seven (90%) graded the level of pain relief as more than 50%. However, when asked about their satisfaction with the overall care, on a scale of 0-10, 25(83.3%) graded it as good while 5 (16.6) were moderately satisfied.

TABLE -5 Satisfaction Score

Score	0-3 (Poor)	4-6 (Average)	≥ 7 (Good)
No.of patients	0	5	25

OBSTETRICIAN'S COMMENT

The obstetrician was asked to comment on various aspects of the study such as, the adequacy of pain relief, the effect on the progress of labor, maternal co-operation during delivery and any side effects.

They were satisfied with the relief of pain in 26 of the 30 women. They did not feel that the progress of labour was affected in any way except in 2 women who had prolonged second stage. All the mothers co-operated well during the second stage and all of them were fully awake except two who had to be called to awaken.

DISCUSSION

Pain during childbirth is graded as severe by most women, although there is a considerable variation in its perception. The characteristic of labour pain is that it is intermittent and it increases in intensity and frequency as the labour progresses. An ideal labour analgesic should be safe to the parturient and the neonate, easy to administer, readily available, inexpensive and with no untoward effect on the progress of labour. Ketamine is a short acting intravenous anaesthetic with excellent analgesic property. It has been widely used in outpatient departments for short and painful procedures like wound suturing, change of dressing in patient with burns, and short surgeries such as incision and drainage of abscess. Perioperative use of low dose ketamine infusion has been shown to provide analgesia and reduce the intraoperative and postoperative narcotic requirement. (6, 7)Ketamine has been safely used in obstetrics since 1966. (24) It's been recommended as an analgesic for forceps delivery, manual removal of placenta and as an induction agent for cesarean section. Ketamine, when used in the dose of less than 1mg.kg-1 over 30min, was shown to have no effect on the progress of labour, the intra-uterine pressures, the oxygenation and the acid base status of the fetus. (24, 28, 29, 30)

ANALGESIAAND PATIENT SATISFACTION

This study has shown that low dose intravenous ketamine infusion at the rate of 0.17 } 0.06mg.kg-1.hr-1 provides acceptable labour analgesia in 90% of the study patients. The pain score was decreased to an acceptable level within 2hrs of starting the infusion. (Figure-6) Of the 3 women who graded low on analgesia, one was a primigravida who was induced for post dates and was on a oxytocin infusion for augmentation of labour. Ketamine, at the rate of 0.2-0.25mg.kg-1.hr-1 was infused, but she had only 20% pain relief. Five hours into labour, the fetal heart monitor showed a loss of beat to beat variability, and therefore the oxytocin and the ketamine infusion were stopped. One hour later, an intramuscular injection of pethidine (50mg) was given. Five hours following this, she delivered normally and the baby had an Apgar score of 9 at the first minute and 10 at the fifth minute of birth. The other two patients were multigravidae at term with spontaneous onset of labour. They delivered within two and a half hours of starting the ketamine infusion. This short duration of labour could have been the cause for them not having had good analgesia, as it takes an average of 2hours to achieve good analgesic effect with this infusion rate. However, this lack of pain relief did not reflect on their rating of satisfaction with the overall care. This could be due to the concern of the investigator during labour and the joy of having a healthy baby in their arms.

OBSTETRICIAN'S COMMENTS

The obstetricians felt that out of the 30 women, 26 had good analgesia while 4 had incomplete pain relief. They also felt that the second stage was prolonged in 2 of the parturients, both of whom needed outlet forceps to assist delivery. Two women were drowsy but arousable on calling their names (sedation score -1). This low dose infusion of ketamine seems to be acceptable to the obstetricians since it provided adequate analgesia in most of the parturients, with them being co operative during delivery and without interfering with the progress of labour.

DOSE OF KETAMINE

The dose of ketamine was found to be 57+/- 37.5mg and the average infusion rate was 0.17 +/- 0.06mg.kg-1.hr-1. This translates to a dose of only 10-15mg per hour. This is much lower than that used in the previous studies (31,32). The total dose of ketamine was more in the primigravida women, since the duration of labour was longer, but the infusion rate per hour was similar, thereby suggesting that the analgesic requirement is similar in both. The parturients who had a spontaneous onset of labour required less ketamine when compared to the women who had their labour induced. Augmentation of the uterine contractions with oxytocin could be the reason for this.

EFFECT ON THE PROGRESS OF LABOUR

Although the obstetricians commented that two patients had prolonged second stage, the average duration of second stage was 46.2 +/- 33.2min for primigravida women and 29.5 +/- 36.9min for multigravida which is within the acceptable limits. (33) Similarly, the duration of labour was 307 +/-150min in primigravida and 200 +/- 175min in multigravida which are also within the acceptable limits. (33) Ketamine is shown to have oxytocic effect and in low doses, it increases the intensity of uterine contractions while maintaining the basal uterine tone (24, 29). This could theoretically shorten the duration of labour and this was evident in this study population. This is in contrast to epidural analgesia, which has been shown to prolong the second stage. (4)

In this study, the incidence of caesarean section was 10% which is less than the prevailing incidence of 25-30% among the population attending this tertiary referral institution. The indication for caesarean section were, arrest of cervical dilatation in one and non-reassuring fetal status in the other two parturients. Of the 6 parturients who had assisted delivery, 2 of them had prolonged second stage (140 and 116 min) and the rest had non-reassuring fetal status. The incidence of assisted delivery in this study was 20% which is within the current incidence of instrumental delivery of this institution. The blood loss in the study group was minimal (184.17 +/-85ml). None of the women had postpartum hemorrhage probably reflecting the oxytocic action of ketamine.

SIDE EFFECTS OF KETAMINE

Intravenous administration of a bolus dose of ketamine causes sympathetic stimulation with an immediate increase in heart rate and blood pressure. This was not observed in the study population possibly due to the low dose of ketamine used. The use of a larger dose of ketamine (2mg.kg-1) causes emergence phenomena. (16) Sarkar et al (31) used the dose of 0.2-0.4mg.kg-1 as bolus, followed by an infusion of 0.5-1.0mg.min-1 which approximated to 1mg.kg-1hr-1 and they reported 14% of their study patients to have hallucinations. Gangla et al (32) although having used only 0.5-0.6mg.kg-1.hr-1, had high incidence (54%) of hallucinations, thereby suggesting that emergence phenomena could be related to peak levels of ketamine. This was not observed in this study population as a lower dose was given as an infusion rather than as bolus. Benzodiazepine was avoided in the study for the fear of sedation and non-participation of the mother during labour. None of the women were sedated to be un-cooperative during the second stage. However, the administration of the bolus dose did cause a sensation of light headedness in 16 patients lasting for less than five minutes and seven parturients had a vacant gaze with a slow nystagmic movement of the eyeball which lasted for about a minute. This may suggest that these side effects could be avoided or minimised if this dose was administered over a period of 15-30minutes. Sarkar et

al (31) have described an incidence of 14% of nausea and vomiting with the use of ketamine for labour analgesia. In this study it was seen that 2 women had vomiting, but they had these episodes before the study intervention and there was no worsening of the symptom.

EFFECT ON THE NEW BORN

Of the 30 babies, 28 had a Apgar score of more than 8 at 1min and all of them had a score of 9 and above at 5minutes. Of the two babies who had less Apgar score at the first minute, one was born to a primigravida at 40+3 weeks, who had her labour induced and was on an infusion of oxytocin for augmentation of labour. She had ketamine infusion at the rate of 0.2mg. kg-1.hr-1 and experienced good analgesia within 1hr of the infusion. After 3hrs of the study period she had variable decelerations of the fetal heart rate and per vaginal examination revealed meconium stained amniotic fluid and ketamine infusion was stopped. The infusion of oxytocin which was also stopped was restarted after 2 hrs and she continued to have variable decelerations of the fetal heart rate and was delivered by outlet forceps (4hrs after stopping the ketamine infusion).The baby was floppy and cyanosed at birth, and needed intubation suctioning and ventilation. However, after 1 min the respiratory efforts became regular and the endotracheal tube was removed. The Apgar score at the fifth minute was 9 and pH of the cord blood was 7.053. The second neonate was born to a multigravida at term, by normal vaginal delivery and had an Apgar score of 6 at the first minute. Throat suctioning and mask ventilation were done after which the respiratory efforts became regular and the Apgar at the fifth minute was 10 and cord blood pH was 7.084. The pH of the cord blood was analysed for all neonates and it ranged from 7.05-7.35 with a mean of 7.20 +/- 0.07 which is within the normal recommended range, (34) suggesting adequate fetal oxygenation.

All the babies were examined by the neonatologist and 3 of them were found to be clinically depressed at birth. Two babies had irregular respiratory efforts which improved with gentle throat suctioning and mask ventilation with oxygen. The third neonate who had severe respiratory depression as described earlier, was intubated and ventilated for 1min. Five babies were shifted to the nursery. Three of them were babies born by caesarean section and are routinely kept for observation for 24 hrs. The other 2 babies included, the one with severe respiratory depression at birth (described earlier) and a neonate born to a mother with impaired glucose tolerance test and previous early neonatal death Therefore, ketamine, which is inexpensive and readily available, can provide good pain relief to the parturients when administered intravenously at the rate of 0.15- 0.2mg.kg-1.hr-1. The minor side effects observed, were in relation to the bolus dose of 0.1mg.kg-1 given as a loading dose prior to initiation of the infusion. Despite this bolus dose, effective analgesia was established only by 2hours. Therefore, it seems that a higher loading dose should be administered, possibly, 0.2-0.4mg.kg-1 but this should be given over a period of 15-30 minutes. This would mean starting the infusion at a higher rate of 0.4mg.kg-1.hr-1 and reducing it to 0.15-0.2mg.kg-1.hr-1 within 30minutes. This study has shown that, intravenous low dose ketamine can provide effective labour analgesia. However, this dose regimen should be ratified on a larger population before being recommended as a standard technique of labour analgesia.

CONCLUSION

Although, systemic opioids, inhalational analgesia and regional techniques are widely used, effective control of labour pain with a technique which has minimal side effects on the parturient, the fetus and the progress of labour is yet to be found. Ketamine, a NMDA receptor antagonist, is shown to be an excellent analgesic. Although it is associated with unpleasant side effects, these can be minimised when ketamine is administered slowly in very low doses (0.1-0.2mg.kg-1.hr-1) while retaining its analgesic property.

In this study, ketamine was administered as a bolus of 0.1mg.kg-1, followed by an infusion of 0.2mg.kg-1.hr-1 to parturients in active labour and was found to provide effective analgesia with minimal side effects. This technique was found to be acceptable both to the parturient and the obstetrician. However, minor modification to this technique, namely, a loading dose of 0.4mg.kg-1.hr-1 given over a period of 30minutes followed by an infusion of 0.15-0.2mg.kg-1.hr-1, would ensure rapid onset of analgesia while minimizing the side effects due to the bolus administration of the loading dose. Since, the efficacy and safety of low dose intravenous ketamine as a labour analgesic has been established, a regimen, with slight modification, would be ratified on a larger population, before being recommended as a standard technique of labour analgesia.

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