

The Role Of Epidural Fentanyl In Painless Labour.

Basim Hrez Ali Al-Sudani*and Sahar Swadi Raheem*

الخلاصة

تسكين الأم الولادة المهبليّة الطبيعيّة عن طريق حقن علاج مسكن خلال قسطرة خارج الأم الجافية قد شهد تطورا خلال العشرين عاما المنصرمة فقد كان العلاج الوحيد المحقون هو ادوية التخدير الموضعية و لكن تم بعد ذلك اضافة ادوية اخرى مع ادوية التخدير الموضعية لتحسين نوعية تسكين الألم. الهدف من هذه الدراسة هو التأكد من كفاءة و تأثير عقار الفنتانيل المضاف الى ادوية التخدير الموضعية المحقونة من خلال قسطرة خارج الأم الجافية على نوعية الألم و على حالة الطفل المولود مقارنة بإعطاء هذه الأدوية بدون عقار الفنتانيل. هذه الدراسة أجريت على 30 امرأة حامل مهيأة للولادة المهبليّة الطبيعيّة تحت طريقة تسكين الألم بالحقن خلال قسطرة خارج الأم الجافية. جميع المريضات هن تحت تصنيف الدرجة الاولى من تصنيف الرابطة الامريكية لأطباء التخدير و أعمارهن بين 20-40 عاما و أطوالهن أكثر من 160 سم. تم تقسيم المريضات الى مجموعتين. المجموعة الاولى يتم حقن 8مل من ليدوكائين 0,75% مع 2 مل من محلول ملح (نورمال سلاين) للجرعة الاولى و الجرعات اللاحقة. المجموعة الثانية يتم حقن 8 مل من ليدوكائين 0,75% مع 20 مايكروغرام مخفف بمحلول النورمال سلاين الى حجم 2 مل. تمت دراسة المدة الزمنية لبدء التسكين و طول فترة التسكين و عدد الجرعات اللاحقة و حالة المولود في المجموعتين . اظهرت النتائج ان بدء عمل التسكين أسرع و طول مدته اطول و عدد الجرعات اللاحقة اقل في المجموعة الثانية مقارنة بالمجموعة الاولى و لا تأثير يذكر على حالة المولود. نستنتج من هذه الدراسة ان اضافة 20 مايكروغرام من عقار الفنتانيل سيكون فعالا و امنا و لا يؤثر على حالة المولود لذلك ينصح باستخدامه.

Abstract

Background: Epidural analgesia for providing Painless normal vaginal deliveries has been developed over the last 20 years, epidural local anaesthetics was the only available option. However, certain drugs were added with the local anaesthetics to improves the quality of analgesia.

Aims : to ascertain the efficiency of fentanyl added to the epidural local anaesthetics in comparison with the use of an epidural local anaesthetics alone.

Patient and methods : This study was carried out on 30 parturients prepared for painless normal vaginal delivery under epidural analgesia in Al-khuder general hospital.

*College of Medicine, Al-Qadisiya University.

All patients subjects according to American society of Anaesthesiologist (ASA) classification were grade 1 between 20-40 of age with length taller than 160 cm. Subjects were allocated into two groups (15 patients in each group):

Group A (n=15) received through an epidural catheter 8 ml lidocaine 0.75%+ 2ml normal saline for the first main dose and subsequent top up doses.

Group B (n=15) received through an epidural catheter 8ml lidocaine 0.75% + 20 microgram fentanyl diluted with normal saline to a total 2 ml volume for the first main dose and subsequent top up doses.

Onset of action of local anaesthetic , the interval from initial bolus dose to the maternal request for additional analgesia , the number of top up doses and the neonatal condition in both groups were recorded.

Results : the group B is associated with shorter onset of action , longer interval from initial bolus dose to the maternal request for additional dose and a lesser number of top up doses than group A.

The effect on neonatal condition manifested by APGAR score at 5 minute after delivery is similar in both groups.

conclusions : 20 microgram of fentanyl added to the usual dose of local anaesthetic epidurally is safe , effective and much better than the use of epidural local anaesthetic alone.

Introduction

Labour pain is of 2 kinds: It is in the field of obstetrics that epidural block become most popular. It is by far the most effective means of relieving pain in labour and is associated with better pain relief than are systemic opioids (1, 2).

Firstly, Visceral distention originating from rhythmic uterine contractions and progressive cervical dilatation causes much of the pain experienced during the first stage of labor. Afferent impulses from the cervix and uterus are transmitted to the spinal cord via segments T10-L1. This usually produces pain over the lower abdomen and quite often causes pain over the lower back and the sacrum as well. (3) . Secondly, the pain caused by stretching of the birth canal and perineum in the second stage of the labour which involves the pudendal nerve deriving from the sacral segments 2,3 and 4 . Although the second stage of labor is briefer than the first, the pain is usually more intense. Perineal pain due to stretching of the vagina, vulva and perineum is superimposed on the pain of

uterine contractions (4). Second-stage pain is principally somatic in nature and is transmitted through the spinal S2-4 segments .

Some women have excruciating pain during childbirth, whereas others experience only mild discomfort. Several variables may help physicians predict which parturients are more likely to have severe pain during labor and delivery, allowing them to know which patients would potentially receive the greatest benefit from epidural block. Some factors shown to correlate with greater pain during labor and delivery include the following: nulliparity, intravenous induction or augmentation of labor with oxytocin (Pitocin), younger maternal age , low back pain during menstruation and increased maternal or fetal weight (5) . Studies show an association between the use of epidural analgesia and a higher rate of cesarean delivery . However , women who select epidural analgesia are different from those who do not . They are more frequently nulliparous , come to the hospital earlier in the course of labour with the fetus having descended to a lesser degree (a higher fetal station) , have slower cervical dilatation , deliver large babies and have smaller pelvic outlet (6 , 7 , 8 , 9) . It is uncommon for spontaneously laboring parturients to request epidural analgesia before 3 cm of cervical dilation. However, women receiving augmentation of labor with oxytocin may request analgesia at minimal cervical dilation. It is appropriate to induce epidural analgesia after the diagnosis of active labor has been established and the patient has begun to request pain relief. Recent data do not support the conclusions of earlier studies that administration of epidural block before 5 cm of cervical dilation will adversely affect the subsequent course of labor (10)..

The use of epinephrine containing solutions in obstetrics remains controversial.It has been postulated that epinephrine will constrict uterine arteries and reduce placental blood flow,but this has not been confirmed by studies in which placental flow has been measured in humans.Moreover,if blood pressure is maintained,epidural block has been shown to cause a small but significant increase in placental flow.However,there is little need for epinephrine containing solutions during labour.Its use should be confined to test doses and possibly where a profound block is required for caesarian section. However, the problems appear in assessing the hemodynamic responses to such test doses in women with painful contractions (11).

Low-dose epidural infusions of fentanyl produce labor analgesia by a primary spinal action (12).

Detailed neurobehavioural testing of neonates has shown minor deviations from normal in some (though not all) studies when epidural block has been used in labour. It is doubtful if they have any clinical significance and, contrary to the early views expressed, it is doubtful if the specific local anaesthetics used make any difference to the incidence and severity of the observed abnormalities in neurobehavioural tests.(2)

Materials and Methods

30 healthy term parturients with cephalic single pregnancy from 38-42 weeks gestation who request labour analgesia were randomized to either epidural lidocaine group (Group A, n=15) or the epidural lidocaine plus fentanyl group (Group B, n=15).

Parturients with pre-eclampsia, diabetes, preterm labour, bleeding disorder, scoliosis, morbid obesity, having allergy to local anaesthetics and bloody CSF in the epidural catheter during the procedure were excluded. All parturients are taller than 160 cm in length, age between 25-40 years and ASA class 1.

In both groups, intravenous access was secured and a preload of 500 ml of Hartmann's (Ringer lactate) solution was given. Women were placed in sitting position when the cervix was 3-6 cm dilated and with strict aseptic precautions, mid lumbar epidural space L3-L4 / L4-5 was identified by using a loss of resistance technique with a 16G Touhy needle then an epidural catheter was inserted through the Touhy needle with the aim to place 5 cm of the catheter in the epidural space. Patient then placed in supine position. The following doses are recommended:-

Group A:

Test dose: 3 ml of 0.75% lidocaine with added epinephrine 1/100000.

First main dose and subsequent top ups:-

8 ml of 0.75% lidocaine plus 2 ml normal saline (total volume = 10 ml).

Group B:

Test dose : 3 ml of 0.75% lidocaine with added epinephrine 1/100000.

First main dose and subsequent top ups:-

8 ml of 0.75% lidocaine plus 20 micrograms fentanyl in 2 ml normal saline (total volume = 10 ml.).

Prerequisites :

- 1 . Aseptic technique.
2. Following test dose careful monitoring for blood pressure and heart rate every 5 minutes, monitoring for any weakness or signs of local anaesthetics toxicity.
3. Recording the following :
 - a . Onset of action of the analgesia by pin prick test .
 - b . Duration of analgesia of the main dose (time from the start of analgesia until the patient start feeling pain and request a further administration of analgesia .
 - c . Number of top up doses of analgesia required for the patient. This should be done on the request of the patient.
 - d . APGAR score : A score at 5 minute test should be estimated. A low score on the one-minute test may show that the neonate requires medical attention but is not necessarily an indication that there will be long-term problems, particularly if there is an improvement by the stage of the five-minute test (14) , therefore it is more accurate to do the a five-minute test
4. Following every top up dose, patient were monitored carefully for 10 minutes to detect any weakness or inadequate analgesia.
5. Continuous foetal heart monitoring.
6. No oxytocin drip during the administration of the local anaesthetics (foetal complications are increased if oxytocin and local anaesthetics are administered simultaneously.).
- 7.No amniotomy for 30 minutes before and after the administration of the local anaesthetic solution.
8. Foley's catheter is inserted.
- 9 .In the early stages of dilatation, the main dose can be given with the patient in supine position. In the later stages of dilatation (station 1 or more), and in the expulsive stage, the upper part of the body should be elevated by approximately 30-60° so that the lower segments are affected.

10 .After each dose,including the top-up doses,verbal contact must be established with the patient and a hearing test should be performed(whispered questions) so that changes in cranial nerves function as a consequence of a total spinal can be recognized early.

Results

1 . The study revealed an obvious decrease in the onset of action in group B compared with group A . The onset of action is between 5 – 15 minutes in 86.6% of cases in group B compared with 66.1% in group A . 7.3 % of cases in group A needs more than 30 minutes for the onset of action compared with 0 % in group B .(table 1).

2 . There were a significant difference in the quality of analgesia (the time from the initial main dose to the first top up dose) between the two groups.Group B patients takes a longer time to request for the first top up dose than group A patients. The duration of analgesia of the main dose is extended more than 1 hour in 60 % of cases in group A compared with 39.6% in group B (table 2) .

3 . Number of top up doses in the group B is less than in the group A. The average number in group B is about 2 top up doses compared with 1,46 top up doses in group A (table 3) .

4 . No changes in the condition of the neonate in both groups.The average of Apgar score at 5 minutes for the neonate in both groups is about 7.46. (table 4).

Table (1) Onset of action of local anaesthetics is obviously reduced in group B in compared with group A

Time(minute)	Group A		Group B	
	Number	%	Number	%
0-5	-	-	-	-
>5-15	10	66.1	13	86.6
>15-30	4	26.6	2	13.3
>30	1	7.3	-	-

Table (2) Duration of analgesia(Requirement of first top-up dose)

Time(minute)	Group A		Group B	
	Number	%	Number	%
<30	1	7.3	-	-
30-60	8	53.1	6	40
60-120	4	26.5	5	33.5
>120	2	13.1	4	26.5

Table (3) Number of top-up doses

case	Group A	Group B
Case 1	2	2
Case 2	2	1
Case 3	3	2
Case 4	2	2
Case 5	2	1
Case 6	2	1
Case 7	1	2
Case 8	2	1
Case 9	3	1
Case 10	2	2
Case 11	2	2
Case 12	2	1
Case 13	1	1
Case 14	2	1
Case 15	2	2

Average

30/15=2

22/15=1.46

Table (4) Apgar score at 5 minute.

case	Group A	Group B
Case 1	7	8
Case 2	8	7
Case 3	7	7
Case 4	5	6
Case 5	8	8
Case 6	9	9
Case 7	8	6
Case 8	8	8
Case 9	8	8
Case 10	8	8
Case 11	7	8
Case 12	6	6
Case 13	9	7
Case 14	6	8
Case 15	8	8

Average

112/15=7.46

112 /15=7.46

Discussion

As the main effect of fentanyl is through the spinal mechanism (12) and as its duration of action is relatively short (duration of analgesia is about 30-60 minutes), fentanyl was used safely together with local anaesthetics during epidural analgesia to augment the analgesic effect of local anaesthetics. In our study, the use of 20 microgram fentanyl in a total volume of 10 ml lidocaine epidurally during a painless labour result in a shorter onset of action and a longer duration of action of the analgesic effect. It also result in a reduction in the number of top up doses. This study showed that no obvious effect on neonatal condition after the use of this dose of fentanyl (the average Apgar score at 5 minutes in both groups is about 7.64), this is agreed with Viscomi C M (16) who reported that no effects on fetal heart variability or accelerations were observed when epidural fentanyl was given to women receiving adequate epidural lidocaine analgesia. In four studies, the addition of fentanyl to bupivacaine had no effect on neonatal respiration (17, 18, 19 and 20) and in two,

did not adversely affect neurobehavioral scores (19 and 20). This study also agreed with D.M.justins (14) who reported that fentanyl added to epidural bupivacaine infusions during labor does not depress neonatal respiration or adversely affect neurobehavioral scores and other indices of neonatal welfare, also this agreed with Chestnut, David H. M.D. (15) who reported that there were no significant differences between groups in Apgar scores during a continuous epidural infusion of 0.0625%Bupivacaine-0.0002% fentanyl during the second stage of labor.

In another study, 15 women undergoing elective cesarean section, fentanyl 1 microgram / kg given I.V. within 10 minutes of delivery produced an average cord blood : maternal blood ratio over 10 minutes of 0.31 with no respiratory depression was observed , and all neurobehavioral scores were normal at 4 and 24 hours (20) .This support our study in that epidural fentanyl 20 microgram even during the last top up dose is insufficient to result in a cord blood : maternal blood ratio that may result in respiratory depression or an abnormal neurobehavioral score.

Conclusions and recommendations

It is safe to use fentanyl 20 microgram epidurally together with epidural administration of lidocaine 0.75 % (total volume 10 ml) in both main and top up doses for achievement of a painless labour.

It result in a better analgesic effect, hastening the onset of action of local anaesthetic, reducing the number of top up doses, no deleterious effect on neonatal condition.

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