COMPARISON OF ETIDOCAINE AND LIDOCAINE FOR OBSTETRICAL ANALGESIA

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ETIDOCAINE is a relatively new local anaesthetic which is a member of the amide family. It has a formula which is similar to that of lidocaine. It has a high degree of lipid solubility and strong protein binding characteristics which should theoretically give it properties of rapid onset, long duration and rapid redistribution into tissue compartments with consequently lower blood levels and decreased toxicity. We here report on a series of 17 patients receiving epidural anaesthesia for vaginal delivery with 0.5 per cent etidocaine and compare them with a group of 21 patients receiving 2 per cent lidocaine for the same procedure.

METHOD

The patients selected for the study were healthy parturient women at full-term with no known intercurrent disease or complications of pregnancy. They were assigned to either the etidocaine group or the lidocaine group according to a randomized schedule. The patient was not aware of the group to which she was assigned but the investigators knew which drug was being used. Early in the series, patients receiving 1.0 per cent etidocaine and 0.5 per cent etidocaine were to form two separate groups, but it became obvious that 1.0 per cent etidocaine produced motor blockade too profound for vaginal delivery and the 1.0 per cent group was included with the 0.5 per cent group to form one group. All patients signed informed consent and the protocol was approved by the Human Research Committee of the University of Toronto. Epidural anaesthesia was induced in the lateral position just prior to delivery. All patients were pre-hydrated with a balanced salt solution and care was taken to avoid aorto-caval compression. The volume of each drug injected was 15 to 20 ml. Therefore the upper limit of etidocaine dosage was 200 mg and of lidocaine 400 mg. After the drug was injected the level of cutaneous analgesia was tested by pin-prick every minute until the level of anaesthesia was established. The level was rechecked every 15 minutes thereafter. The following parameters were recorded:

1. Quality of anaesthesia. This was considered to be satisfactory if delivery and episiotomy repair were accomplished without patient discomfort and with no supplementation required. Otherwise, anaesthesia was termed unsatisfactory.
2. Dose of drug.
3. Initial onset of sensory blockade.

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4. Complete onset of sensory blockade which was defined as the time at which the highest level was achieved.
5. Two-segment regression of sensory blockade.
6. Complete return of sensory function defined as that time at which no detectable sensory deficit to pin-prick could be determined.
7. Degree of motor blockade. This was scored as 0, 1, or 2. "0", the patient could flex knees and ankles completely. "1", implied free ankle movements with impaired knee flexion. "2", there were no knee or ankle movements.
8. Maternal blood pressure. A fall of greater than twenty torr systolic was considered significant hypotension.
9. Foetal Apgar scores at both one and five minutes.

The dose/segment relationship was established by dividing the total number of segments blocked by the volume of drug injected. The degree of motor blockade was compared by totalling the motor blockade scores (0, 1, or 2) for each patient and dividing by the number of patients studied.

RESULTS

The observations made in this study are contained in Tables I and II. The pertinent findings are summarized in Table III. The major differences between the drugs are the much lower percentage of satisfactory anaesthesia with etidocaine, the much greater variability in the time of onset of complete block with etidocaine as compared to lidocaine, the more profound motor block with etidocaine and the slightly longer duration of action of this drug.

DISCUSSION

Any local anaesthetic drug used for obstetrical anaesthesia should be safe for both mother and foetus, while producing pain relief and allowing enough motor function for active maternal co-operation in expelling the foetus. In this series of patients there was little to choose between lidocaine and etidocaine from the standpoint of safety. There were no toxic reactions observed with the dosage of the drugs used. Maternal hypotension was virtually absent and there was no foetal depression as judged by Apgar score. The work of Adams, *et al.* suggests that etidocaine is four times as potent as lidocaine and also four times as toxic when given intravenously, while it is only twice as toxic when given subcutaneously.¹ Therefore, it probably has a higher therapeutic/toxicity ratio for epidural anaesthesia than does lidocaine. Bromage suggests that etidocaine is twice as potent and twice as toxic as lidocaine, giving it a therapeutic/toxicity ratio of one.² In several large series of cases using etidocaine, the incidence of toxic reaction has been very low.^{2,3,5} Bromage suggests that if etidocaine is accidentally injected intravenously, it may be more toxic than lidocaine.² Although the evidence for this suggestion is not convincing, this possibility should be kept in mind and, as with any local anaesthetic, care should be taken to prevent intravascular injection.

There are areas in which the differences between the drugs highlight the inadequacies of etidocaine for obstetrical epidural anaesthesia. First, there was a very

TABLE I
ETIDOCAINE RESULTS

Patient	Age	Dose 0.5% in mg	Initial sensory onset time in min	Complete sensory block time	Two-segment regression of sensory blockade	Complete return of function	No. of dermatomes blocked	Motor block	Quality of anaesthesia S - satisfactory U - unsatisfactory	Apgar score 1 min/ 5 min	Hypotension greater than 20 torr systolic
1	28	75	7	10	88	158	13	1	S	7/10	
2	22	75	8	18	135	180	11	1	S	9/10	
3	32	75	5	20	75	105	11	1	U	9/10	
4	29	95	8	14	120	300	12	1	S	8/9	
5	23	95	4	11	86	263	16	1	S	7/8	
6	23	90	4	10	105	185	12	1	S	9/9	
7	27	75	8	10	67	117	12	2	S	8/10	
8	31	75	5	20	150	160	16	1	S	8/9	
9	19	75	10	15	60	120	15	1	S	9/10	
10	22	75	15	20	75	135	10	1	U	9/10	
11	24	75	10	20	120	210	13	1	U	9/10	
12	32	75	17	62	82	112	?	0	U	8/9	
13	21	75	5	20	?	?	12	1	S	8/9	
14	22	150	7	18	30	90	12	1	U	9/10	
15	26	200	8	43	93	163	14	2	S	8/10	
16	27	200	7	12	55	270	12	1	S	8/10	
17	21	75	5	5	49	64	14	0	S	9/9	

TABLE II
LIDOCAINE RESULTS

Patient	Age	Dose 2.0% in mg	Initial sensory onset time in min	Complete sensory block time	Two-segment regression of sensory blockade	Complete return of sensory function	No. of dermatomes blocked	Motor block	Quality of anaesthesia S - satisfactory U - unsatisfactory	Apgar score 1 min/ 5 min	Hypotension greater than 20 torr systolic
1	28	300	8	15	30	75	12	1	S	9/10	
2	27	300	3	15	65	110	13	0	S	8/9	
3	22	300	3	10	70	130	15	0	S	8/8	
4	20	300	4	10	45	70	12	0	S	7/8	
5	28	400	7	15	135	165	12	0	S	9/9	Yes
6	21	400	5	12	60	180	15	1	S	9/10	
7	25	400	5	11	60	150	14	0	S	8/8	
8	33	400	5	7	50	150	13	1	S	10/10	
9	22	400	7	7	60	120	14	0	S	8/9	
10	27	400	5	10	?	180	15	0	S	8/9	
11	22	400	5	10	90	165	10	1	U	8/9	
12	26	400	5	15	60	120	15	2	S	9/9	
13	22	400	2	7	70	120	18	1	S	8/9	
14	31	400	5	15	90	240	14	0	U	8/9	
15	20	400	4	6	145	160	14	1	S	8/9	
16	24	400	6	16	80	150	14	1	S	8/9	Yes
17	21	400	5	5	150	210	12	0	S	10/10	
18	24	400	5	7	?	210	13	0	S	8/9	
19	23	400	5	8	90	120	13	1	S	7/9	
20	20	400	5	7	120	180	12	1	S	7/8	
21	17	400	5	8	45	90	11	0	S	10/10	

TABLE III
SUMMARY OF RESULTS

	Lidocaine (2)	Etidocaine (0.5%)*
Percentage satisfactory anaesthesia	19/21 (90%)	12/17 (71%)
Dose/Segment relationship cc/segm.	1.4 ± 0.21	1.3 ± 0.24
Initial sensory onset time (min)	5 min ± 1.3 (2-8)**	7.8 ± 2.7 (4-17)**
Complete sensory onset time	10 min ± 3.5 (5-16)**	19 ± 13.6 (5-62)**
Duration to two-segment regression	74 min ± 32 (30-150)	87 ± 34 (30-150)
Complete return of sensory function	148 ± 44 (70-240)	165 ± 65 (64-300)
Motor block (ave. score)	0.57	1.0
Hypotension (20 torr Systolic)	1	0
Apgar Score - 7-1	21	17
Apgar Score - 0-6	0	0

*Three patients received Etidocaine 1 per cent.

±, standard deviation.

(), range.

**Significant difference $p < 0.01$.

high incidence of unsatisfactory anaesthesia as judged by complaints of pain from the patient. This is most likely due to the low concentration of etidocaine used. This concentration in many cases was not high enough to produce good sensory analgesia, although sensory levels as measured by pin-prick were adequate.

Lund has shown that with increasing dosage of the drug satisfactory anaesthesia increased accordingly.³ With lidocaine one can increase the concentration to 2 per cent and thus the dosage without producing a great degree of motor blockade. Etidocaine, however, produces much more intense motor blockade at the 0.5 per cent concentration than lidocaine 2 per cent and clearly at the 1 per cent concentration the blockade is so great as to prevent adequate maternal effort in the second stage of labour.² This is the reason we abandoned 1 per cent etidocaine very early in this series.

Although others have presented data to show that the onset of analgesia as well as the time to complete block with etidocaine is more rapid^{2,3} than with lidocaine, we find that the onset and time to complete block are marginally slower. The patient variation is great with the onset rapid in some instances and very prolonged in others. This is not the ideal situation in obstetrical anaesthesia, for in many instances the baby cannot wait for the block to be complete, with consequent unsatisfactory anaesthesia and the obvious danger to a foetus which might be experiencing distress. The reason for this unpredictability in the time to complete sensory block with etidocaine is at present unclear to us. For these reasons it would appear that etidocaine has no real place in epidural anaesthesia for obstetrics. However, we are presently evaluating 1 per cent etidocaine for surgical anaesthesia in the hope that this concentration of drug will produce better sensory blockade in a situation where muscle relaxation may become advantageous.

SUMMARY

Etidocaine, a relatively new local anaesthetic agent, is compared with lidocaine for use in epidural anaesthesia for vaginal delivery. The parameters compared were quality of anaesthesia, dose of drug, onset and regression of sensory blockade, complete degree of motor blockade, effect on maternal blood pressure, and foetal Apgar scores at one and five minutes. The major differences between the drugs are

the lower percentage of satisfactory anaesthesia with etidocaine, the much greater variability in the time of onset of complete sensory block with etidocaine as compared to lidocaine, the more profound motor block with etidocaine, and the slightly longer duration of action of this drug. It is concluded that etidocaine has no real place in epidural anaesthesia for obstetrics.

RÉSUMÉ

Les auteurs comparent l'étidocaïne à la lidocaïne comme agents d'anesthésie péridurale pour des accouchements par voie vaginale. On a comparé les deux agents sur les points suivants: qualité d'anesthésie, dose de médicament, début et durée du blocage sensitif, intensité du bloc moteur, effets sur la pression artérielle de la mère et le "score Apgar" à une et à cinq minutes.

Les principales différences notées entre les deux agents ont été un pourcentage plus bas d'anesthésie satisfaisante avec l'étidocaïne, un bloc moteur plus intense avec l'étidocaïne et la durée d'action légèrement plus longue de cet agent. Il semble que l'étidocaïne n'offre pas d'avantages suffisants en anesthésie obstétricale pour y avoir place.

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