CLINICAL EVALUATION OF ETIDOCAINE IN CONTINUOUS CAUDAL ANALGESIA FOR VAGINAL HYSTERECTOMY

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SYNOPSIS

A randomised double-blind trial was carried out between 1% etidocaine and 1.5% lignocaine (both with 1/200,000 adrenalin), using the caudal approach for vaginal hysterectomy on 40 patients. Etidocaine was found to be effective clinically as a local anaesthetic, with a rapid onset of action and good muscle relaxation, though limited somewhat by the high incidence of visceral pain.

The clinical efficacy of etidocaine for intra-operative procedures is worthy of further clinical trials.

INTRODUCTION

In recent years, great interest has centered around the development of newer local anaesthetics with a prolonged duration of action. Structurally a xylidide, related to lignocaine (Fig. 1), etidocaine (Duranest®, W 19053) was first described by Adams *et al* (1972) to have a long duration of action in animals. Subsequent studies in man (Popper *et al*, Bridenbaugh P.O. *et al*, 1972; Lund *et al*, 1973) revealed similar findings.

A clinical trial was thus undertaken to evaluate the clinical effectiveness of etidocaine for vaginal hysterectomy.

MATERIALS AND METHODS

40 female patients, all in ASA I or II, and scheduled for vaginal hysterectomy, were selected for the double-blind trial. 20 of them received 1% etidocaine with 1/200,000 adrenalin, whilst the other 20 received 1.5% lignocaine with 1/200,000 adrenalin, allocation being made randomly by drawing lots from a box. The mean age, weight, and height of patients in the 2 study groups are shown in Table I; the difference between the 2 study groups are not statistically significant.

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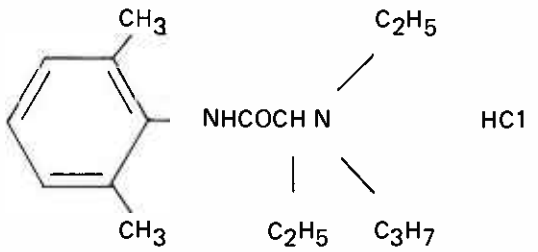
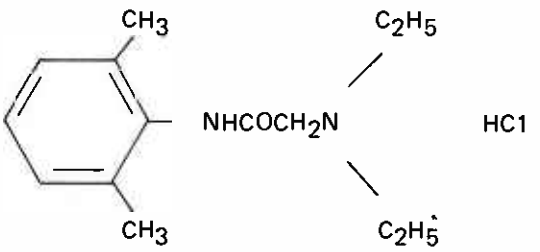
Anaesthetic Technique

The anaesthetic technique used is as described by Seow *et al*, 1976.

All patients were premedicated with 10 mg valium orally 2 hours before operation. An intravenous drip of 5% dextrose was set up. Caudal analgesia was then induced using a standardised technique. With the patient prone, a 16-gauge Tuohy



Etidocaine



Lignocaine

Fig. 1. Formulae of local anaesthetic agent.

needle was inserted through the sacrococcygeal membrane into the sacral canal. Entry into the epidural space was confirmed by the loss of resistance technique with an air-filled syringe. After giving a test dose of 5 ml local anaesthetic, a fixed length of PVC catheter was next threaded through the Tuohy needle into the epidural space. A further 20 ml of local anaesthetic was subsequently injected through the catheter as soon as patient was turned supine.

This technique was consistently performed by a single investigator, and a separate observer, not knowing the drug dispensed, was responsible for assessment of blockade.

Criteria of Blockade

Sensory and motor blockade were assessed as soon as the analgesic solution was injected and subsequently at 3-minute intervals.

1. Effective analgesia was considered attained when there was no response to clamping of the 4 perineal quadrants with an Allis forceps. If sensory blockade was absent at any of the 4 quadrants, a further 10 cc of the local anaesthetic was given—these patients were excluded from analysis of latency of onset below.
2. Intensity of motor blockade was assessed by Bromage's technique:

   Grade 1— complete paralysis: unable to move feet or legs

   Grade 2— almost complete paralysis: able to move feet or knees

   Grade 3— partial paralysis: able to lift legs but not sustained

   Grade 4— no paralysis: full flexion of knees and feet.

Supplementation of Local Anaesthetics

1. If patient was anxious, intravenous valium 10 mg was given after above assessment of blockade and before commencement of surgery.
2. If patient complained of pain at any time during operation, N_2O: O_2 in ratio of 3:3 litres was administered.
3. If effective analgesia was not attained, general anaesthesia (GA) with thiopentone, N_2O: O_2 and 0.5% halothane was used.

Quality of Anaesthesia

1. Excellent—if no supplementation of N_2O or GA was required.
2. Satisfactory—if analgesia was present but some supplementation with N_2O was required.
3. Unsatisfactory—no effective analgesia at all and GA was required.

RESULTS

1. Latency of Onset

The mean onset of complete analgesia of etidocaine and lignocaine was 6.45 minutes and 8.21 minutes respectively, there being no statistically significant difference between the 2 groups (Table II). One lignocaine patient who required a pre-operative top-up dose to attain complete analgesia was excluded in the analysis.

3 etidocaine patients and 5 lignocaine patients had a delayed onset of analgesia in the L_5 and S_1 dermatomes, the delay after blockade of other sacral and lumbar segments ranging from 3 to 21 minutes. This difficulty in blocking L_5 and S_1 dermatomes has been noted by several workers.

2. Highest Level of Sensory Analgesia

The highest level of sensory analgesia reached by the 2 drugs were comparable, averaging 15.85 segments anaesthetised for etidocaine and 14.00 segments for lignocaine (Table II). The lower limit of spread was dermatome S_5 in every patient.

3. Degree of Motor Blockade

Etidocaine caused a more marked degree of motor paralysis when compared with lignocaine (Table III). 11 etidocaine patients (55%) developed complete paralysis of legs as opposed to 2 lignocaine

TABLE I

CHARACTERISTICS OF PATIENTS IN THE 2 STUDY GROUPS

	Etidocaine (20 cases)		Lignocaine (20 cases)	
	$\bar{x}$	SD	$\bar{x}$	SD
Age (yrs)	55.95	10.81	53.90	12.25
Weight (kg)	55.56	9.82	50.75	9.88
Height (cm)	150.53	6.34	151.75	7.15
Operative time (mins)	92.35	25.25	84.00	27.90

TABLE II

MEAN VALUES OF SENSORY BLOCK

	Etidocaine			Lignocaine		
	n	$\bar{x}$	SD	n	$\bar{x}$	SD
Latency of onset (mins)	20	6.45	4.21	19	8.21	4.58
Highest level of analgesia (no. of segments)	20	15.85	5.46	20	14.00	4.97

TABLE III

INTENSITY OF MOTOR BLOCK

Intensity	Etidocaine (20)	Lignocaine (20)
Grade 4	0	2
Grade 3	2	2
Grade 2	7	14
Grade 1	11	2

patients (10%)—this difference is statistically significant ($p < 0.01$).

4. Clinical Effectiveness

Excellent analgesia was obtained in only 11 etidocaine patients (55%) and 13 lignocaine patients (65%). Of the remaining 9 etidocaine patients, 7 (35%) had satisfactory analgesia, with N_2O supplementation for relief of visceral pain encountered during traction of the uterus, whilst 2 (10%) had such severe visceral pain as to require GA for continuation of operation. In the case of the remaining 7 lignocaine patients, 5 (25%) needed N_2O supplementation and 2 (10%) GA for the same reasons.

5. Intra-operative Top-up Dose

3 etidocaine patients (15%) and 4 lignocaine patients (20%) required one intra-operative top-up dose of the respective drug for completion of surgery—the mean duration of operative time being not significantly different in the 2 groups (Table I).

6. Duration of Analgesia

The duration of analgesia as measured from the onset of complete analgesia to the time the patient required post-operative pain relief was not significantly different in the 2 groups—for etidocaine and lignocaine, the mean values being 382.23 minutes and 363.00 minutes respectively (Table IV). 7 patients in each group were excluded from this analysis because they required intra-operative top-up dose or required GA or did not require any post-operative top-up dose.

TABLE IV

DURATION OF SENSORY ANALGESIA

	Etidocaine (13)	Lignocaine (13)
<120 mins	0	1
120—	1	3
240—	8	5
360—	1	1
480—	2	0
600—	1	3
$\bar{x}$ (mins)	383.23	363.00
SD	123.3	251.0

7. Side-effects

The frequency of side-effects in the 2 study groups were comparable (Table V). Shivering was noted in 4 etidocaine patients (20%) and 9 lignocaine patients (45%), most of them complaining of cold when pushed into the cold operating room. In view of the great variety of factors, such as adrenalin added, the local anaesthetic itself, ambient temperature, which might have been responsible for the shivering, it was not possible to correlate the incidence of shivering to the local anaesthetic agent itself.

Transient local discomfort or mild pain on injection was experienced in 15 etidocaine patients (75%) and 9 lignocaine patients (45%). Bromage attributed such phenomenon to the local irritation caused by the rather marked acidity of the local anaesthetic solution. In our study, the ph values of 1% etidocaine and 1.5% lignocaine, both with freshly added adrenalin, were 3.91 and 4.01 respectively.

No systemic toxicity was observed in either group. Any adverse effects on cardiovascular system were secondary to sympathetic blockade by the local anaesthetic agent. Blood pressure fell below diastolic level in 6 etidocaine patients (30%) and 4 lignocaine patients (20%), and warranted intervention with ephedrine and intravenous fluids. 6 etidocaine patients (30%) and 5 lignocaine patients (25%) developed bradycardia of less than 60/min and were treated with IV atropine 0.6 mg.

TABLE V

INCIDENCE OF SIDE-EFFECTS

	Etidocaine (20)	Lignocaine (20)
Visceral Pain	9	7
Shivering	4	9
Local Pain	15	9
Vomiting	3	3
Reduced BP	6	4
Reduced PR	6	5

DISCUSSION

The clinical evaluation of the efficacy of local anaesthetic agents is beset with many problems (Covino and Bush, 1975). An attempt was made to obviate these difficulties by the use of a double-blind trial, using the same investigator and a separate assessor throughout the study, and a standardised technique and site of injection for the same operation.

The longer duration of action of etidocaine has been demonstrated on animals (Adams *et al*) and in man (Bridenbaugh and Moore, 1972; Lund, 1973). In our study, etidocaine was found to have a long duration of action, though not significantly longer than lignocaine. However, it should be borne in mind that duration of action was taken from the onset of complete analgesia to the first post-operative dose, this interval being influenced by numerous factors which might prolong the effect of local anaesthetics, such as premedication, intra-operative supplementation with valium, blood loss, etc. Furthermore, vaginal hysterectomy is done on older patients who are usually stoical, and may thus give a false impression of an excessively long action of a local anaesthetic agent.

Unlike other long-acting local anaesthetic, etidocaine has a rapid onset of action, comparable with lignocaine (Scott, Jebson and Boyes, 1973; Poppers *et al*, 1974; A.R. Abdel Salam *et al*, 1975). This was corroborated in our study, when the drug was given via the caudal route.

The ability of etidocaine to block motor nerves has been demonstrated by several workers (Lund *et al*, 1973; Bromage *et al*, 1974). This profound muscular relaxation with etidocaine would provide ideal operating conditions for abdominal, pelvic and lower extremities surgery. However, this would be a setback if the drug is to be used primarily for pain relief, such as post-operative analgesia and obstetric analgesia.

The observation of discomfort or pain on intra-abdominal manipulation has also been previously reported (Bridenbaugh P.O. *et al*, 1974; Lund *et al*, 1974). This phenomenon of inadequate visceral anaesthesia is not unique for etidocaine, but occurs with other currently used local anaesthetics such as lignocaine and mepivacaine (Bridenbaugh P.O. *et al*, 1974). Our study showed that with 1% etidocaine and 1.5% lignocaine, comparable incidence of visceral pain requiring supplementation or GA was seen. This would be a serious disadvantage to the use of either drug in intra-abdominal procedures. However, the visceral pain during pelvic surgery can be markedly reduced or eliminated by adequate premedication and slow injection of an adequate dose of etidocaine in the $L_{4,5}$ interspace with head-up position, or supplementation with light GA. It is also important not to allow surgery to commence too early because skin analgesia is present before there is adequate blockade of the various visceral nerve components (Lund).

In view of the small number of patients involved in this study, firm conclusion cannot be drawn as to the usefulness of etidocaine in clinical practice. 1% etidocaine has been found to have a rapid onset of action, long duration of analgesia and marked motor relaxation, factors favourable for intra-abdominal procedures. However, the high incidence of visceral pain may detract some of the value of the drug for surgery. Further clinical evaluation along this line is thus required.

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