Our Experience with Ethrane (Enflurane)

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Introduction

Enflurane (or Ethrane) is a stable fluorinated methylethyl ether (Fig. 1). The drug was synthesized by TYRELL in 1963. It is a colourless volatile liquid without any chemical stabilizer. The anaesthetic properties of ethrane were studied by VIRTUE et al[1] and they described them generally similar to those of Halothane. Further clinical works were done by DOBKIN, BLACK, ADAMS and others[2,3,4]. They found that enflurane is a satisfactory anaesthetic drug. It is usually administered from a specially calibrated vapourizer through a standard anaesthetic circuit with or without Soda-lime. The minimum alveolar concentration (MAC) of enflurane which is necessary for anaesthesia is 0.6% in a mixture of 70% Nitrous Oxide in Oxygen and 1.7% in Oxygen.

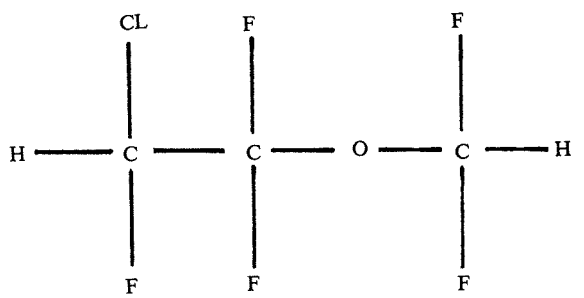

Fig. 1: The chemical structure of enflurane.

Only about 2% of the inspired concentration of enfurane undergoes bio-transformation in the body. It gives out fluoride ions. But quantitatively ethrane does not produce blood levels which would cause nephrotoxicity even on prolonged exposure[5,6]. (The critical value 50U M/L). ROYSTON et al analysed respiratory characteristics during enflurane anaesthesia and found an average respiratory rate of 21/min. and tidal volume of 240ml.[7] This is also observed that emergence from anaesthesia is faster after enflurane anaesthesia with no respiratory depression and less nausea and vomiting. In some cases it may cause cerebral excitation leading to seizure like activity. Enflurane produces different degrees of muscular relaxation at different depths of anaesthesia.

Patients

Twenty-five patients were randomly selected from the elective operation lists. The age ranges from 6 years to 85 years. There were 15 males and 10 females. Some of them were specially chosen as they were having repeated anaesthesia. All of them are of ASA I – II status (except one for Laparatomy with jaundice who was with risk). The disposition of operations are shown in Table I. The operating time varied from 30 minutes to 150 minutes. Five patients were ventilated by mechanical ventilator. The rest of them were with spontaneous respiration.

TABLE I

Type of Surgery	*Number of Patients*
1. Appendisectomy	4
2. Cystoscopy	4
3. Excision of lump of Breast	3
4. Herniorrhaphy	3
5. Haemorrhoidectomy	2
6. Laparatomy with Jaundice	1
7. Laparatomy and Cholecystectomy	3
8. Prostatectomy	2
9. Spleenectomy	1
10. Thyroid lobectomy	2
Total	25

Methods

All patients were premedicated with a Benzodiazepine and Atropine with variable doses. Atropine was not given in patients for thyroid surgery.

Induction was done with Thiopentone Sodium, Suxamethonium, Lignocaine throat spray and endotracheal intubation. The lungs were ventilated manually using Magill or Bain circuit fitted with antipollution scavenging system.

The patients were given a mixture of 60% Nitrous oxide, 40% Oxygen and enflurane. Enflurane was

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administered from Enfluratec (calibrated enflurane vapourizer). The inspired concentration was adjusted by dial settings according to the situation. The patients who were given a relaxant and ventilated were given 0.6% to 1% enflurane where as the patients with spontaneous respiration received 1.5% to 3% enflurane in the inspired gas mixture.

A small dose of (1 – 2U g/KG) Fentanyl was given to maintain analgesia throughout the operation. All patients were extubated in the operating theatre at the end of the operation.

Monitor

Heart rate and E.C.G. was continuously displayed on a monitor during the whole period of anaesthesia. Systolic blood pressure was recorded at five minutes interval by a oscillotonometer. Tidal volume was measured by Wright's respirometer. Carbon dioxide analyser was used to measure the expiratory CO_2 percentage.

Results

Anaesthesia was satisfactory during the whole period of operation. The cardiovascular parameters were stable. There was increased Tidal volume with the lighter plane of Anaesthesia. A stable tidal volume indicated satisfactory depth of Anaesthesia. The end expiratory CO_2 was within normal limit. Mascular relaxation was adequate for appendisectomy, herniorrhaphy without any added muscle relaxant. There were no convulsions or seizure at the emergence from anaesthesia. Recovery from anaesthesia was quicker and patients could be sent back to the ward earlier when they were wide awake and responded rationally to questions. Our findings conform with the findings in other centres (Induction with enflurane up to 5% in 60% N_2O and 40% O_2 took us quite a long time).

Conclusions

Ethrane is quite a useful anaesthetic. It can be used for various types of surgery. The properties – Cardiovascular stability, quick recovery without respiratory depression – make it an anaesthetic of choice for many suitable operations.

All evidence suggests that enflurane has a low potential for long term toxicity. It is always wise to use a scavenging system. The peak concentration that can be inhaled by the theatre staffs are astonishingly high. Sometimes over 3000 ppm of Nitrous oxide for as long as 10 minutes, may impair mental performances[8] we feel in the same way as others feel, that the volatile anaesthetics which are used today, are far from perfect, because of the association between biotransformation and toxicity.

So it would be wise to use anaesthetics which are inert or only a very small amount metabolised in the body.

Our present knowledge about uptake, distribution and elimination together with the idea of Minimum Alveolar Concentration (MAC) should give us a rational assesment of a newer anaesthetics as they are being developed.

Acknowledgement

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