The precise explanation of these findings is uncertain. Bonta, Goorissen & Derkx (1968), however, showed in the cat that pancuronium blocked the fall of arterial pressure induced by vagal stimulation. This suggests that our results may perhaps be due to depression of inhibitory vagal influences, although clearly other interpretations are possible.

REFERENCES

BONTA, I. L., GOORISSEN, E. M. & DERKX, F. H. (1968). Pharmacological interaction between pancuronium bromide and anaesthetics. *Eur. J. Pharmac.*, **4**, 83–90.

GABE, I. T., TUCKMAN, J. & SHILLINGFORD, J. P. (1962). Determination of relative changes in cardiac output from noncalibrated earpiece dye-dilution curves. *Circulation Res.*, **11**, 405–413.

MCDOWELL, S. A. & CLARKE, R. S. J. (1969). A clinical comparison of pancuronium with d-tubocurarine. *Anaesthesia*, **24**, 581.

The use of post-operative vomiting as a means of evaluating anti-emetics

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The multiplicity of factors which predispose to nausea and vomiting make the reliable evaluation of anti-emetic drugs difficult. One can give them to patients with established emesis, or use them prophylactically in a situation where vomiting is expected in a known proportion of cases. Post-operative vomiting falls into this latter group. Sufficiently large numbers of patients have operations of comparable severity and duration to form a standard population on which studies can be carried out.

Our experience has shown that patients scheduled for minor gynaecological surgery form a suitable group for such studies. Anaesthesia can be kept constant with methohexitone–nitrous oxide–oxygen, but emetic sequelae are uncommon in the absence of opiate premedication. Other factors influencing the incidence of sickness are the duration of anaesthesia, necessity for dilatation of the cervix, the degree of ambulation and fluid restrictions and ward surroundings.

It is feasible to visit patients at 1 and 6 h after operation and record the occurrence of any emetic effects during this time. Prolonging the study after 6 h causes problems because of visitors, eating, ambulation and also the tendency to sleep. With half the subjects on each series having cervical dilatation, groups of 100 patients give reproducible results. These numbers are required to minimize differing individual tendency to motion sickness, etc. (Morrison, Hill & Dundee, 1968).

TABLE 1

Pre-anaesthetic medication	% Vomiting	% Nausea	% Nil
Saline	11	7	82
Pethidine 100 mg	40	24	36
with cyclizine 50 mg	16	19	65
trimethobenzamide 100 mg	17	23	60
promazine 25 mg	22	30	48
trifluprom azine 10 mg	21	10	69
propromazine 20 mg	16	15	69
promethazine 25 mg	10	22	68
thiethylperazine 10 mg	12	13	75
perphenazine 5 mg	7	9	84
,, 2·5 mg	8	11	81
hyoscine 0·4 mg	20	20	60
metoclopramide 10 mg	10	21	69
diazepam 10 mg	32	16	52

With this method it has been demonstrated that the control incidence (saline premedication) of 18% nausea and vomiting during the first 6 post-operative hours is increased to 60% by 10 mg morphine and to 64% by 100 mg pethidine. Table 1 shows some of the findings with pethidine (100 mg) and with pethidine combined with anti-emetic premedication.

The doses of the anti-emetics were those commonly used in clinical practice. In this data when nausea and vomiting occurred together this was recorded as vomiting which also included retching. While many compounds reduce the incidence of vomiting, of those studied perphenazine was the only one to reduce markedly the incidence of nausea, and it was the most effective anti-emetic, even in doses of 2·5 mg. Similar studies are being carried out with morphine 10 and 15 mg as the stimulus.

If enough patients are available, this is a reliable method of studying anti-emetics and it can also be used to compare the emetic action of different opiates, different doses of the same opiate, or other drugs which can be given as premedication.

REFERENCE

MORRISON, J. D., HILL, G. B. & DUNDEE, J. R. (1968). Studies of drugs given before anaesthesia. XV. Evaluation of the method of study after 10,000 observations. *Br. J. anaesth.*, **40**, 890–900.

A method of inducing stress for the assessment of drugs in man

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Conventional monitoring has proved inadequate for the assessment of circulatory homoeostasis in anaesthetized patients since it gives no indication of failure until collapse is imminent.

Accordingly a method of inducing stress which it was hoped would reflect circulatory reserve was devised and investigated. The stress used was the application of a sudden sharp increase in intra-thoracic pressure and is a modification of the original manœuvre described by Valsalva. After consent had been obtained the method was tested in eight male patients whose average age was 57 years (range 35 to 72) and who represented a cross-section of anaesthetic risk from good to poor. After premedication with pentobarbitone (200 mg intramuscularly) anaesthesia was induced with 5% thiopentone (250–500 mg intravenously) and intubation carried out after the injection of suxamethonium (40–100 mg intravenously). Anaesthesia was maintained with halothane and oxygen in a semi-closed circle system with carbon dioxide absorption. An Aga pressure relief valve prevented the pressure in the circuit ever exceeding 40 cm H_2O when the system was completely closed at intervals during anaesthesia. Simultaneously, and with the reservoir bag compressed, a high-flow oxygen supply was fed into the circuit. This had the effect of immediately raising the intra-thoracic pressure to 40 cm H_2O, where it was maintained for 30 s.

A single non-conventional e.c.g. chest lead was used to check the heart rate and rhythm. The blood pressure was measured from a catheter inserted percutaneously into the radial artery and the right atrial pressure was measured by means of a polyethylene catheter threaded into the right heart from a superficial vein. A volume plethysmograph attached to a finger indicated peripheral blood flow. All four variables were suitably displayed and charted.