DIAZEPAM IN PULMONARY SURGERY

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DIAZEPAM is a derivative of benzodiazopine which has attracted the interest of anaesthetists since its introduction in 1961. Its sedative effect is intermediate between the neuroleptics and the tranquilizers which are often useful in anaesthesia, and we have studied its usefulness in patients undergoing pulmonary surgery.

Our observations will be presented as a comparative study of two series of cases, in one of which diazepam was used (54 cases), and in the other of which a standard premedication was used with thiopentone induction for anaesthesia for pulmonary surgery (56 cases).

METHODS

The patients were selected at random. There were 35 cases of pulmonary tuberculosis (diazepam 18, thiopentone 17), 68 cases of cancer (diazepam 34, thiopentone 34), and 7 cases of bronchiectasis (diazepam 2, thiopentone 5), making a total of 110 patients. These patients differed in age, sex, weight, pathology, and anaesthetic risk, and required different types of surgery.

Although the patients were chosen at random, irrespective of the nature of the operation and the pathology, a strict procedure was followed in evaluating the anaesthetic risk (according to the classification of the American Society of Anesthesiologists), while making the observations and during the administration of the anaesthetic.

Procedure

The blood pressure was measured by indirect stethoscopy, controlled occasionally by direct readings and recordings on an electrospigmomanometer. The heart rate and ECG were observed and recorded on an oscilloscope and electrocardiograph. The tidal ventilation was monitored by a Wright respirometer. Finally, the blood pressure and heart rate before and after the induction of anaesthesia were accurately compared.

The anaesthetic techniques were as follows:

1. Premedication. Either (*a*) our standard premedication with oral Noludar,[®] secobarbital, or Tuinal[®] (with or without diphenhydramine or promethazine) the night before, and meperidine or aneleridine, diphenhydramine (Benadryl) and atropine intramuscularly one hour before induction, or (*b*) premedication with diazepam (*per os* and intramuscular).

2. Induction of anaesthesia with intravenous thiopentone or diazepam.

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3. Anaesthesia maintained with halothane, and succinylcholine as required for muscular relaxation.

4. Pulmonary ventilation controlled with a Bird-type respirator, in association with a Vernitrol anaesthetic apparatus and a double lumen catheter (Carlens or White-Carlens).

RESULTS

The results are presented in the form of tables. Table I shows the mean ages and weights of the two groups of patients, while Tables II and III indicate the distribution of anaesthetic risks in these two groups and the respective dosages of diazepam and thiopentone. It can be seen from Table II that there were no "moribund" patients (category 5) and that patients who received diazepam included a greater number of "bad risks" (categories 3 and 4).

TABLE I

Drug	Number of patients			Age (yrs)		Weight (lbs)	
	male	female	total	mean	range	mean	range
Valium	39	15	54	45.9	17-69	135.7	85-260
Thiopentone	46	10	56	49.7	16-74	135.5	90-205

TABLE II

ANAESTHESIA RISK

	I	II	III	IV
Valium	11	20	15	8
Thiopentone	19	22	13	2

TABLE III

INDUCTION DOSE

	Dosage (mean)	Range	mg/kg
Valium	28.1	20-60	.46
Thiopentone	433.8	140-625	7.11

Table IV illustrates the changes in arterial pressure in our patients. Those receiving diazepam showed no significant modification of the blood pressure, either systolic or diastolic. On the other hand, the patients who were given thiopentone suffered a sharp fall in pressure, which was statistically highly significant.

The spirometric data given in Table V indicate a marked difference between the two groups; there was only a slight diminution of the tidal volume with diazepam, in contrast to an almost complete apnoea with thiopentone.

TABLE IV
BLOOD PRESSURE
(mm Hg with 95% confidence limits)

	Before induction		After induction	
	systolic	diastolic	systolic	diastolic
Valium	117.2±3.24	75.3±1.97	113.0±2.99	74.1±2.61
Thiopentone	121.9±3.84	78.3±2.13	97.1±2.54	69.4±1.50

TABLE V
SPIROMETER READINGS
(with 95% confidence limits)

	Before induction	After induction
Valium	524.4±32.95	482.9±38.28
Thiopentone	559.8±24.4	42.4±33.34

TABLE VI
PULSE
(with 95% confidence limits)

	Before induction	After induction
Valium	89.5±2.72	88.9±2.97
Thiopentone	87.5±2.32	75.8±2.96

TABLE VII
ANAESTHETIST'S SUBJECTIVE IMPRESSION OF PATIENT

	Before induction	After induction	Postop.
Valium			
excellent	42	52	29
good	12	2	23
fair	—	—	2
Thiopentone			
excellent	16	—	3
good	39	22	46
fair	1	2	7

Changes in pulse rate are shown in Table VI. There was no important modification with diazepam, but thiopentone was associated with a significant bradycardia.

Table VII presents some data on the anaesthetist's subjective impression of the patient's condition. From this table it is clear that (a) diazepam gives superior premedication, as reported previously; (b) after induction of anaesthesia with diazepam, there is a total absence of significant repercussions on vital signs, in contrast to what happens with thiopentone; (c) the patients in the diazepam

group have a better postoperative recovery, judged by the following criteria: excellent – no complications; good – only minor complications, e.g. prolonged sleep; fair – complications, with cardiorespiratory difficulties, e.g. cardiac arrest.

DISCUSSION

General comments

Analgesic properties. Like the barbiturates, diazepam is not an analgesic. Hence analgesics are absolutely essential during painful surgery.

Cardiorespiratory effects. Diazepam causes only a minor fall in blood pressure if given in a moderate dose and injected slowly. There is usually a slight bradycardia, relieved by premedication with atropine. Unlike the barbiturates, diazepam does not produce bronchorrhea, muscarinic effects, or bronchospasm; this makes it particularly valuable for the pulmonary or bronchitic patient.

Intravenous injections of diazepam are well tolerated but it is preferable to administer it into the infusion tubing to avoid pain.

Muscular relaxation. The use of diazepam did not reduce the requirements for relaxant drugs.

Comments specific to pulmonary surgery

The high versatility of this new intravenous anaesthetic medication is indicated by its successful use when dealing with tuberculosis, carcinoma, and bronchiectasis. In pulmonary surgery three properties of diazepam are of particular interest to the anaesthetist:

1. The absence of muscarinic effects, bronchospasm, and bronchorrhea is especially appreciated in bronchoscopy and other endoscopic procedures (intubation with cuffed tube, insertion of a tube with double lumen) which precede anaesthesia for pulmonary surgery.
2. Diazepam greatly facilitates inhalation anaesthesia, which we believe is the method of choice for pulmonary surgery.
3. The frequency of atelectasis is reduced. None of our cases showed atelectasis in the first 48 hours.

SUMMARY AND CONCLUSIONS

Diazepam compared to thiopentone gives a greatly improved intravenous induction; it is thus a new and important pharmacological contribution in our search for an ideal anaesthetic technique for pulmonary surgery.

RÉSUMÉ

Il s'agit d'une étude comparative de deux séries de cas, l'une comportant l'utilisation du diazepam, l'autre l'utilisation d'une médication classique en anesthésie pour chirurgie pulmonaire et oncologie, tuberculose, bronchiectasie.

Durant les périodes pré-, per-, et post-opératoires, des observations et des études sont faites sur la fonction respiratoire et sur la fonction cardio-vasculaire (tension artérielle, électro-cardiogramme, spirométrie et observations constantes

des signes vitaux) et ces études sont rapportées dans la présente communication.

La conclusion de cette étude et de ces observations nous permet de reconnaître statistiquement parlant que l'utilisation du diazepam en anesthésie pour chirurgie pulmonaire a contribué pour beaucoup à l'obtention d'une technique d'anesthésie "optima" en chirurgie pulmonaire.

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