The Use of Neurolept Analgesia for Gastro-intestinal Endoscopy

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SUMMARY

A prospective double-blind study of the effects of sedation in 142 patients undergoing gastro-intestinal endoscopy was performed. Four regimens were studied (neurolept analgesia with and without topical anaesthesia, and anticholinergic and topical anaesthesia, with and without diazepam). Droperidol and fentanyl without topical anaesthesia yielded the best results as far as tolerance and side-effects were concerned. It is suggested that this form of neurolept analgesia be used for gastro-intestinal endoscopy.


For many patients endoscopy is a distressing experience, hence the need for better premedication to avoid the occurrence of serious complications. The ideal technique should be safe, allay fears, and reduce the gag reflex and the discomfort of the procedure. In spite of the tranquil state, the patient should be able to obey all instructions. Recovery should be speedy, with minimal side-effects, and amnesia for the event is an advantage. With this in mind, a prospective double-blind trial was undertaken to evaluate four drug regimens as premedication for gastro-intestinal endoscopy.

PATIENTS AND METHODS

Four drug regimens were administered to 142 patients by an anaesthetist, without the endoscopist knowing which drugs had been administered.

Of the 142 patients 96 were males and 46 females, and 66 were Indian and 76 Black. The age range was 16 - 74 years, with an average of 37.9 years. The distribution of these factors did not vary in the four groups.

Group 1: Forty-four patients received intravenous neurolept analgesia in the form of droperidol (Inapsin; Janssen) in a mean dose of 5 mg, followed 5 minutes later by fentanyl (Sublimaze; Janssen), in a dose of 1 - 2 µg/kg, until the respiratory rate fell to between 10 and 12 per minute.

Group 2: Thirty-seven patients received intravenous fentanyl (Sublimaze, Janssen), in a dose of 1 µg/kg, until the respiratory rate fell to between 10 and 12 per minute.

Group 3: Thirty-one patients received intravenous diazepam 10 mg (Valium; Roche), plus topical anaesthesia as above, and intravenous propantheline bromide 30 mg (Pro-banthine; Searle).

Propantheline bromide was given only if the duodenum could not be entered during endoscopy and was omitted if contraindicated because of glaucoma or prostatic enlargement.

Group 4: Thirty patients received topical anaesthesia plus 30 mg intravenous propantheline bromide.

The following variables were measured before, during and after endoscopy.

The pulse rate was checked continuously by a Sanei II pulse meter with a photo-electric transducer. The blood pressure was read repeatedly on a von Recklinghausen oscillometer. The respiratory rate was continually counted. Anxiety was determined on a modified Hamilton rating scale, and charted both subjectively and objectively. Tolerance of the procedure was judged by the degree of tranquillity or restlessness and the presence or absence of coughing, gagging, moaning or efforts made to withdraw the endoscope.

The endoscopist also noted the degree of gastric peristalsis and the state of the pylorus. Patients were questioned as to their memory of the procedure and their willingness to undergo a repeat endoscopy.

Random capillary blood samples were taken in 24 patients from the large ear lobe, which had been previously warmed by rubbing. Of these patients, 12 received neurolept analgesia with topical anaesthesia and 12 benzodiazepine with anticholinergic and topical anaesthesia. Blood samples were analysed for pH, PCO2 and bicarbonate levels by means of a Radiometer BMS Mark II blood gas apparatus. Base deficit was determined with a Severingham slide rule (Radiometer blood gas calculator BGC 1).

RESULTS

Anxiety

The level of anxiety was similar in all groups before the administration of the drugs. In group 1 the level of anxiety fell significantly after administration of the drugs, and after the procedure. In group 2, the level of anxiety did not fall significantly after administration of the drugs or during the procedure, but was significantly lower after the procedure. In group 3, anxiety was significantly less after the administration of the drug and after the procedure, but not during the procedure. In group 4, anxiety rose significantly after the administration of the drug, and increased further during the procedure. In this group the level of anxiety fell after the procedure,
but was still significantly raised compared with the initial level. After administration of the drug (prior to the procedure), the lowest level of anxiety was in group 1 and the highest level in group 4. These differences were statistically significant.

During the procedure the lowest level of anxiety was in group 1 and the highest in group 4, the differences being statistically significant.

After the procedure, very little anxiety was found in any group other than group 4, which had a significantly higher level of anxiety than the other groups.

**Sedation**

In group 1, significant sedation was achieved after drug administration, during and after the procedure. Similar levels of sedation were found in groups 2 and 3, virtually none in group 4.

**Ease of Intubation**

Intubation was regarded as easy (no hold-up or slight resistance) in nearly 90% of patients in groups 1, 2 and 3. Greater difficulty was experienced in group 4, but the differences were not significant.

**Tolerance of Procedure**

Patients tolerated the procedure significantly better when sedated. Patients in groups 1 and 2 tolerated the procedure significantly better than those in groups 3 and 4.

**Gastric Peristalsis**

There was no significant difference in the state of the stomach following administration of any of the drug regimens. An aperistaltic stomach in a state of tonic contraction is considered ideal for total viewing of the organ. This was obtained in nearly 80% of patients in all drug groups.

**State of Pylorus**

It was possible to traverse the pyloric ring in patients in all groups and no significant difference could be discerned.

**Memory of the Procedure**

Careful questioning of the patients after endoscopy revealed that amnesia in patients in groups 1, 2 and 3 was equal and significantly greater than that in group 4.

**Willingness to Repeat the Procedure**

The patients were questioned immediately after endoscopy and the next day as to their willingness to undergo the procedure again. Patients in group 4 were significantly less willing than those in the other groups.

**Pulse Rate**

A significant rise in pulse rate occurred during the procedure and persisted, although to a lesser degree, after the procedure in all groups. The increase in rate was significantly greater in group 4 after administration of the drug, and in addition this group revealed a significantly greater increase in pulse rate at all stages than did groups 1, 2 and 3.

**Respiration Rate**

There was a significant decrease in the respiratory rate after drug administration in groups 1 and 2 only.

**Systolic Blood Pressure**

Prior to drug administration the systolic blood pressure was significantly higher in groups 3 and 4. This is unexplained.

After drug administration a significant fall in systolic blood pressure occurred in groups 1 and 2. During the procedure a significant rise occurred in group 4.

At all periods studied the systolic blood pressure was significantly lower in groups 1 and 2, and was significantly higher in group 4.

**Diastolic Blood Pressure**

Prior to drug administration diastolic blood pressure was significantly higher in groups 3 and 4. This is unexplained.

There was no alteration in this state following drug administration, or during or after the procedure.

**Blood Gas Analysis**

**Blood pH.** Neither neurolept analgesia nor diazepam altered the pH significantly at any stage.

**Blood PCO2.** No significant alteration of blood PCO2 occurred at any stage in the neurolept analgesia or diazepam groups.

**Blood HCO3.** No significant alteration of blood HCO3 occurred at any stage in the neurolept analgesia or diazepam groups.

**Base deficit.** No significant alteration in base deficit occurred at any stage in the neurolept analgesia or diazepam groups.

The mean duration of the procedure, which varied from 10.8 to 11.8 minutes, did not differ significantly in the four groups. The mean time to recovery (± SD) in group 1 was 54.3 ± 29.7 min, in group 2 it was 52.9 ± 15.5 min, in group 3 it was 67.3 ± 23.3 min, and in group 4 it was 2.1 ± 4.7 min. The recovery time for patients in group 3 was significantly longer than that for all other groups (group 1 P<0.05; group 2 P<0.01; group 4 P<0.001).

**DISCUSSION**

Neurolept analgesia without anticholinergics has proved to be the most effective of the four premedication regimens
for gastro-intestinal endoscopy, according to a double-blind study. With this regimen anxiety was significantly less during and after the procedure. Significantly better sedation was also achieved with neurolept analgesia, and tolerance of the procedure was better.

Neurolept analgesia is induced by combining butyrophenones (droperidol), with short-acting narcotics (fentanyl) or synthetic opiates. A state of ataxia or calmness, with a detached attitude resulting in immobility to external stimuli without inducing sleep, is obtained. This neurolept analgesia can be used for endoscopy examinations (gastro-intestinal and cystoscopy), radiological studies, and minor surgical procedures. With supplementation, major surgical procedures can be carried out.

Droperidol belongs to a group of drugs known as the butyrophenones. They are closely related to the phenothiazines, and act on the membrane of neural cells and the synapses. Permeability is altered, thereby blocking the action of dopamine, noradrenaline, 5-hydroxytryptamine and y-aminobutyric acid (GABA). Droperidol has an antiemetic effect 700 times greater than that of chlorpromazine. It is a major tranquilizer and has minor side-effects which include inner anxiety and outer tranquillity, feelings of weightlessness, decrease in blood pressure and bradycardia, respiratory depression and reduction in secretions. Hypothermia, antihistaminic activity and occasional dyskinetic movements occur. Its effects last for 6-12 hours before the drug is excreted in the urine and faeces.

Droperidol was used in this series in 5-mg doses, and side-effects were minimal, probably because of the small dose utilized. In 1 patient hypovolaemia necessitated a rapid infusion of Ringer’s lactate to restore the blood pressure to normal.

The analgesic fentanyl is closely related to pethidine chemically, but it has morphine-like action which results in relief of pain, sedation and smooth muscle constriction. It may also induce ventilatory depression, emesis, constipation, histamine release and muscle rigidity of the chest wall which reduces lung compliance.

Fixed combination preparations (Innovar) were not used in our series. Separate dosages with varying increments according to requirements were employed.

Used in varying combinations in our series, these drugs caused no cardiovascular depression, although care should be taken in hypovolaemic patients. They can be used safely in porphyria, but caution should be exercised in patients with liver disease.

The antidote to fentanyl, naloxone (Narcan; Endo) has immediate effects. It was used in 1 elderly Black patient, who was fairly obese. She received a fairly rapid intravenous dose of fentanyl (2 μg/kg) based on her weight. She became apnoeic for 1 minute, then breathed at a rate of 5 deep breaths per minute, but responded immediately to intravenous naloxone 10 mg. This case illustrates the importance of having adequate resuscitative facilities, a means to ventilate with oxygen, endotracheal tubes, naloxone, muscle relaxants, adequate suction and an intravenous line (e.g. butterfly) available during endoscopy.

Le Brun has demonstrated the safety of neurolept analgesia by the unassisted endoscopist. In a comment on Le Brun’s paper, it was suggested that safety could be further enhanced by carrying out the endoscopy in an operating area, and by adhering to the routine required for the management of surgical day-cases. In addition, a sealed envelope should be given to the patient, containing details of the drugs administered. This can be given to the general practitioner should complications occur later.

Many drug combinations have been used as premedication for gastro-intestinal endoscopy. The phenothiazines are no longer in use because they induce prolonged sleep, respiratory depression, a fall in blood pressure and tachycardia. The benzodiazepines, however, are in constant use for this purpose, diazepam being the principal one. Benzodiazepines have many advantages in endoscopy, such as the rapidity of onset. They are hypnotic, anxiety-reducing and anti-epileptic. A light sleep is induced with muscle relaxation, yet the patient is able to respond to commands. Benzodiazepines have little or no effect on the cardiovascular and respiratory systems.

In our series diazepam often caused intense burning on intravenous administration, a point noted by others, especially if a small vein was used, and it was often many hours before the patient was able to leave hospital. Diazepam is secreted in bile and reabsorbed by the small intestine, and this can lead to a late increase in sedation after the patient has apparently recovered. Lignocaine 4% acts promptly and well, and its effects last for about 45 minutes. In the dosage used the toxic effects, such as central nervous stimulation, convulsions and myocardial depressions, were not induced.

Propantheline was used for its antimuscarinic and ganglion-blocking effects, and in dosages of 30 mg or more it did not induce restlessness.

**REFERENCES**