THE USE OF DEHYDROBENZPERIDOL AND PHENOPERIDINE FOR
REPEATED BURNS DRESSINGS
A Preliminary Communication
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SUMMARY
Neuroleptanalgesia has been used to permit dressing of severe burns on 76 occasions in 24 patients. Dehydrobenzperidol 10 mg was given to all patients by intramuscular or intravenous injection and was followed by phenoperidine given intravenously in an initial dose of 1 mg followed by incremental doses of 0.5 to 1 mg. The procedure was successful in 70 instances and partially successful in 6. Respiratory depression was the principal side effect but was easily managed in this series. This method is considered to represent an advance over previous methods of analgesia for burns dressings.

Severely burned patients require frequent changes of dressing, often on alternate days, during the period of desloughing. These dressings continue until complete epithelial cover has been achieved. The dressing of a major burn may take longer than an hour and is so distressing to the patient that he dreads the procedure, and fails to eat or sleep in anticipation of the next ordeal. These painful experiences are remembered vividly, often for life (Brit. med. J., 1963; Woodward, 1959).

General anaesthesia in these toxic patients is often difficult and dangerous owing to the frequent presence of myocarditis, hepatic dysfunction, renal damage and pulmonary infection. It has the additional disadvantage that it interferes with the nutrition of the patient both before and after the procedure. During the dressing the patient may have to be sat up, turned over, or immersed in a saline bath, and these procedures cause anxiety about the airway and the blood pressure of the anaesthetized patient.

Simple sedation with an opiate has hitherto been generally used in this hospital, except on occasions when skin-grafts have been taken, when general anaesthesia has been customary. The opiates have not been very successful as the degree of analgesia has been inadequate in spite of high dosage, and the frequent occurrence of dizziness, nausea, vomiting, constipation, and addiction have presented drawbacks. Hypnosis (Bernstein, 1963) and refrigeration have both been tried, but do not have a wide field of application.

The technique of neuroleptanalgesia, a word coined by Jean Delay (1961), has now been applied to this problem. This communication reports a trial of dehydrobenzperidol and phenoperidine in twenty-four patients.

METHOD
Choice of patient
All patients admitted to the McIndoe Burns Centre with burns involving more than 10 per cent body surface were given neuroleptanalgesia for the removal of dressings and the excision of slough. The administration of these drugs was repeated for every re-dressing until either the area of skin-loss was minimal or until the patient was receiving daily saline baths for the removal of dressings. The ages of the patients treated have ranged from 8 to 80 years, whilst the area of total body surface burned has varied from 10 to 70 per cent. No attempts were made to use neuroleptanalgesia for the taking of skin-grafts, but both homografts and autografts were applied to the granulating areas during the dressings.

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Dehydrobenzperidol 10 mg was given to all patients, either by intramuscular injection 2 hours before the dressing, or intravenously 10 minutes before commencing the procedure. The dose given seemed to produce a fairly constant effect in spite of variations in age, weight and fitness of the patients. The dose varied from 0.15 mg/kg to 0.37 mg/kg.

Phenoperidine was administered by intravenous injection through a Gordin needle 5 minutes before the dressing started. The dose was based on experience gained during previous dressings of that patient. For any patient being dressed for the first time the initial dose was usually 1 mg and the patient was observed for 5 minutes. At this time the effect on the respiratory rate was maximal. Provided the patient remained alert, with a respiratory rate above 15 breaths per minute and in the absence of cyanosis, an incremental dose of 0.5–1.0 mg of phenoperidine would then be given with the aim of providing maximal analgesia without excessive respiratory depression. From experience with these patients, and with an earlier technique used by one of us for carotid angiography, a good effect seemed to occur when the respiratory rate was between 12 and 16 breaths per minute. The adult patients in this series reached this point after an average dose of 0.05 mg/kg of phenoperidine had been given, although in some cases as much as 0.07 mg/kg was required. An incremental dose of half the initial dose seemed to be necessary about 20 minutes later, and this frequently coincided with a period when the sloughs were being removed by sharp dissection.

RESULTS

It was noted that even after the intravenous administration of dehydrobenzperidol the onset of sedation was delayed for some 5 minutes, reaching a maximum at 20 minutes. After intramuscular injection a full effect was not obtained until 2 hours had elapsed. No alterations in pulse rate were noted following the administration of dehydrobenzperidol. Serial blood pressure recordings were only made during twelve of the dressings because of the technical difficulty of placing an oscillometer cuff on burnt or dressed limbs. Where these readings were made, however, only a slight fall in blood pressure (10 mm Hg) was noted. In some patients there was a slight rise in the respiratory rate.

Following the subsequent injection of phenoperidine, all patients became drowsy, with a characteristically expressionless face. They would fall into a light sleep, but could be roused on calling their names, and could answer questions briefly but intelligently. A high degree of analgesia was obtained.

Patients had difficulty in maintaining posture against gravity, and when sitting up there was a tendency for the head to fall forward on to the chest. In three of the cases, however, a catatonic-like maintenance of arm posture was noted.

No serious failures occurred. Only partial successes were recorded in six of the seventy-six procedures, the patients complaining of varying degrees of pain. In all patients phenoperidine was cautiously administered and there were a few occasions when the patient might have been more comfortable with a larger dose. The surgeons tended to become over-enthusiastic with the method, and they often forgot that the patient from whom they were dissecting sloughs was not under the influence of a general anaesthetic. As both surgeon and anaesthetist became accustomed to the technique, more successful teamwork was achieved.

Patients gradually woke up during the final bandaging, but on return to bed would lightly doze for 2 or 3 hours. It was found that patients would eat the next meal provided they had overcome their lethargy, but most of the patients were able to take fluids within 15 minutes of the completion of the procedure.

There was no evidence that patients acquired any tolerance to the use of these drugs. Once the dose required by a patient was established, the desired effect was attained during subsequent dressings with an identical dose.

CASE HISTORIES

CASE 1.

On January 3, 1965, an old lady of 80 sustained burns of 15 per cent body surface when her nightdress caught fire. She was transferred from another hospital on January 27 for skin grafting. The dressings were changed four times without sedation, but she was confused, noisy, distressed and unco-operative.

On February 3 she was transferred from the ordinary ward to the McIndoe Burns Centre where she had
USE OF DEHYDROBENZPERIDOL AND PHENOPERIDINE FOR BURNS

seven dressings performed with neuroleptanalgesia over a period of 3 weeks, and in addition one general anaesthetic on February 12 for skin grafts to be taken. Following the general anaesthetic she developed auricular fibrillation which was controlled with digoxin, and 3 days later bronchopneumonia treated with chloramphenicol.

For each dressing a Gortdh needle was placed in a vein on the dorsum of the hand. Dehydrobenzperidol 10 mg was injected rapidly, and the patient was wheeled on her bed down the corridor to the saline bathroom. The patient gradually became quieter and less talkative. Phenoperidine was then injected. On the first occasion only 1 mg was given initially, and then repeated. On subsequent occasions 2 mg were given as a single dose. After 2 minutes the patient was lifted off her bed and placed on a trolley without any protest. The dressings were then removed rapidly and de-sloughing and cleaning started, the anaesthetist taking careful note all the while of the respiratory rate, which on one occasion fell to 12 b.p.m.

During the early dressings, when the sloughs were adherent, a supplemental dose of phenoperidine was used and the first two dressings required a total of 3 mg of phenoperidine; later no supplements were necessary. The dressings usually lasted just over an hour.

This patient showed a tendency to facial sweating which was not related to room temperature or surgical stimulation. It seemed to occur soon after the phenoperidine had been injected, and is presumably a direct diaphoretic effect.

CASE 2.

A male patient, aged 21, was transferred to the McIndoe Burns Centre on February 24, 1965, for further treatment. He had sustained electrical burns 3 months previously (September 28, 1964), which had involved 40 per cent of the body surface. On admission to another hospital he was unconscious and anuric. He responded to treatment, and after approximately four weeks, grafting and dressings were commenced, using general anaesthesia. On two occasions while under general anaesthesia, he had cardiac arrest, treated by external cardiac massage. Altogether six general anaesthetics were given.

On transfer to the McIndoe Burns Centre the burns involved the left leg, buttocks and chest. The right arm had been amputated at the shoulder. His haemoglobin was 7.6 g. per cent, and his total body weight 32.5 kg including dressings. In view of the wasted condition of the patient, the high output renal failure, and the intractable vomiting due to atrophic gastritis, together with the previous history of cardiac arrest, it was decided that subsequent procedures should be arranged under neuroleptanalgesia. Saline baths, removal of dressings and application of homografts were performed at approximately 3-day intervals, using this technique. Blood transfusions were given when necessary. In all, the method was employed twenty times, each procedure lasting approximately 90 minutes. Dehydrobenzperidol 10 mg was given, usually by the intravenous route, together with phenoperidine, approximately 5 minutes before the dressings commenced. The average dose of phenoperidine was 2 mg in a single dose, prior to the saline bath, followed by a 1-mg increment after 25-30 minutes. The finding of a suitable vein also presented a problem, and on two occasions these drugs had to be given intramuscularly with hyaluronidase (1500 units) 15 minutes prior to the dressing. The neuroleptanalgesia produced was found to be equally successful by this route.

At the time of writing the patient no longer needs neuroleptanalgesia for the performance of dressings. It is of interest to note that he had been in the habit of taking Drinamyl (containing desamphetamine 5 mg with amylobarbitone 45 mg) prior to his accident. He has not exhibited any addiction to the drugs used for neuroleptanalgesia.

SIDE EFFECTS

Respiratory depression was shown by a fall in respiratory rate, and by the development of varying degrees of cyanosis (noted transiently in 20 per cent of the cases), when the effect of the phenoperidine was at a maximum, i.e. 5 to 10 minutes after the initial dose. Cyanosis is noted earlier in the zones of hyperaemia adjacent to the burns. However, as these patients maintain consciousness, they obey orders to breathe more deeply. Measurements of reduction of respiratory minute volume by means of a Wright Respirometer have proved unsatisfactory, because patient response and active participation when it was used could not be excluded.

There were no instances of vomiting in the series, and it seems to be an advantage to perform a dressing soon after food, so that the patient is then ready for the next meal. For various reasons this could not always be done, but with encouragement most of the patients were able to take food afterwards without any trace of nausea.

About half the cases exhibited facial sweating during the dressings. This occurred 15 minutes after the initial injections and appeared to follow the injection of phenoperidine. It was not related to the degree of surgical stimulation nor to the temperature of the dressing-room.

We have as yet seen no tendency for addiction to develop towards these drugs. This might have become noticeable in those patients requiring several dressings under neuroleptanalgesia when, towards the end of their series of dressings, reduced dosages were employed. When the dressings eventually became sufficiently limited for them to be performed without associated analgesia, there were no requests for the technique to be continued.

There was one unusual reaction in a young man with 25 per cent burns of 3 weeks duration, who, 3 minutes after an injection of dehydrobenzperidol
10 mg and phenoperidine 2 mg intravenously, became very flushed and complained of a severe crushing pain across the lower chest with difficulty in breathing. He was sitting up at the time. A blood pressure cuff was not in place (because the patient had burns of both arms), and no recording was made at the time. The pain lasted for 2 minutes, and was treated with oxygen by mask and laying the patient flat. There was a rapid improvement. The patient had had the drugs previously and also subsequently without any ill-effects. There appears to be a similarity between this response and that which may be obtained with drugs used in arteriography or pyelography.

PRECAUTIONS
In view of the possibility of producing severe respiratory depression or arrest with phenoperidine, a close watch was kept at all times on the respiratory rate. This drug has a delayed effect and there is a risk in repeating it before the full effect has been reached, a process which requires at least 5 minutes.

Phenoperidine was never administered except by an anaesthetist. A vein was kept "open" with a Gordh needle throughout the procedure. On the first occasion on which these drugs were given to each patient phenoperidine was given as an initial dose of 1 mg followed by increments of 0.5 mg at 5-minute intervals until a satisfactory clinical result was reached. On subsequent occasions a larger dose was given, based on the previous experience. A narcotic antagonist, nalorphine, was immediately available at all times, but as yet there has been no occasion to use it. Similarly a means of inflating the patient's lungs was considered essential and an Ambu resuscitator or an anaesthetic apparatus were always kept at hand. It is well known that in narcotic overdosage ventilation of the lungs may present difficulties. It is desirable to have a short-acting muscle relaxant and endotracheal tube available to overcome this difficulty, should it arise.

DISCUSSION
Ideally the patient should be sedated to a level at which he is not emotionally upset by a frightening and uncomfortable experience, but should be capable of some co-operation. Such a state of indiherence to the surroundings, with complete mental detachment and calmness, has been called the neuroleptic state. This is produced by drugs of the butyrophenone group such as haloperidol (Serenace) or dehydrobenzperidol (Droperidol). When these drugs are used with a potent analgesic (Nilsson, 1963; Nilsson and Janssen, 1961) such as phenoperidine (Operidine) to provide total body analgesia, a satisfactory state is achieved in which dressings may be carried out without distress. Dehydrobenzperidol was chosen for its neuroleptic activity owing to reports of psychic disturbance when haloperidol is given in large doses (Corssen, Domino and Sweet, 1964).

In our experience this technique represents an advance over previous methods of analgesia for burns dressings, and has been acclaimed by our surgical colleagues. The patients appeared grateful for the freedom from worry and pain.

It is, of course, clear that the degree and duration of respiratory depression found in patients during this procedure must be investigated, and it is hoped to incorporate the results of an investigation in a subsequent report.

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REFERENCES


USE OF DEHYDROBENZPERIDOL AND PHENOPERIDINE FOR BURNS

EMPLOI DU DEHYDROBENZPERIDOL ET DE LA PHENOPERIDINE POUR LE PANSEMENT REPETE DE BRULURES: COMMUNICATION PRELIMINAIRE

SOMMAIRE
Nous avons recouru à la neuroleptanalgesie pour panser 24 brûlés graves à 76 reprises. Tous ces patients reçurent 10 mg de déhydrobenzpéridol par voie intra-musculaire ou intra-veineuse, puis 1 mg de phénopéridine par voie intra-veineuse, enfin une dose additionelle du même produit de 0,5 à 1 mg. Cette façon de procéder donna de bons résultats à 70 occasions, des résultats médiocres à 6 occasions. L'effet secondaire le plus important fut une inhibition de la respiration dont nous vinmes cependant facilement à bout chez les patients étudiés ici. Nous pensons que cette méthode est en progrès sur les méthodes utilisées jusqu'ici.

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