SADDLE BLOCK WITH PETHIDINE FOR PERINEAL OPERATIONS

I. ACALOVSCHI, V. ENE, E. LŐRINCZI AND F. NICOLAUS

Small doses of morphine given intrathecally and extradurally produce long-lasting relief of chronic and postoperative pain in man (Behar et al., 1979; Wang, Nauss and Thomas, 1979). In addition to morphine, the efficacy of pethidine (Cousins et al., 1979), fentanyl (Bailey and Smith, 1980), methadone and hydromorphone (Bromage, Camporesi and Chestnut, 1980) has been studied. Using the extradural route, all the opiates, including pethidine, were able to interrupt pain at a spinal level without affecting motor and autonomic control (Cousins et al., 1979).

Recent studies (Mircea et al., 1982; Sandu et al., 1983) showed that pethidine, unlike morphine, when given intrathecally did not produce a selective segmental analgesia, but exhibited all the effects of the subarachnoid administration of local anaesthetics—including motor, sensory and sympathetic blockades. Thus spinal anaesthesia was obtained which was adequate for surgical interventions, particularly in the perineal area.

The purpose of this study was to assess the effectiveness of the intrathecal administration of pethidine in obtaining blockade, suitable for surgery on the perineum.

PATIENTS AND METHODS

Studies were carried out on 111 patients undergoing perineal surgery between March 1983 and December 1984 (table I). The group included 77 men and 34 women, aged between 20 and 72 yr (mean age of 37 yr). Institutional approval and informed patient consent were obtained.

IURIE ACALOVSCHI,* M.D., PH.D.; VICTORIA ENE, M.D.; ECATERINA LŐRINCZI, M.D.; FLOARIA NICOLAUS, M.D.; Department of Anaesthesia, Clinical Hospital, 16 Iaşiilor St, 3400 Cluj-Napoca, Romania.

*Present address, for correspondence: Spitalul Clinic de Adulţi, Secţia Anestezie - Terapie Intensivă, Str. Iaşiilor no.16, 3400 Cluj-Napoca, Romania.

SUMMARY

Saddle blockade with pethidine hydrochloride was performed in 111 patients undergoing short surgical operations on the perineum. A dose of 5% pethidine 0.5 mg kg⁻¹ was injected to the subarachnoid space at L4-5 or L5-S1 with the patient in the sitting position. Sensory blockade was achieved in 5.28 ± 1.43 min. This extended to the sacrococcygeal area, perineum, buttocks and posterior surface of thighs, and was followed 1–2 min later by motor blockade. During the operation the patients were stable haemodynamically and no respiratory depression was recorded. Sensory blockade lasted for 141 ± 26.06 min and was followed by postoperative analgesia, the mean duration of which was 301 ± 98.38 min.

Postoperative neurological complications were recorded in three patients (2.7%): headache alone in one, headache associated with backache in one, and leg weakness, backache, nuchal rigidity and photophobia in another. Seven patients (6.3%) complained of itching, five patients (4.5%) of nausea and vomiting and two (1.8%) developed urinary retention.

A 5% solution of pethidine hydrochloride containing 100 mg in 2 ml was used. The drug as tested was an aqueous, preservative-free solution of 1-methyl-4-phenyl-4-carbetoxipiperidine hydrochloride. Besides its hyperosmolality of 352.3 mosmol litre⁻¹, other relevant physico-chemical properties of the solution were: pH 4.354 and specific gravity 1.009. Although the specific gravity was close to the upper limit of the specific gravity of CSF, it has been demonstrated that the solution behaved as if hyperbaric (Mircea et al., 1982). Spinal anaesthesia was induced with the patient in the sitting position. Lumbar puncture was performed at L4-5 or L5-S1 with a 20- or 22-gauge needle. Eight patients were
TABLE I. Indications for surgical operation

<table>
<thead>
<tr>
<th>Indication</th>
<th>No. of patients</th>
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<tbody>
<tr>
<td>Internal and external haemorrhoids</td>
<td>60</td>
</tr>
<tr>
<td>Perianal fistula</td>
<td>20</td>
</tr>
<tr>
<td>Anal fissure</td>
<td>11</td>
</tr>
<tr>
<td>Pilonidal cyst</td>
<td>7</td>
</tr>
<tr>
<td>Perineal abscess</td>
<td>7</td>
</tr>
<tr>
<td>Anal polyp</td>
<td>3</td>
</tr>
<tr>
<td>Ischio-rectal abscess</td>
<td>1</td>
</tr>
<tr>
<td>Anal stenosis</td>
<td>1</td>
</tr>
<tr>
<td>Correction of endoanally lowered intestinal loop</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>111</td>
</tr>
</tbody>
</table>

premedicated (diazepam 0.15 mg kg⁻¹) 30 min before coming to the operation theatre; the remainder received no premedication. A dose of 5% pethidine 0.5 mg kg⁻¹ (without adrenaline) was injected intrathecally (0.7 ml of solution for a subject of 70 kg body weight), the patient remaining in the sitting position for 5 min after the injection.

Once the patient had been placed supine, the speed of onset and the level of sensory blockade were assessed. The degree of anal relaxation was used as an indication of the quality of motor blockade. During the operation heart rate, arterial pressure and respiration were measured every 5 min. (A baseline reading had been obtained before the lumbar puncture.) The spread of analgesia was assessed by pinprick during anaesthesia and by touch in the postoperative period. Following surgery the patients were instructed to pinch the skin of the perineum gently every 10–15 min; the onset of regression of the sensory blockade was noted by the ward nurse.

The duration and quality of postoperative analgesia were assessed by the patient and by the ward nurse. The patient was instructed to ask for additional analgesia when it was felt necessary and, hourly, the ward nurse questioned the patient about pain and the need for further analgesia. When the latter was requested, pentazocine i.v. or i.m. was used as sole method of providing postoperative analgesia. The duration of analgesia was defined according to Rawal, Sjöstrand and Dahlström (1981) as the time between the intrathecal injection of pethidine and the time pain became severe enough to require additional analgesia.

Postanaesthetic complications were noted, with particular attention being paid to the possibility of respiratory depression, and the other side effects ascribed to spinal opiate analgesia (itching, nausea and vomiting, urinary retention) (Bromage et al., 1982).

In order to demonstrate any advantage of intrathecal pethidine, a comparison was made between the patients receiving pethidine and a group of 10 patients (aged 39.1 ± 15.96 SD yr) undergoing similar perineal operations in whom saddle block was induced with 4% lignocaine. Using the same procedure, a dose of lignocaine 0.5 mg kg⁻¹ mixed with 33% glucose 0.3 ml was injected to the subarachnoid space via the L4–5 space. The duration of postoperative analgesia was assessed as described above.

RESULTS

The subarachnoid injection of pethidine resulted in anaesthesia similar to that noted with the intrathecal administration of local anaesthetics. In all patients sensory and motor blockade were obtained. Sensory blockade was limited to the sacrococcygeal area, perineum, buttocks and posterior surface of the thighs (fig. 1), corresponding to the innervation from S2–5 and the sacrococcygeal roots. Although subjective, the method used for assessing the duration of the sensory blockade offered reliable information. The time to maximal segmental spread of sensory blockade was 4–8 min (mean 5.28 ± 1.43 SD min) and regression started after 141 ± 26.06 SD min. Motor blockade was achieved 1–2 min after the onset of anaesthesia and, conversely, it regressed first. The limited extent of the motor blockade permitted early ambulation of the patients.

The patients were haemodynamically stable during the operation, and no respiratory depression
was noted. In only three was there a decrease in arterial pressure, but this was never greater than 20% of the initial values.

The duration of analgesia ranged from 150 to 360 min with a mean of $301 \pm 98.38$ SD min, but there were 11 patients (9.91%) who had an "unlimited" duration of analgesia, that is, they did not ask for additional analgesics during the entire postoperative period, as their pain was slight and tolerable (three patients) or absent (eight patients). The postoperative analgesia was significantly longer ($P < 0.02$) than that conferred by subarachnoid lignocaine in the control group (table II).

The side effects ascribed to spinal opiate analgesia were rare: seven patients (6.3%) complained of itching, mainly located to the face, the incidence of nausea and vomiting was 4.5%, and two patients (1.8%) developed some degree of urinary retention. There were no signs of respiratory depression.

Three patients (2.7%) had neurological complaints: headache in one, headache associated with backache in another, and leg weakness, backache, nuchal rigidity and photophobia in the third. The symptoms appeared within 24 h of saddle blockade and recovery occurred within 1 week. In all three patients with headache this was postural, being aggravated by sitting or standing, and relieved by lying flat. Pain was located in the frontal or nuchal area. The last of these patients, a 21-year-old female medical student, underwent a saddle blockade for the emergency incision of a perineal abscess. With a 22-gauge needle, 5% pethidine 0.7 ml was injected at L4–5. There was no decrease in arterial pressure during the operation. Sensory blockade was adequate and the patient was pain free for 8 h following operation. At that point she was aware of moderate pain, but did not require additional analgesia. Twelve hours after the operation she left the hospital in order to resume her academic activities. The next day she complained of moderate backache around the site of lumbar puncture. Twenty-four hours later she was admitted to the hospital, suffering from headache, backache, photophobia and leg weakness. Her past history revealed that she was hypotensive (retinal arterial pressure 15 mm Hg) and suffered from recurrent migraine. Neurological examination showed obvious nuchal rigidity. The retinal arterial pressure measured 24 h after admission was 25 mm Hg. She required bed rest, hydration with physiological saline solution and mild analgesics. After 4 days of treatment all complaints subsided, but next day the patient had an attack of migraine and exhibited a herpetic eruption on the lower lip. The migraine was treated successfully with dihydroergotamine.

**DISCUSSION**

Our results bear out the efficacy of pethidine as a local anaesthetic following subarachnoid injection. With the technique described (pethidine 0.5 mg kg$^{-1}$ as a saddle block), anaesthesia was obtained which was adequate for operations on the perineal region.

The limitation of anaesthesia to the perineal region in a sitting patient suggests that, although the pethidine solution had a specific gravity close to the upper limit of that of CSF, it acted like a hyperbaric solution—blocking only the sacral roots—and this fact plus the small dose of pethidine injected explain the limited extent of the sensory blockade and the absence of sympathetic blockade. Consequently, the patients were haemodynamically stable—an important advantage of this technique. The limited extent of the motor blockade, which can be explained similarly, allowed early ambulation. However, unlike saddle blockade with local anaesthetics, the subarachnoid injection of pethidine provided significantly longer postoperative analgesia (an average of 5 h).

The mechanism by which intrathecal pethidine provides motor blockade as well as prolonged postoperative analgesia is not completely understood. It is known that pethidine has local anaesthetic properties (Blacow, 1972; Jaffe and Martin, 1975), which were demonstrated in a recent experiment on an isolated frog nerve–muscle preparation (Sandu et al., 1983). However, blockade could not be obtained after the extradural injection of pethidine 100 mg (Cousins et al., 1979), the sole effect being a selective analgesia.

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**TABLE II. Duration of postoperative analgesia following subarachnoid pethidine v. subarachnoid lignocaine**

<table>
<thead>
<tr>
<th>Postoperative analgesia</th>
<th>4% Lignocaine</th>
</tr>
</thead>
<tbody>
<tr>
<td>5% Pethidine</td>
<td>0.5 mg kg$^{-1}$ + 33% glucose</td>
</tr>
<tr>
<td>0.5 mg kg$^{-1}$</td>
<td>0.3 ml</td>
</tr>
</tbody>
</table>

| $n$ | 111 | 10 |
| Mean | 301 | 109 |
| SD | 98.38 | 31.07 |
| $P$ | < 0.02 |
SADDLE BLOCK WITH PETHIDINE

Cousins and colleagues (1979) suggest that the analgesic effect of pethidine is at a spinal level, with an additional late systemic effect after 30–40 min. Their interpretation is based on high concentrations of drug found initially in the cerebrospinal fluid (CSF) and 30 min later in blood—concentrations which approached the "analgesic concentration" (0.46 mg/litre of blood) (Stapleton, Austin and Mather, 1979).

The high blood concentrations of up to 0.7 mg litre⁻¹ within 20 min of extradural injection, corresponding to concentrations determined to be analgesic after i.v. infusion of pethidine, not only lead to the speculation that the analgesic effect could be systemic rather than regional, but also offer an explanation for the selectivity of the analgesia, without any associated changes in sensory, sympathetic or motor function. The losses that occur after extradural injection, from vascular uptake of pethidine via the extradural venous plexus and from absorption into extradural fat, may explain the absence of motor blockade in these patients. The small quantity of drug left available for transfer across the dura could reach the spinal cord via the posterior radicular artery, which has branches that penetrate directly to the dorsal horn region (Cousins and Mather, 1984). This would permit easy access to the superficially located dorsal horn area, resulting in a selective spinal analgesic effect. On the other hand, the subarachnoid injection of pethidine avoids losses of the drug. The resorption into the capillaries of the spinal cord is very slow, and a highly lipid soluble drug like pethidine (octanol/water partition coefficient 38.8) is rapidly absorbed by the lipid tissue of the spinal roots, leading to the development of an anaesthetic blockade.

The axonal blockade produced by pethidine in the spinal nerve roots does not explain the postoperative analgesia noted in our patients after the reversal of motor and sensory blockade. The duration of postoperative analgesia (301 ± 98.38 SD min), which exceeded the duration of action of pethidine administered subcutaneously (Glynn et al., 1981), suggests that intrathecal pethidine also has an effect upon nociceptive synaptic junctions in the dorsal horn of the spinal cord. Another argument is the fact that some patients exhibited side effects such as itching, urinary retention or nausea and vomiting usually ascribed to intrathecal morphine. The low incidence of complications indicates that the rostral spread of pethidine in CSF is minimal and could be attributed to its higher lipid solubility compared with morphine (Bromage, 1984), as well as to the hyperbaric-like effect of the solution.

Although the mean duration of postoperative analgesia in most patients did not exceed 5 h, it represents the main advantage of saddle blockade with pethidine compared with saddle block with 4% lignocaine.

Special attention must be paid to the patients who complained of neurological problems. These were mild and easily reversible in two, but in one patient the clinical picture could be attributed to an aseptic meningitis.

Headache, recorded in three of our patients (2.7%) is a common complication of spinal anaesthesia, assumed to be the result of a decrease in CSF pressure (Bruce-Smith, 1980). The incidence of 2.7% is acceptable compared with post-spinal headache recorded after anaesthesia with local anaesthetics. The leakage of liquor into the extradural space can be responsible, not only for the headache, but also for the other neurological complaints such as backache and stiff neck (Morris, 1972), which are difficult to distinguish from meningeal irritation. It is likely that the clinical picture noted in our last patient had, as an underlying cause, decreases in CSF pressure, augmented by concurrent medical conditions. Among these, the recurrent migraine may have been important, for such patients are more prone than others to develop post-spinal headache (Kaukinen et al., 1981). Other circumstances that might have contributed to the severity of the neurological complaints in this patient were the prompt discharge from hospital and the rapid resumption of normal physical activity. While early ambulation does not increase the incidence of post-spinal headache, the rapid resumption of normal activity does (Poukkula, 1984). However, as it is known that pethidine is somewhat irritating when applied locally (Jaffe and Martin, 1975), the meningeal reaction noted could also be attributed to a possible neurotoxic effect.

With this caveat, saddle blockade with pethidine proved to be a safe technique in our series of patients. The haemodynamic stability and the limited extension of the motor blockade allowing for an early ambulation are important characteristics of the technique. Although not very prolonged, the associated postoperative analgesia was advantageous.
REFERENCES


