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Anesthesiology
46:357–359, 1977

Catheterization after Long- and Short-acting Local Anesthetics for Continuous Caudal Block for Vaginal Delivery

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Bupivacaine (Marcaine®) has been advocated for continuous caudal obstetrical anesthesia because its long duration of action (3–4 hours or more) necessitates few, if any, "refills." Avoidance of subsequent doses decreases potentials for complications such as total spinal block, inadvertent intravascular injection, tachyphylaxis, or a systemic toxic reaction from high blood levels of local anesthetic drug.[1] However, obstetricians and nurses attending these patients after they left the postdelivery room criticized its use because "the patients *all* have to be catheterized post-delivery." A review of the hospital records of the last 100 obstetric patients was conducted to determine the incidence of catheterization. All had continuous (fractional dose) caudal anesthesia with 0.5 per cent bupivacaine. Of these 100 patients, 74 had been catheterized at least once. This was markedly higher than the 32 per cent reported in studies[2] using shorter-acting local anesthetic drugs. Therefore, a prospective study was conducted comparing the incidences of post-delivery bladder catheterizations when a short-acting drug, 2 per cent 2-chloroprocaine (Nesacaine®), and a long-acting drug, 0.5 per cent bupivacaine, were used as the local anesthetic drugs for continuous caudal anesthesia. The two variables to be compared were the incidences of catheterizations and/or urinary tract infections.

METHOD OF STUDY

Two hundred consecutive patients scheduled for routine vaginal delivery under continuous caudal anesthesia were studied. All were classified as ASA physical status I. To eliminate bias during the period of study, selection of patients was randomized. Postpartum nursing personnel were unaware which local anesthetic drug had been used. One hundred patients received 2-chloroprocaine and 100 received bupivacaine utilizing a standard caudal technique.[1] Because there was no way to anticipate which patient would deliver within the time afforded by a single-dose technique, caudal catheters were inserted in all patients. All patients received 1,000 ml 5 per cent dextrose in lactated Ringer's solution iv during labor and were catheterized at the time of delivery. One hundred seventy-four infants were delivered by forceps.

RESULTS

Postpartum care nurses catheterized 22 of the 100 patients receiving 2-chloroprocaine once, and four twice. Sixty-three bupivacaine patients were catheterized one time and 15, two or more times. Three patients who received bupivacaine and two who received 2-chloroprocaine had urinary tract infections and positive urine cultures after de-

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Accepted for publication December 12, 1976.

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livery. Of the two patients who received 2-chloroprocaine, neither was catheterized after delivery. One received antibiotic treatment and the other did not. Both were afebrile and asymptomatic on discharge from the hospital on the third postdelivery days. Two of the three patients who received bupivacaine had been catheterized after delivery. However, in one of these cases a face presentation was rotated to an occiput–anterior presentation for delivery, and the other patient had a low forceps delivery for twins. Neither patient required antibiotic treatment or had her hospitalization prolonged.

Analysis was done to determine whether parity difference might be responsible for any difference seen. Seventy-eight patients who received bupivacaine were either para 0 or para 1, and 11 patients were para 3 or more. In the 2-chloroprocaine group, 73 patients were para 0 or para 1 and ten were para 3 or more. Thus, the distributions of the cases in the two groups were similar. Of the 63 patients catheterized in the bupivacaine group, 51 (81 per cent) were either para 0 or para 1. This can be compared with 17 patients (79 per cent) of the 22 patients who were catheterized in the 2-chloroprocaine group. Therefore, parity did not seem responsible for the differing rates of urinary retention.

In the bupivacaine group, 22 patients, 16 of whom were catheterized (25 per cent of the total number of catheterizations), were considered to have had "difficult deliveries"—abnormal presentations, rotations, etc. Sixteen patients who received 2-chloroprocaine were listed in this category. Six of these were catheterized (again, 25 per cent of the total number catheterized). Therefore, no statistically significant difference existed with regard to difficult deliveries as a cause of catheterizations.

Although a plastic caudal catheter was inserted in every patient, in 63 cases delivery occurred after the first dose of bupivacaine, but 79 of the patients receiving 2-chloroprocaine needed one to four reinjections.

Discussion

Bladder dysfunction is a well recognized problem following vaginal delivery, no matter what the type of anesthesia. Forceps delivery,[3] epidural anesthesia,[4] and general anesthesia[2] are all reported to increase the incidence of bladder dysfunction. Krantz and Edwards also found that patients receiving bupivacaine had approximately twice the rate of urinary retention of patients receiving lidocaine for delivery. Also, both bupivacaine and etidocaine (another long-acting local anesthetic drug) are associated with incidences of bladder dysfunction of more than 50 per cent, and substantiate that long-acting local anesthetic drugs do result in higher incidences of postpartum bladder catheterizations. However, it has not been substantiated that long-acting local anesthetic drugs should not be used because catheterization is a medical hazard. The greater number of catheterizations resulting from the long-acting local anesthetic agent did not increase the incidence of urinary tract infections. Cattell,[5] Guze,[6] Dudley,[7] Ansell,[8] Haskell,[9] and Pryles[10] have all demonstrated the safety of a single bladder catheterization. Urinary tract infections should not result if proper technique is followed.

In conclusion, this study confirms that there is a greater incidence of postpartum urinary retention when bupivacaine is used as a local anesthetic drug for caudal anesthesia. However, the absence of any increased medical risk because of the necessity for catheterizations should encourage, rather than discourage, the use of bupivacaine when these problems are compared with the potential dangers of reinjections necessary when short-acting local anesthetic drugs are used. Perhaps the ideal would be to use a long-acting local anesthetic drug such as bupivacaine for the routine vaginal delivery under continuous caudal or lumbar block anesthesia, reserving the short-acting local anesthetic drugs for the reinforcing doses needed approximately an hour prior to delivery or for the multipara with an anticipated short labor.

Postscript: Upon completion of the study, it was suggested that the chemical difference between the two local anesthetic drugs (one an amide and one an ester) and not the duration of effect might be responsible for the difference seen. One hundred additional patients were studied in a similar manner substituting 1 per cent lidocaine and 1 per cent mepivacaine. Results were as follows: lidocaine, 34 per cent needed catheterization; mepivacaine, 42 per cent. The final tabulation would then be: bupivacaine, 63 per cent; mepivacaine, 42 per cent; lidocaine, 34 per cent; 2-chloroprocaine 22 per cent. This is also a descending order of the expected durations of anesthesia.

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Anesthesiology
46:359–361, 1977

The Pressor Effect of Droperidol on a Patient with Pheochromocytoma

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On theoretical grounds, neuroleptanesthesia seems appropriate for patients who have pheochromocytoma, since droperidol antagonizes the pressor effects of catecholamines[1–3] and prevents catecholamine-induced arrhythmias.[1,4,5] Following this line of thought, we have used neuroleptanesthesia for a patient with pheochromocytoma, in whom administration of droperidol induced an extreme increase in blood pressure.

REPORT OF A CASE

A 13-year-old boy, weighing 31 kg, had had repeated headaches and attacks of nausea for three years. In the three months prior to admission to the Hospital of Osaka University Medical School, the patient had experienced palpitation, exertional dyspnea, and nocturnal sweating. His physician made a tentative diagnosis of pheochromocytoma based on symptoms and a positive phentolamine test. Blood pressure and pulse rate after hospitalization fluctuated between 136/84 and 228/114 torr, and between 90 and 126/min, respectively. Epinephrine in the urine was 46 μg/day; norepinephrine, 391 μg/day, and vanillylmandelic acid in the urine, 16.5 to 40.2 mg/day. Blood volume measured with ^{51}Cr-labelled erythrocytes was 2,760 ml. Basal metabolic rate was +13 per cent. Oral glucose tolerance test showed a diabetic pattern. EKG revealed left ventricular hypertrophy. Examination of the ocular fundi revealed retinal hemorrhages. Results of other routine clinical examinations were within normal ranges.

Six days before operation, the effect of droperidol on the blood pressure was examined. As shown in figure 1, intravenous administration of 1.25 mg lowered the blood pressure from the initial 190/120 to 160/108 torr within 30 seconds, followed by elevation to 216/160 torr one minute later. Within five minutes the patient became dyspneic and restless. He complained of rigidity in the lower extremities. Ten minutes later, when the blood pressure reached 232/160 torr, iv infusion of phenoxybenzamine was begun. The drug was diluted in a 5 per cent glucose solution and administered at the rate of 30 mg/hr. In this manner, the hypertension was easily controlled. When the blood pressure dropped below normal level, 200 ml whole blood was transfused. From the following day, phenoxybenzamine was administered iv at a dosage of 10 mg daily. In addition, 10 mg of propranolol was given orally every 12 hours to control tachycardia of about 130/min. Following these medications, the blood pressure stabilized between 136/76 and 168/128 torr, and the pulse rate between 100 and 110/min.

As surgical premedication, pentobarbital, 100 mg, was given orally one and a half hours before anesthesia; scopolamine, 0.3 mg, was given im an hour later. The patient was calm on arrival at the operating room. An intra-arterial cannula was placed in the right radial artery for direct continuous monitoring of blood pressure. As shown in figure 2, when the patient was given 1.25 mg droperidol, iv, for anesthetic induction, the blood pressure rose from 160/108 to 188/110 torr within 3 minutes. When another 1.25 mg of droperidol was given, the blood pressure reached 206/100 torr within the next minute. The blood pressure decreased without treatment and returned to the initial level in 10 minutes. Then fentanyl, 0.1 mg, and pancuronium, 3 mg, were given successively, and mechanical ventilation with N_2O and O_2 (1:1) was administered for a few minutes, followed by endotracheal intubation. During anesthesia, increases in blood pressure and pulse rate were recorded during manipulations of the tumors. These increases, however, were easily managed by iv administrations of 2 mg phentolamine twice and 1 mg propranolol once. Five minutes after administration of these adrenergic blockers, droperidol, 2.5 mg, was given. This did not induce any further elevation of the blood pressure. An estimated 800 ml blood was lost during the operation. Fourteen hundred milliliters of whole blood were transfused. Throughout the operation, normal sinus rhythm was maintained. Although there was a transient hypotension (70/50 torr) immediately after the resection of all tumors, the blood

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Accepted for publication December 12, 1976.
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