

## SPINAL ANALGESIA FOR TRANSLUMBAR AORTOGRAPHY \* †

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### INTRODUCTION

TRANSLUMBAR aortography is the roentgenographic visualization of the abdominal aorta and its branches by the aortic injection of a contrast fluid. By this means abnormalities of the lumbar aorta and its branches, including the arteries of the lower extremities, can readily be demonstrated. It is a valuable tool, therefore, in the study of renal, adrenal, retroperitoneal, vascular and placental disorders. Translumbar aortography was first described in 1929 by Dos Santos, a Portuguese urologist (1). Only in the past few years, however, has the method been widely practiced in the United States. Relatively few anesthesiologists have been confronted with its analgesic problems, which have not been solved despite the currently popular use of intravenous or local anesthesia.

Pain experienced by an individual varies with his personality and threshold for the perception or expression of pain. Even the phlegmatic patient experiences considerable discomfort during the passage of the 16 or 18 gauge aortic needle, 15 or 16 cm. in length, through the vertebral fascia and along the body of the vertebra, and the rapid injection of the contrast medium into the aorta is painful. Complete immobility is necessary during the exposure of the X-ray films but this is quite difficult to obtain when the patient is in pain and startled during the injection of the radiopaque liquid. Additional factors that may aggravate pain or disturb the procedure are: (1) inexperience of the operator, (2) hypersensitivity of the patient to pain, (3) aggravation of pain in the diseased organ under study, and (4) repetition of the needle puncture or injection of dye to obtain optimal visualization or for teaching purposes.

Extensive experience with lucaine® spinal analgesia in obstetrics, culdoscopy and extraperitoneal general surgical procedures suggested that sensory subarachnoid block without significant motor paralysis might be most suitable (2-7). The hypobaric technique employed

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for culdoscopy seemed especially appropriate for aortography which procedure also necessitates use of the prone position.

#### HYPOBARIC LUCAINÉ® SPINAL ANALGESIA

A vasopressor drug, ephedrine sulfate, 50 mg., or neosynephrine hydrochloride, 5 mg., is injected subcutaneously five to ten minutes before the lumbar puncture, if the patient is not hypertensive. To control blood pressure more precisely because of the presence of hypertension or cardiac disease, injection of the vasopressor, in the form of a dilute neosynephrine infusion, 5 mg. in 500 cc. of 5 per cent glucose, should start just before or after the spinal injection of lucaine.

The spinal needle, preferably of 24 or 26 gauge, is inserted through the third or fourth interspace with the patient in the lateral or sitting position; the latter position is more desirable when the 24 or 26 gauge needle is employed (8, 9). The analgesic solution, 20 mg. of lucaine hydrochloride dissolved in 3 cc. of distilled water, is injected in fifteen seconds. The patient is then immediately turned prone and tilted 10 degrees in a head up position. When hypalgesia, determined by pinprick, reaches the ninth thoracic dermatome, the table is returned to the horizontal level. Analgesia usually is adequate within three to five minutes, always before ten minutes have elapsed.

#### RESULTS

In the 29 cases managed with spinal hypobaric lucaine the analgesia has been reliable and effective. During injection of the radiopaque solution all patients have reported the sensations of warmth and flushing. In the one extravascular injection the patient complained of sharp, burning abdominal pain. The duration of analgesia has been about one hour, adequate for an unhurried aortic puncture and the reinjection of contrast medium if the X-ray films are unsatisfactory. Motor paralysis of the extremities has not been evident; the intercostal and abdominal musculature have never been affected. The systolic and diastolic blood pressures occasionally have fallen 10 to 30 mm. of mercury; hypotension has appeared slowly and responded to small doses of a vasopressor agent.

No anesthetic complications or sequelae have been observed. The possibility of a postpuncture headache is minimized by the use of a fine gauge lumbar puncture needle and hydration with 2,500 cc. of fluids by mouth each day for three days (8, 9).

#### DISCUSSION

Local infiltration and paravertebral block are least hazardous but leave so much to be desired that most workers have resorted to intra-

venous anesthesia with 2.5 per cent thiopental sodium (10-17). This method has been unsatisfactory in our hands and those of our colleagues in neighboring hospitals because of the high incidence of laryngospasm, respiratory obstruction and depressed ventilation. These major complications are to be expected when intravenous anesthesia is used for a patient in a prone position on an X-ray table. Under these conditions resuscitation has frequently been required. Even the use of a special device to support the patient has not prevented these difficulties (18). Furthermore, an unconscious patient, who has received 0.75 to 1.0 Gm. of thiopental sodium during the twenty to forty-five minutes that this procedure takes, requires continued supervision until he has recovered from anesthesia. It is significant that Deterling has turned to local anesthesia after extensive experience with intravenous thiopental sodium (19). Smith and his co-workers, after having performed 800 aortic punctures with intravenous anesthesia, recently stated that a desirable improvement would be the elimination of the need for general anesthesia (20).

To avoid the difficulties encountered with intravenous anesthesia and the incomplete analgesia obtained with local or paravertebral block, we have considered or tried other methods. Inhalation analgesia with nitrous oxide is unsatisfactory because its analgesic potency with safe concentrations of oxygen is not reliable. With nitrous oxide or trichloroethylene some patients become unexpectedly or uncontrollably restless. Cyclopropane, ethylene or ether is forbidden not only because of the possibilities of duplicating the respiratory complications experienced with intravenous anesthesia but also because of the hazard of explosion in the presence of X-ray equipment (21).

We have used epidural anesthesia in 21 patients; excellent analgesia was obtained in 19 and in 2 we failed to find the epidural space. The epidural injection of 25 cc. of 2 per cent procaine hydrochloride with 1:200,000 epinephrine hydrochloride (the latter is omitted in hypertensive patients) at the level of the tenth or eleventh thoracic interspinous space provides effective analgesia from the fourth thoracic to the third lumbar dermatome, as a rule, and does not produce intercostal muscular paralysis. The fall of blood pressure is gradual and mild or moderate with the use of 2 per cent procaine in these non-operated patients, even when originally hypertensive. Hypotension is easily controlled with small doses of a vasopressor infusion. The patients are conscious, cooperative and capable of normal respiratory activity even in the prone position. The disadvantages of epidural anesthesia are: (1) the delay of twenty to thirty minutes in the arrival of analgesia when using a solution such as 2 per cent procaine, with its effect limited to analgesia without significant motor effect, (2) the occasional inability to find the epidural space or the inadvertent

puncture of the dura even in experienced hands, and (3) the unpredictable failure of analgesia, in spite of excellent technique, when volumes and concentrations of local anesthetic agents are used which are limited to producing analgesia without motor paralysis.

The detection of extravascular injection by the patient's complaint of burning abdominal pain has been claimed as an advantage for local anesthesia (19). It has also been noted, however, with lucaine spinal and 2 per cent procaine epidural analgesia.

Our search for an analgesic method has terminated, at least temporarily, with spinal hypobaric lucaine, 20 mg. in 3 cc. of distilled water. In our hands the technique has been simple, safe and effective. We have not found it "too long-lasting and time-consuming"—the only objections of the one group of workers who reported the use of spinal anesthesia; however, they failed to describe their technique (10).

When lumbar puncture or spinal analgesia is contraindicated, our alternative choice, in descending order of preference, is epidural, paravertebral, local or intravenous anesthesia.

#### SUMMARY AND CONCLUSIONS

We have described a spinal hypobaric technique, using 20 mg. of lucaine hydrochloride in 3 cc. of water, to produce analgesia to the ninth thoracic segment without motor paralysis. It is the simplest form of adequate and dependable pain relief for translumbar aortography. The method has been tested in 29 consecutive cases and found completely satisfactory, confirming our experience with more than 325 patients anesthetized with 20 mg. of hypobaric spinal lucaine for other diagnostic and surgical procedures which require analgesia only to the ninth thoracic segment. Spinal hypobaric lucaine is more effective than local infiltration, less hazardous than intravenous anesthesia and more certain than epidural analgesia.

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