SPINAL ANESTHESIA FOR CESAREAN SECTION

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The choice of anesthesia, method and agent, for obstetrics including cesarean section, has received considerable attention during recent years. Since there are two patients to be considered in these cases the choice of the anesthetic is doubly important.

It is the purpose of this paper to discuss the use of spinal anesthesia in a series of 120 cases of cesarean section performed at the Royal Victoria Montreal Maternity Hospital since December 1942.

Spinal anesthesia has been used for cesarean section by many people and is considered to be a very good method of anesthesia by most of them. Hopkins (1) and Sinclair (2) reported on the use of spinal anesthesia with cocaine for cesarean section in 1902. Since that time many others have written of successful use of spinal anesthesia for these cases; especially since 1928, when Pitkin (3) described controllable spinal anesthesia in obstetrics using a procaine preparation. In the same year Astley (4) cited the advantages of spinal anesthesia in cases of toxemia. He used stovaine. Burns (5) in 1930 reported 10 cases and stated that cesarean section under spinal anesthesia, using stovaine, is an ideal method of dealing with pregnancy complicated by a serious cardiac lesion.

In 1932 Eades (6) reviewed the literature on the subject and presented several series of cases of cesarean sections under spinal anesthesia, totaling 340 cases with two deaths due to the anesthetic. He also presented a personal series of 121 cases in which he used spinocaine in 107 and procaine crystals in 14. There were six postoperative deaths, in one of which spinal anesthesia may have played a part since the patient was in impending shock and had a steadily declining blood pressure in spite of analeptics and blood transfusion, death occurring five hours after operation.

For a number of years Cosgrove (7) has advocated the use of spinal anesthesia in obstetrics, using procaine, and in 1937 reported a series of 244 cesarean sections done under spinal anesthesia with no mortality, immediate or remote, attributable to the anesthetic.

In 1940 Heard (8) reported a series of 279 cesarean sections in which spinal anesthesia was used in over 50 per cent. He concluded that: he who denies the baby the safety of spinal anesthesia must accept the responsibility of protecting him from ether.

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Batten (9) in 1941 reported a series of 96 cases over a twelve year period and in 1943 (10) a further series of 25. He showed the advantages to be gained from the administration of oxygen to the mother before delivery; this produced a marked increase in the oxygen in the umbilical vein and thus the amount available to the baby. He used pontocaine and procaine together in most of his cases. Weintraub and Merrian (11) recently reported 345 cases using procaine. In this series there were four maternal deaths, none of which was due to the anesthetic.

In 1942 Thomas (12) reported 121 cases without death due to the anesthetic. He used heavy solution of nupercaine. Mueller in 1944 reported a series of 14 cases, using a procaine and pontocaine mixture, with excellent results.

A few writers have reported less favorably regarding the use of spinal anesthesia in cesarean section. Franken (14) discussed the dangers of spinal anesthesia in cesarean section, mentioning especially the fact that hard labor pains or excessive movement of the patient might send the anesthetic to dangerously high levels.

Mallinson (15) discussed the physiologic changes associated with pregnancy and concluded that pregnancy is a contraindication to the use of spinal anesthesia. He stated that in pregnancy there is a diminished carbon-dioxide combining power in the blood and therefore there is an increase of carbon dioxide in the blood with a lowered carbon-dioxide alveolar tension: (i.e.) a certain degree of acidosis is present. Now under spinal anesthesia vasoconstrictor paralysis as well as motor and sensory paralysis occurs and, if this is added to an excess of carbon dioxide in the blood, the residual tone of the vessels is lost and the blood pressure level may fall very low since carbon dioxide also causes peripheral vascular dilatation.

In our series of 120 cases we have been very well pleased and satisfied with results, at the same time recognizing the difficulties and dangers inherent in the method. The ages of the patients varied from 21 to 43 years, and the indications for cesarean section included disproportion, previous section, placenta previa centralis, toxemia, diabetes mellitus, pulmonary tuberculosis, fibromyomas of the uterus and chronic nephritis.

**Technic**

The technic used for the induction of spinal anesthesia in our series was essentially as follows.

Preoperative sedation was not used or, if used, the dosage was small. However we feel that sedation could have been used to advantage and with safety in more of our cases. Most of the patients were given a hypodermic injection of morphine or morphine and hyoscine immediately after the delivery.
Ephedrine hydrochloride ¼ to 1½ grains (50–100 mg.), was administered hypodermically at least fifteen minutes before the injection of the spinal anesthetic and in those who had received only ¾ grain of ephedrine hydrochloride, a further dose of ¾ grain was given just before the spinal injection of pontocaine.

The patient was placed in the sitting position for the injection of the anesthetic agent, which was pontocaine in all but two of the cases. In these two we used nupercaine, following the technic of Thomas (12). We used pontocaine 1 per cent solution in a dosage of 1.2–2 cc., with an equal volume of 10 per cent glucose in normal saline solution, or the niphlanoid form of pontocaine dissolved in cerebrospinal fluid and then mixed with 10 per cent glucose in normal saline solution as before. We prefer the 1 per cent solution of pontocaine.

After the injection the patient was placed flat with her head raised on a pillow. The anesthetic level in almost all cases came to the costal margin or above with no further change of posture of the patient, which is a much higher level than would be obtained using the same technic in nonpregnant patients. After twenty minutes and not before, we permitted a moderate degree of Trendelenburg position to be assumed by the patient if the obstetrician required it.

Following the injection of pontocaine and until after the delivery of the baby we administered oxygen to the patient. Batten (10) has reported on the advantages to be gained from the use of oxygen in this manner. Some of the patients complained of difficulty in breathing, for a short time, but by allowing them to breathe oxygen from the anesthesia gas machine they all remained well oxygenated and the babies were pink on delivery and cried spontaneously. In only one case in our series did the anesthetic rise to such a level that the patient was in danger from respiratory depression. Oxygen was administered under pressure with the anesthesia gas machine and the patient maintained a good color. At the same time an intravenous injection of glucose in saline solution was started although the blood pressure level was still good. In less than thirty minutes the patient was breathing adequately, the baby appeared to be normal on delivery and cried spontaneously. The postoperative course of mother and child was uneventful.

The blood pressure levels of these patients showed considerable variation. Some patients had almost no change at any time while a few had quite marked drops during the first five to ten minutes. The systolic pressure dropped to about 50 mm. of mercury, but in all cases this had returned to above 100 in another five to ten minutes, so that in less than twenty minutes the blood pressure of almost all cases was again at or above the preoperative level. In a few cases there was no drop in blood pressure, but rather a rise which in some cases reached 180 or 200 mm. systolic.
Postoperative Results

In our series there were no maternal deaths and the majority of the patients enjoyed an uneventful recovery. There were no untoward postanesthetic sequelae.

There were seven fetal deaths in the series, in none of which was the anesthetic responsible. Five of the fetal deaths were in premature infants and the indication for cesarean section in each of these was placenta previa centralis. Of the others one was diagnosed as erythroblastosis fetalis, and in the other no cause of death was found at autopsy.

All the babies were of good color and cried spontaneously after delivery, some of the babies crying as soon as the head, and before the body, was delivered. The babies were generally in much better condition than those delivered from mothers receiving an inhalation agent.

Advantages of Spinal Anesthesia

Spinal anesthesia presents the same advantages for cesarean section that it does for general surgery plus a few arising from the conditions peculiar to the operation:

1. The tone of the uterus is not lost and contractions are good; thus there is a diminished blood loss.
2. There is a lower incidence of nausea and vomiting.
3. There is no depression so that resuscitation of the baby is not necessary.

Disadvantages of Spinal Anesthesia

There are certain disadvantages or contraindications to the use of spinal anesthesia in general surgery and these same disadvantages or contraindications apply to cases of cesarean section, but in addition spinal anesthesia appears to have a greater and more profound effect when used in obstetrical patients than in the non-pregnant patient. Thus it is important to have a competent, well-trained anesthetist in direct charge of each case, and he or she must have readily available all the means necessary for successfully combating any trouble which might arise.

Summary

We have reported a series of 120 cesarean sections performed under spinal anesthesia. This is a safe method of anesthesia for these operations provided that adequate precautions are taken, since the state of pregnancy appears to increase the dangers of spinal anesthesia.

The pregnant patient differs from the nonpregnant in her reaction to spinal anesthesia in the following manner:

1. The level of anesthesia ascends higher; this is especially noticeable if the patient is having hard uterine contractions.
2. The blood pressure level is more likely to drop.
3. The respiration of the patient is more easily depressed if the anesthesia ascends very high.

REFERENCES


Bindings for Volumes 1, 2, 3, 4 and 5 of Anesthesiology are available in green cloth with gold lettering (price $2.00 per volume; 15 cents extra for name), or in yellow cloth with black lettering (price $1.50 per volume). Journals to be bound should be sent, together with the Index, to Headquarters of the American Society of Anesthetists, Room 1503, 745 Fifth Avenue, New York 22, N. Y.