

plications to look out for are the intravenous or subarachnoid injection of the drug, infection, breaking of the needle, fall in blood pressure, toxic manifestations, and trauma to the sacrum. An increase in the number of operative deliveries was observed." 12 references.

J. C. M. C.

RANDALL, L. M.: *Continuous Caudal Anesthesia in Obstetrics*. *Journal-Lancet* 64: 7-11 (Jan.) 1944.

"Members of the Section on Anesthesia of the Mayo Clinic previously have published the technic of effecting continuous caudal anesthesia in obstetrics by injection of 1.5 per cent solution of metycaine. My colleagues of the Section on Obstetrics of the same institution wish me to report on our experience with this procedure from the standpoint of the first eighty-three patients in whose cases this method of anesthesia was employed. This number represents about 10 per cent of all patients delivered at the Clinic since the first patient was given caudal anesthesia on June 3, 1942. The solution was injected through a needle fixed in the caudal canal in nineteen cases and through an indwelling catheter in sixty-four cases. . . . In thirty-nine cases (47 per cent), continuous caudal injection of 1.5 per cent solution of metycaine, without any other measure of anesthesia, can be judged to have been 100 per cent successful, as far as analgesia and anesthesia were concerned. . . . In twenty-four cases (29 per cent), continuous caudal anesthesia provided excellent analgesia and anesthesia until it was discontinued for various reasons. Before these cases are considered in numerically separate groups, which will total to twenty-four, it may be said that in eleven the effect of continuous caudal anesthesia was continued into the second stage of labor for from one to two hours. . . .

Of the total of twenty-four cases in which continuous caudal anesthesia was stopped for various reasons, failure of progress in the second stage of labor occurred in ten. In all these ten cases occipital posterior position occurred. In five of the ten cases rotation was effected manually, in one, by means of forceps, and in four it was spontaneous. In nine of the twenty-four cases continuous caudal anesthesia was discontinued at the onset of the second stage of labor or very early therein. In two of these nine cases the discontinuance was because the catheter slipped and it was decided to carry on analgesia and anesthesia by inhalation rather than to reinsert the catheter.

"In one of the nine cases, the vertex was asynclitic and descent and rotation were arrested below the level of the spines of the ischium. Continuous caudal anesthesia was discontinued by election in three of the nine cases. In two instances of the nine, in which occipital posterior position was recognized early in the second stage of labor, continuous caudal anesthesia was discontinued because the patients had no desire to bear down; when nitrous oxide and oxygen were administered to them for analgesia, and the effect of the caudal injection had disappeared, they cooperated well. In the last case of the nine yet to be considered, the same situation that has been described in the previous sentence obtained in the presence of a breech presentation. In four cases of the twenty-four continuous caudal anesthesia was discontinued in the first stage of labor. In two of these cases the patients were primigravidas, dilatation of whose cervixes remained at 8 to 9 cm. for five hours. Cessation of continuous caudal anesthesia was succeeded by completion of the first stage of labor and analgesia and anesthesia were effected by inhalation in the second stage, for delivery and repair. . . . One patient who was admitted in an emergency condition after

many hours of hard labor had suffered from prolapse of the uterus before conception. The cervix was found to be dilated 5 cm. on the patient's admission and it remained so in spite of continuous caudal anesthesia, in the course of which 90 cc. of 1.5 per cent metycaine solution were injected in four hours. At the end of that time, because of fetal and maternal indications, Dührsen's incisions were made in the cervix and delivery was accomplished with mid forceps. The second case of the two was one of marginal placenta praevia in which a bag had been inserted. Over a period of eight and a half hours 130 cc. of 1.5 per cent metycaine solution were given, with complete relief of pain but no progress in dilatation beyond 4 cm. In one case of the twenty-four a leaking catheter led to administration of nitrous oxide and oxygen. . . . It was necessary to reinsert the catheter three of fifty times in which catheters were used and a needle once of thirteen times in which needles were used. In one case a needle was broken but the fragment could be withdrawn without making an incision. In one case, when the attempt was made to withdraw the catheter after its insertion, a portion of the catheter was sheared off against the sharp edge of the needle and it was necessary to make an incision to remove the piece of catheter. In one case decubitus developed near the site of injection and persisted for several weeks. In another case a draining sinus developed but healed spontaneously weeks later.

"In twelve cases hypotension occurred during or following the injection. . . . It is our opinion that too rapid injection of the solution into the caudal canal was largely responsible for the fall in blood pressure. A marked diminution of blood pressure, if it persisted for sufficient time, could exert deleterious effects on the infant through failure of circulation of blood in the maternal portion of the pla-

centa. . . . The average amount of solution of metycaine administered to these sixty-three patients was 90 cc. The greatest amount was 502 cc. over a period of twenty-seven hours. Fourteen patients received 50 cc. or less. . . . In twenty cases (24 per cent) deficient results were obtained with continuous caudal anesthesia. In two of these cases there was some reaction to the injection and the procedure was abandoned. In two it is probable that an insufficient amount of metycaine was injected. There were eight cases in which errors in technic or accidents to equipment resulted in failure: in two, needles were broken; in one the catheter became plugged; in four cases the catheters did not remain in place, and in one, too short a needle was inserted. In each of the two cases in which the needle broke it was necessary to make an incision in order to remove the fragment. One patient of the twenty received an injection only sixteen minutes before delivery and it was necessary, for delivery, to effect anesthesia by inhalation; repair after the episiotomy, however, was performed under the anesthesia resulting from the caudal injection. In the remaining seven cases in this group of twenty, no error in technic or equipment is known. We believe that metycaine was injected into the caudal canal but anesthesia satisfactory neither to the patient nor to the obstetrician occurred. . . .

"Our obstetrical experience with eighty-three patients who have received continuous caudal injection of 1.5 per cent metycaine solution may allow of certain opinions and statements regarding the procedure. Primiparous women who are experiencing a long first stage of labor, and multiparous women who previously have experienced a long first stage, may be candidates for this form of anesthesia. The preliminary, and in some instances the associated, administration, by mouth, of pentobarbital sodium in doses of

1½ to 3.0 grains (0.1 to 0.2 Gm.) gives additional analgesia. . . . In some of our cases it would seem that the first stage of labor was prolonged after continuous caudal anesthesia was instituted and in others it appeared to be shortened, but impressions in this respect have not much value because of the great variation in this stage of labor under all circumstances. The second stage is no doubt prolonged when continuous caudal anesthesia is employed. The percentage of occipital posterior positions has been greatly increased in our experience. . . . In our series, forceps delivery occurred forty-eight times in fifty-eight vertex presentations, 82 per cent. Our usual incidence of forceps deliveries is 26 per cent. . . . We have used this form of anesthesia in cases of toxemia and have demonstrated considerable lowering of blood pressure. To these patients the risk of delivery is increased and they do not tolerate pain well. . . . Significant falls in blood pressure have occurred. The response to intravenous injection of ⅛ to ⅜ grain (0.008 to 0.024 Gm.) of ephedrine, and in two cases to the injection of solution of acacia, has restored the pressure. To patients who enter labor with hypertension and toxemia, if hypertension follows the injection, we prefer to give ⅛ grain of ephedrine and repeat the dose if necessary rather than to give an initial dose of ⅜ grain.

"Because of the complete relaxation of the perineum following caudal injection, extraction of the aftercoming head in breech delivery is facilitated. Other operative procedures, such as Dührssen's incisions, repair of the perineum and repair of the cervix, are effectively accomplished. These may be rendered possible even when analgesia against the pain of uterine contraction has not occurred. . . . It has been stated that this form of anesthesia should not be used when placenta praevia is present but in two such

cases we had no untoward effect from its use. The bladder must be watched. Patients to whom continuous caudal anesthesia is administered lose the bladder reflex and may be unable to void. Catheterization is to be performed whenever necessary. . . . The progress of labor must be more carefully noted when continuous caudal anesthesia is used than when other methods are employed. The reason for this is that the patient is no longer able to judge the severity of pain or to perceive symptoms that may be significant, such as tonic contractions or changes in the character of the pain. Nothing announces the advent of the second stage except the results of rectal examination. As a result, much more time must be spent with the patient than is usual. There is no doubt that when anesthesia produced by continuous injection of 1.5 per cent metylocaine solution is completely effective, and when labor progresses normally through the first and second stages, the patient and the obstetrician are impressed with the results. When a deficient or completely unsatisfactory result obtains, however, one realizes that a panacea for relief of the pain of labor has not yet been devised."

J. C. M. C.

LULL, C. B., AND ULLERY, J. C.: *Cesarean Section under Continuous Caudal Analgesia: a Preliminary Report*. J. A. M. A. 124: 90-93 (Jan. 8) 1944.

"After observing the results of continuous caudal anesthesia in several hundred vaginal deliveries, we extend its use for immediate puerperal sterilization. Our results were satisfactory. Following this we have attempted to evaluate its use for cesarean section and herewith is a report on our observation in 50 cases. . . . Mental reassurance should be included in the usual preoperative preparation of a patient