The Table summarizes the 14 cases of urethral valves which have been operated upon: clearly, the results leave a great deal to be desired. The older children are much more likely to survive than the infants, but this merely indicates that the older children are suffering from a less severe obstruction and in no way contradicts the view that earlier diagnosis will lead to improved results. More careful attention to the urinary abnormalities of the "under-threes" is required if a significant proportion of children with this disease are to grow up to be healthy adults.

ADDENDUM.—In the eight months which have elapsed since this paper was completed the survivors in the series reported have continued to thrive and five additional cases have been treated. Of these, two, aged 9 days and 11 weeks, died of renal failure before operative treatment of the obstruction had been completed; three, aged 3 weeks, 9 months, and 6 years, have made a satisfactory recovery.

My thanks are due to Mr. Twistington Higgins and to other members of the staff of the Hospital for Sick Children, Great Ormond Street, for allowing me to treat their cases, and to Mr. N. Stidolph, of the Whittington Hospital, for inviting me to see the last of the series. Thanks are also due to Mr. Derek Martin and Mr. P. Cull for their assistance with the illustrations.

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CONTINUOUS CAUDAL ANALGESIA EXPERIENCES IN THE MANAGEMENT OF DISORDERED UTERINE FUNCTION IN LABOUR*

BY

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Prolonged labour which results from incoordinate action of the uterus or cervix is a serious problem which confronts every obstetrician from time to time. The occasional grave consequences to both mother and foetus have resulted in an increasing tendency to terminate such labours by caesarean section when vaginal delivery is delayed after 36 to 48 hours of established labour (Munro Kerr and Chassar Moir, 1949).

The purpose of this paper is to record the experience gained from the therapeutic application of continuous caudal analgesia to the management of this problem. The comments and conclusions are based on a study of 74 cases of disordinated action of the uterus or cervix which had prolonged the first stage of labour beyond 48 hours. The clinical types treated included hypotonic inertia, hypertonic lower uterine segment inertia, and primary cervical dystocia (Jeffcoate, 1950). The material has been collected from the Department of Obstetrics and Gynaecology at Newcastle-upon-Tyne General Hospital during the past three and a half years, and 22 cases of cervical dystocia reported in a previous publication (Arthur and Johnson, 1952) are included.

Caudal analgesia was originally devised for minor pelvic operations and described simultaneously by Sicard (1901) and Cathelin (1901). The method is therefore not a new one, but Hingson and Edwards (1943) are largely responsible for describing the modern continuous technique and for applying it to obstetric practice, chiefly as a pain-relieving measure. The in-

trinsic difficulties and possible complications of the method, in its present form, however, prejudice its widespread adoption for obstetric analgesia, especially when adequate results are obtainable by simpler means. On the other hand, the satisfactory results achieved by its therapeutic use in the management of disordered uterine function justify a wider trial (Nixon, 1952).

The principle of caudal analgesia in the labouring patient is to block the sacral plexus with a suitable local analgesic agent as it lies within the confines of the sacral canal, and to extend the level of analgesia upwards in the extradural space to the level of the tenth dorsal segment.

By this means both the motor and the sensory connexions to the pelvic floor and perineum arising from the sacral plexus are effectively blocked, together with the visceromotor parasympathetic connexions to the cervix. The upward extension of analgesia to the tenth dorsal segment in the extradural space interrupts the sensory connexions to the fundus uteri which enter the cord at this level, and the uterine action becomes painless. The sympathetic visceromotor fibres of the fundus uteri arising from the cord higher up, in the region of the fifth dorsal segment, are uninfluenced by caudal analgesia, while the opposing parasympathetic fibres from the sacral plexus below are paralysed.

Successful caudal analgesia in the labouring patient is therefore aimed at securing unopposed and painless contractions of the uterine fundus, acting upon a completely paralysed and insensitive cervix and birth canal. These conditions seem very suitable for dealing with the problem of either inert uterine function or cervical dystocia, or a combination of these two conditions, and the principle has been adopted in the management of the labours described below.

Methods Used

The technique of continuous caudal analgesia used in this series closely followed that described by Hingson and Edwards (1943). With the patient lying in the left lateral position, a malleable caudal needle was introduced into the sacral canal and connected by a length of fine pressure-tubing, with a 10-ml. syringe and two-way tap interposed, to a bottle of 1.5% piperocaine hydrochloride ("metycaine") in Ringer-Locke solution. The malleable-needle technique was adopted in preference to the indwelling-catheter method for several reasons. In the first place, suitable nylon catheters were not easily obtained, and complications have been reported from time to time with "polythene" catheters. The risk of introducing infection seemed greater with any catheter technique, together with the added risk of tubing fracture. Furthermore, it is doubtful whether polythene catheters can be sterilized with sufficient certainty to insert into the extradural space with complete safety.

The malleable-needle technique proved completely satisfactory, and the requisite apparatus can now be obtained from Messrs. Thackray, Ltd. It was always ready for use, being autoclaved in a small drum together with the necessary drapings.

Analgesia was induced when labour had been prolonged beyond 48 hours owing either to an intrinsic failure of uterine function or to cervical dystocia without any evidence of cephalo-pelvic disproportion.

A preliminary vaginal examination was always made before caudal analgesia, to assess carefully the stage to which labour had progressed and to ensure that the cervix had reached at least one-third dilatation. Hingson and Edwards state that this degree of dilatation is essential, and failure to observe this rule may result in the inhibition of uterine contractions. It is also emphasized that this method

*Condensed from a paper presented to the Newcastle-upon-Tyne Obstetric Society on December 5, 1952.

should not be contemplated if there is any evidence of cephalo-pelvic disproportion, or non-engagement of the head from any other cause whatsoever, for fear of dangerously overdistending a paralysed lower uterine segment.

An initial dose of 40 ml. of piperocaine, injected down the pressure-tubing described above, gave satisfactory analgesia to the tenth dorsal segment for approximately one and a half hours. Thereafter, maintenance doses of 15 ml. were administered at half-hourly intervals. These injections were given by a midwife specially trained in the technique, and the patient was turned on to her opposite side via the abdomen after each half-hourly dose to maintain a bilateral effect. The blood pressure was recorded after each injection, and 20 mg. of methylamphetamine hydrochloride was administered intramuscularly at the onset of caudal analgesia to prevent any severe fall in blood pressure. Analgesia was maintained for approximately six hours in each case, and was then followed by a second vaginal examination to assess progress in cervical dilatation. The subsequent management of each individual case depended upon the progress made.

The comparative findings of the two vaginal examinations enabled each patient to be placed in one of three categories. Group 1 included all those with fully dilated cervixes who were immediately delivered with forceps. Group 2 comprised those patients who showed definite progress, but who had not achieved complete dilatation of the cervix after six hours of caudal analgesia. Treatment was continued with half-hourly injections of piperocaine in the confident anticipation of complete dilatation of the cervix, which was achieved in an average of nine hours in all the cases in this second group. The longest caudal block lasted fourteen hours. Group 3 included those who failed to respond at all after the six hours, and delivery was completed by a lower uterine caesarean section without further delay.

Results

The results in the 74 patients subjected to the treatment are given in Table I.

Group 1.—Forty-five patients were found to have completely dilated cervixes when the second vaginal examination was performed after four to six hours of treatment. Twenty-seven required simple outlet forceps to complete delivery, the foetal skull lying in the pelvic outlet and the

examination was carried out after six hours of treatment. Analgesia was continued until full dilatation of the cervix was reached. This was achieved in an average of nine hours, the longest duration being fourteen hours. Nine patients were delivered by a simple outlet forceps with an anteriorly presenting occiput, and nine more required anterior correction of the occiput before forceps delivery was completed. One patient delivered herself spontaneously. There was no stillbirth or neonatal death in any patient included in this second group.

Group 3.—Ten patients showed no further cervical dilatation after six hours of caudal analgesia, and all these were selected for lower uterine caesarean section and delivered successfully. One infant was delivered in a state of white asphyxia and died within a few minutes of delivery, but the remainder survived and did well. This death is attributed to an error of judgment, for caudal analgesia had been unwisely employed when the head remained above the pelvic brim from partial extension of an occipito-posterior position. A strong contraction ring developed in the uterus, and the infant presumably died from partial obstruction of the placental circulation. This case occurred early in the series and served to emphasize further the importance of avoiding caudal analgesia when the greatest diameter of the foetal skull still remains above the pelvic brim.

Table II shows, by comparison with other published data, that in the present series of 74 cases there was no increased incidence of prolonged labour—that is, labour exceeding 48 hours—despite a local interest in this problem.

TABLE II

	Total Labours Exceeding 48 Hours	Stillbirths and Neonatal Deaths		Maternal Deaths		Average Duration of Labour	
		N.-C. Group	Caudal Group	N.-C. Group	Caudal Group	N.-C. Group	Caudal Group
Newcastle General Hospital, 6,957 deliveries	241 (3.4%)	19 (11.4%)	3 (4.1%)	2	0	66.5 hours	58 hours
Queen Charlotte's Hospital, 20,000 deliveries	631 (3.1%)	77 (12%)	—	3	—	74.9 hours	—

N.-C. = Non-caudal.

Discussion

The number of patients selected for the treatment gradually increased as technical ability improved and confidence in the method developed. Failures of technique were frequent in the early stages, but, with increasing experience, types of patients—for example, the obese or uncooperative—who had previously been regarded as unsuitable subjects were successfully treated. My recent experience agreed with Hingson's statement that successful caudal analgesia could be achieved in approximately 80% of cases attempted, and the presence of a pilonidal sinus or local sepsis became the main contraindication to the method.

To judge from the results obtained so far, there was a great improvement in the foetal salvage rate in the 74 cases studied. This was doubtless attributable to the overall diminution in the length of labour as shown in the last column of Table II, but a noteworthy observation in the series was the surprising lively condition of the infants at birth (with the exception of the three cases quoted above) despite unmistakable evidence of foetal distress in no fewer than 29 cases before analgesia was started. A suggested explanation of this phenomenon, which is under further investigation, is the dilatation of the uterine arterioles, which might result from blocking their autonomic connexions, thus enhancing the maternal blood supply to the placenta.

Conclusions

The application of continuous caudal analgesia to the management of prolonged labour which resulted from primary failure of uterine function or cervical dystocia has

TABLE I

Method of delivery	Group 1 (45 Cases)			Group 2 (19 Cases)			Group 3 (10 Cases)
	Low Forceps	Anterior Rotation and Forceps	Breech Extraction	Low Forceps	Anterior Rotation and Forceps	Normal Delivery	Lower Segment Caesarean Section
Method of delivery	27	16	2	9	9	1	10
Stillbirths and neonatal deaths	1	0	1	0	0	0	1

occiput anterior. Sixteen required anterior rotation of the occiput in the mid-cavity of the pelvis from a transverse or posterior position before forceps delivery was completed. The two remaining patients were delivered by breech extraction. There was one stillbirth from an intracranial injury following a difficult breech extraction, and one infant died on the fourth day from pneumonia. In this latter case the membranes had been ruptured surgically for severe pre-eclamptic toxæmia arising two weeks before term. The blood pressure was 210/120 at the time of the rupture of the membranes, and the urine contained 5 g. of albumin per litre.

Group 2.—Nineteen patients showed progressing but incomplete dilatation of the cervix when the second vaginal

proved a most valuable addition to the obstetrician's armamentarium.

In many cases the method resulted in speedy dilatation of the cervix to permit earlier delivery of the patient than might have otherwise been expected. Patients showing no response whatever to the treatment were selected for lower segment caesarean section, which was performed on patients who were refreshed by a respite from labour pains. It was deduced from the results obtained that caudal analgesia should be tried when caesarean section might otherwise be seriously regarded as the only satisfactory solution to prolonged and non-progressive labour. By its use many patients will be spared abdominal operation, but, on the other hand, if by failure of response caesarean section is subsequently thought to be necessary, its successful outcome will not have been prejudiced by the previous management.

There were no serious untoward sequelae attributable to caudal analgesia, and this series concludes a pilot study before a more careful statistical investigation is undertaken into the value of the method described in the management of labour exceeding 48 hours.

Summary

The results obtained by employing continuous caudal analgesia as a therapeutic measure in the management of 74 cases of uterine inertia and cervical dystocia, or a combination of these two conditions, are described.

Sixty-four patients were successfully delivered vaginally, with two neonatal deaths, after a period of analgesia lasting from four to fourteen hours.

Ten patients showed no further progress whatever after six hours of caudal analgesia, and were delivered by a lower segment caesarean section.

Continuous caudal analgesia accelerated the progress of labour in a high proportion of cases, and considerably diminished the foetal hazards of this perplexing obstetric problem.

My thanks are due to the nursing staff for preparing the apparatus and managing the patients, and to those obstetricians who have given caudal analgesia a fair chance to see what it can achieve. I am also indebted to Mr. Linton Snaith for his permission to publish the clinical data, and to Professor Harvey Evers and Mr. Hugh Arthur for much helpful criticism and advice in the preparation of this report.

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Medical Memorandum

Supernumerary Pectineus Bursa Causing Femoral Vein Compression

Supernumerary pectineus bursa is a rarity. In the following case recurrent attacks of bursitis had led to femoral vein compression with consequent swelling of the affected leg.

CASE REPORT

A housewife aged 41 was referred to the out-patient department on December 31, 1951, complaining of severe pain in the right thigh which had kept her awake for one night. Her doctor stated that the thigh was greatly swollen and had made a diagnosis of possible venous thrombosis. Two months earlier she had complained only of swelling of the right thigh; there was no pain or tenderness, or any sug-

gestion of a deep vein thrombosis, nor were any inflammatory changes seen in the limb. The doctor thought it was possibly a case of angioneurotic oedema.

On examination her general condition was good. No abnormality was found in the respiratory system, cardiovascular system, or abdomen. The circumference of the right thigh was 2 in. (5 cm.) greater than the left, and the right calf 1 in. (2.5 cm.) greater than the left. There was, however, no evidence of actual oedema. The pulses of the two legs were equal and good. No pelvic abnormality was found on rectal or vaginal examination. There were no varicose veins. X-ray examination of the chest, pelvis, lumbar spine, and femora showed nothing abnormal. No cause could be found for this swelling in the limb and she was asked to report again should she get any further attacks, so that she could be seen during an attack.

She reported back on June 17, 1952, stating that during the previous week a lump the size of a walnut had appeared in the right groin. It had been present for two days and had then disappeared. On examination there was no sign of the lump in the groin, and in view of this she was again asked to attend when the lump reappeared.

Her third attendance, on September 22, 1952, showed a swelling the size of a walnut in the right groin situated below and lateral to the pubic spine. It was cystic and tender; the skin was mobile over it, but the swelling was fixed to the underlying muscle. An irreducible femoral hernia was diagnosed and operation undertaken.

At operation by a Lotheissen approach, dissection below the inguinal ligament revealed a cystic swelling which was found to be lying on the pectineus fascia and intimately adherent to the femoral vein. It was realized that this was not a femoral hernia but a bursa arising from the pectineus fascia. It was excised with the exception of a small portion adherent to the femoral vein.

Pathological Report.—The bursa contained gelatinous fluid and had a smooth lining. On histological examination the material was shown to consist of oedematous and congested fibro-vascular tissue, moderately infiltrated with chronic inflammatory cells, eosinophils predominating. In one edge the material was lined by flattened endothelial cells.

The patient made an uneventful convalescence, and on discharge from hospital on October 7 there was no significant difference in the circumference of the two limbs after exercise. When seen on December 15 she was symptom-free and there was no difference in measurement of the left and right lower limbs.

COMMENT

Supernumerary pectineal bursa is a further lesion to be considered in the differential diagnosis of swellings in the ileo-femoral region. In the case recorded the patient presented with swelling of the thigh, the cause of which remained undiagnosed until the bursa became large enough to appear in Scapa's triangle, when it was diagnosed as a femoral hernia.

Perrigard (1947) recorded this condition under the title of supernumerary bursa of pectineus muscle simulating hernia in the inguinal region. In his patient the bursa was adherent to some of the smaller tributaries of the long saphenous vein, whereas in our patient the bursa was firmly adherent to the femoral vein. In Perrigard's patient there were no symptoms referable to venous obstruction, and the bursa seemed to have been more superficial in its situation. We can find no other reference to this condition in the literature.

A similar condition which may lead to some confusion is the ileo-psoas or ileo-pectineus bursa which lies lateral to the femoral artery and may overlap the arteries and veins to lie anterior to them.

We should like to express our thanks to Dr. K. P. Ball and to Dr. Isobel Finlayson for the detail given in her original letter.

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