SPARTEINE SULPHATE

A Clinical Trial of 105 Cases

by

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Of the three factors that govern labour, uterine action, the vis a tergo., is the most crucial. Uterine inertia taxes the time and patience not only of the patient but her doctor as well. Further, patients in the so-called 'false labour' tend to occupy hospital beds for several days, involving a national loss in these days of extreme pressure on hospital turnover. On the other hand, the uterus endowed with good and coordinated function often overcomes impediments — mild to moderate — due to abnormalities of the foetus or maternal passages. Such dynamic and all important uterine action is often wanting; vagaries in uterine function are so common that for nearly a century obstetricians have been in the search of a drug for induction of labour and/or acceleration of sluggish labour. Since the introduction by Blair Bell in 1909 of posterior pituitary extract in obstetric practice, oxytocics have come to stay. Induction of labour having become an established procedure, the quest now is for a safer and better oxytocic.

Pitocin and its synthetic counterpart, the traditional oxytocics have proved double-edged weapons, for they are as harmful in untrained hands as they are invaluable in trained ones. Their extreme potency, including the risk of tetanic uterine contractions, foetal death and rupture of uterus, warrant the quest for a safer oxytocic with a simpler mode of administration.

The spastic effect of ergot and its derivatives has limited their use to postpartum haemorrhage. However, in sparteine, a related alkaloid, we have a promising oxytocic.

Sparteine: Isolated in 1851, sparteine is a lupamine alkaloid occurring in spartium scoparium and other plants. It has the empirical formula $C_{15}H_{26}O_2$. It is marketed as the acid salt (sulphate); in India it is available as Unitocin, manufactured by Unichem Laboratories, Limited, in ampoules of 150 mg. Though originally used for cardiac arrhythmias, it has now drawn world-wide attention as an oxytocic. Several workers

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have used this drug in our country and abroad with fairly uniform results. The biggest series of 1364 intrapartum cases and 200 immediate post-partum cases reported by Plentl *et al* (1961) point to its great efficacy in shortening the duration of labour with no side effects and a wide margin of safety. The same authors (1963) used if for elective induction of labour in 407 cases with 83.3% success.

In India, Jhaveri (1963) used it in 174 cases to accelerate labour and found it the drug of choice. Devi and Mokadam (1963) used it in 42 cases with extremely gratifying results. Desai used it on an equal number of 45 cases in the first and second stages of labour and found the delivery time much reduced. Nadkarni and Shah (1964) found it most useful in cases of spontaneous premature rupture of membranes with uterine inertia. Bhaskara Rao and Subrahmanyam, (1964) used it in 65 cases with a 66.1% success rate of induction. The results were better after an oxytocic sensitivity test but did not make any difference between pitocin and sparteine sulphate. They particularly stressed the ease of administration due to doing away with an intravenous drip. Apte (1965) used it in cases of abortion.

Material and Methods

In the present trial of 105 selected cases at King George Hospital, Visakhapatnam, over a 15 month period, 40 were elective inductions for uncomplicated term pregnancies, 33 were cases of hypotonic inertia and 32 were cases of indicated induction. Only cases with live viable foetuses were included in this series. The following criteria were insisted upon for the trial cases:—

1. Cervix well taken up. 2. Cervix dilated to at least 2 cm. 3. Vertex presentation. 4. Engagement of presenting part. 5. No cephalopelvic disproportion. 6. Absence of cardiovascular disease.

Intramuscular injections of 150 mg. of sparteine sulphate were given at half to one hour intervals, up to a maximum of 6 injections. The response was noted in terms of the strength, intensity and frequency of uterine contractions. Where poor or no response followed, injections were discontinued after the third dose. In certain cases of failure, sparteine was repeated after 24-48 hours, following a re-assessment of cervical condition, foetal heart and maternal condition. In all cases, the maternal effects as evidenced by changes in blood pressure, pulse rate and subjective symptoms were noted and effects on foetal heart were noted at regular and frequent intervals. In hypotonic inertia, rupture of membranes was done prior to administration of sparteine if membranes were not already absent. The results are tabulated in Table I.

I. Elective induction

Of the 40 cases, 28 were successfully induced (70%). The number of injections varied from 2 to 6, the average number needed for successful induction being 4 or 5 for primigravidae and 3 for multigravidae. Three of these cases were successful after a second course of injections. The mean induction-delivery inter-

TABLE I

Group	No. of patients	Successful	Percentage	Complications
Group I : Elective induction	40	28	70	
Group II : Acceleration of labour	33	27	81.9%	One case of postpartum haemorrhage.
Group III : Indicated induction	32	22	68.75%	
Postmaturity	6	2		
Hydramnios	5	5		
Premature rupture of membranes	12	11	94%	Three cases of asphyxia neonatorum, one mild and two severe
Mild toxaemia	9	4		

val was 10 hours in primigravidae (range 6 to 30 hours) and 7¾ hours in multigravidae (range 4 to 22 hours). The cause of failure could not have been an unripe cervix. Most of the "poor response" cases showed initial good contractions but they were neither strong, nor sustained. There were 2 cases with good contractions lasting 5 hours which subsided after the last injection, without producing remarkable dilatation of the cervix. When repeated 24 hours later, neither case showed any appreciable response.

2. Acceleration of labour

Of the 33 cases, 27 were successful (81.9%). The average duration of labour before administration of sparteine was 20 hours in primigravidae and 12 hours in multigravidae. The average length of labour after the administration of the drug was 3½ hours, where the membranes were originally intact and cervix dilated less than 3 cm. The average number of injections required was three. There were 6 failures; all of them responded to intravenous infusion of syntocinon and delivered within 12 hours.

3. Indicated inductions

In this heterogenous group of 32 cases there was an over all success rate of 68.75%. Sparteine was strikingly useful in premature rupture of membranes and in hydramnios where artificial rupture was done (94% success). Sparteine was, however, of limited use in postmaturity, and had to be abandoned in two cases of mild toxaemia because of foetal distress.

Complications and side effects:— Besides the two cases mentioned above there was another case where flushing of the mother's body necessitated abandoning of the trial. In a third para with hypotonic inertia, sparteine administration stimulated the contractions in three and half hours and after a forceps delivery was followed by severe postpartum haemorrhage 2 hours later. There was one asphyxiated baby in the toxaemia group, but toxaemia and prematurity also have to be taken into account in apportioning the blame. The child was revived with oxygen. There was no case of foetal death.

Discussion

Though Kleine introduced spar-

teine into clinical practice as early as in 1939, it was not until the extensive investigations by Plentl, Friedman and Gray (1961) that the drug has called general attention. These workers in their study of over 1500 patients receiving the drug during labour and immediate postpartum, observed a significant reduction of both first and second stages of labour. They also stressed the foetal and maternal safety factor. Van Voorhis *et al* (1966) in a double evaluation of the drug show that it acts as a mild uterine stimulant producing a decided reduction in the latent interval. They, however, add that its use is attended by a greater incidence of uterine hypertonicity and foetal bradycardia.

In our series of 105 cases, there was an overall success rate of 72%. In the elective induction group, seven out of every ten inductions succeeded.

Some of the failures responded to syntocinon drip, but the converse was also true in at least one case in the present study. A primigravida, apparently refractory to the syntocinon drip, responded well to a course of 4 injections of sparteine the following day with an induction-delivery interval of 8½ hours. There was, however, a small but undeniable proportion of cases where extreme variability was noticed in the effects from patient to patient and even in the same patient. It was sometimes difficult to predict the outcome of labour by the patient's initial response to the drug. Most of the failures were in those patients who, to start with, responded with very good uterine contractions. In our series, one primigravida electively induced and one multigravida with postmaturity showed well coordinated and sustained contractions after 3 injections in each case for nearly 5 hours, but later the contractions waned away without appreciable dilatation of the cervix.

The most impressive (94%) success in our experience was met with in the acceleration of labour in hypotonic inertia and in cases of hydramnios. Similar results of 100% success have been reported by Nadkarni (1964). It was particularly noted that when rupture of membranes was followed up with injections of sparteine, the average duration of labour after administration of sparteine was 1 hour 50 minutes.

Sparteine would appear to cut short the prolonged, teasing and exhausting latent phase of labour and to initiate the active phase, as reported by Schulman & Ledger (1965). Peterson & Morese (1965), in their study on 404 patients, employed cervical dilatation curves to demonstrate the effect of sparteine on labour in relation to rupture of membranes. Their analysis suggests that while the presence of ruptured membranes prior to therapy with sparteine exerts little effect on the latent phase of labour, it does result in definite shortening of the active phase. They add that this need not necessarily predispose to precipitate labour.

With regard to the complications, sparteine has been both praised and condemned. Out of 2,765 patients who were given the drug, Newton *et al* (1964) have collected 9 episodes of uterine tetany, over 188 cases

of tumultous labours and precipitate deliveries, 5 of placental abruptions, 141 of cervical and uterine lacerations and 5 of foetal deaths. Plentl *et al,* Brediosian and Gamble (1965), Boysen (1963), Marchick, Filler and Filler (1964) and other workers found that complications following administration of sparteine were comparable quantitatively and qualitatively with those following oxytocin, and that sparteine was a potent and capricious drug. They further regarded its intramuscular administration as a dangerous and unpredictable method of stimulating or inducing labour owing to its uncertain and erratic absorption by this route. However, we have had no serious irreversible maternal or foetal complications to report in this series.

Sparteine has much to recommend its use—it is easy of administration, does away with a drip, is inexpensive and causes less discomfort to the patient. One course of injections is about 1/3 as expensive as an oxytocin drip, and in our country this is indeed very necessary. As with an oxytocic, it must be borne in mind that constant supervision cannot be relaxed, as the response can be very unpredictable and the safety factory is relative. In properly selected cases and with constant supervision, sparteine has a proven place in the induction and acceleration of labour. Its judicious use, alone or in combination with amniotomy, is a valuable aid to streamlined labour.

Summary

A trial of sparteine sulphate (Unitocin) in 105 cases, divided into three groups, is described. An over-all success rate of 72% was recorded, with the most gratifying results in induction following premature and spontaneous rupture of membranes (94%). In view of the good results, ease of administration and relative safety, sparteine is recommended for hypotonic inertia and selected cases of induction, particularly now that elective induction has come to stay as a safe and useful procedure. It is a very effective weapon in reducing the incidence of caesarean sections and in saving many hospital beds occupied by patients in so-called false labour.

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