

# INTRAVENOUS PITOCIN DRIP AS A METHOD OF INDUCTION OF LABOUR\*

by

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During the last two to three decades, the subject of induction of labour has undergone evolutionary changes both in the indication and in the methods employed. Dale, in 1906, demonstrated the oxytocic action of posterior pituitary gland and Blair Bell (1909) was the first to report on the use of posterior pituitary extract in obstetric practice. Several years later, Kamm and his co-workers separated the posterior pituitary extract into its two fractions, oxytocin and vasopressin.

Pituitrin, as a drug for inducing labour, was condemned by almost all obstetricians because the action of this drug varies in different individuals and even a small dose like  $\frac{1}{2}$  unit of pituitrin can produce severe uterine contractions in some women resulting in intrauterine death of the

foetus from asphyxia or rupture of the uterus or both. But our interest in the posterior pituitary hormone was revived since Vincent du Vigneaud succeeded in isolating and standardising oxytocin from the posterior pituitary gland. To ensure complete safety for the mother and child an effort was made by various obstetricians to find out a more physiological method of administering this powerful drug other than by intramuscular injection. Theobald (1948) first put forward the idea of administering this drug by the continuous intravenous route and popularised this method of induction of labour. It has now become a safe procedure if carried out with all due care and we find so many reviews on the subject in the current literature.

We carried out induction of labour with intravenous pitocin drip in 115 cases and the result is reported in this article.

## *Method*

Before starting the intravenous drip the patients were sedated by

\* This work was carried during the years 1954 and 1955.

\*\* An Article on "Treatment of Uterine Inertia With I.V. Pitocin Drip" was published by the authors in the *Journal of Obstetrics and Gynaecology of India*, Vol. VII, December 1956.

oral administration of twenty grains of chloral hydrate. An infusion of glucose saline was then started and allowed to run in at the rate of 15 drops per minute for 15 minutes and then only pitocin was added to the solution. The dilution used was 5 units of pitocin in 500 c.c. of glucose saline. After allowing the drip to run in at 15 drops per minute for sometime the rate of the drip was very gradually increased as necessary but not more than 60 drops per minute. In the entire series pitocin (Parke & Davis) was used because it is a well known standardized product with predominance of oxytocic factor. In cases of toxæmia of pregnancy the diluent used was 5% glucose. We used 1:1000 dilution as this was recommended by Jeffcoate (1948) and Kaufmann et al (1953). The patients were watched personally by one of us right through the induction. The duration of uterine contractions, the interval between contractions, pulse rate, blood pressure and foetal heart sound were noted frequently. The drip was continued through the third stage of labour, except in two cases, and it was stopped only after the placenta was expelled.

#### *Material*

All the 115 patients in whom the intravenous pitocin drip was used were general ward patients admitted in the obstetric wards of the Patna Medical College Hospital. Some of these had specific indications for inducing labour but the majority were cases waiting in the wards for delivery. These were mainly women coming to hospital when near term

with abdominal pain due to some sort of bowel disorder which was mistaken for labour pains.

#### *Elective Induction of Labour*

Until recent years induction of labour was reserved mainly for obstetric and medical indications. Reports of elective inductions have been published by several authors in recent years but this procedure has not been accepted for general use by many obstetricians since oxytocic pituitary extracts containing little or no vasopressor substance are now available and as these are now well standardized, it is a valuable and effective drug when given intravenously. There is very little danger to mother or foetus provided the cases for induction are properly selected, the patient is under observation of an experienced obstetrician throughout the period of intravenous drip.

Our cases for elective induction were selected according to the criteria laid down by Hanley (1951) and quoted by Stone et al (1955), that is "there must be present a soft cervix, 50 per cent cervical effacement, 1-2 cm. of dilatation and a pelvis through which one can be reasonably assured that normal delivery is probable."

Membranes were artificially ruptured in 64 cases before starting the pitocin drip, in 33 cases there was spontaneous premature rupture of the membranes and membranes were intact in 18 cases.

Cases in which the pitocin drip failed to induce labour even after using 5 units of pitocin or where delivery had to be achieved by cae-



sarean section were considered as failures.

### Results

Induction of labour with intravenous pitocin drip was carried out in 115 patients. The indications for induction are shown in Table I. There were 32 cases of primigravidas and 83 multigravidas, 6 of the primigravidas had unfavourable cervix and only 4 of these could be successfully induced, while all the primigravidas with favourable cervix were successfully induced. Of the multigravidas 79 had ripe cervix and 4 had unripe cervix but in the multigravidas only one multigravida with favourable cervix was a failure.

The age of the patients, the parity, the lag period, the duration of labour, the mode of delivery and other details are shown in Tables II-VI, and in Table VII the duration

of labour in pitocin-induced cases is compared with the duration of labour in 25 cases used as controls, where after artificially rupturing the membranes patients were given 5% glucose drip without any pitocin, and also with cases of normal labour without any interference which took place during the time this work was in progress.

TABLE I

*Indications for Inductions of Labour  
by Intravenous Pitocin Drip*

Elective induction .. .. .	70
Premature rupture of membranes ..	31
Pre-eclampsia & eclampsia .. .. .	7
Placenta praevia .. .. .	4
Abruptio placentae .. .. .	1
Hydraminos .. .. .	2
Total .. .. .	115

TABLE II

*Age and Parity*

Parity	Age					Total
	16-20	21-25	26-30	31-35	36-40	
1	32	—	—	—	—	32
2	6	7	3	—	—	16
3	—	9	3	1	—	13
4	—	13	4	1	—	18
5	—	8	4	—	—	12
6	—	—	8	4	—	12
7	—	—	4	—	—	4
8	—	—	—	5	—	5
9	—	—	—	1	—	1
10	—	—	—	—	—	0
11	—	—	—	1	1	2
Total	38	37	26	13	1	115

TABLE III

*Status of Membranes at Onset of Labour and Its Relation to Successful Results*

Status of membranes	No. of cases	Successful induction	Induction failed
Artificially ruptured	64	64	nil
Spontaneously ruptured	33	31	2
Intact	18	15	3

TABLE IV

*Interval between Starting Pitocin Drip and Onset of Labour*

Lag period	Primigravida	Multigravida
0-15 mts. .. ..	16 (50%)	56 (65.05%)
16-30 mts. .. ..	11 (34.3%)	21 (25.3%)
31-45 mts. .. ..	1 ( 3.12%)	2 ( 2.4%)
46-60 mts. .. ..	—	1 ( 1.2%)
61-75 mts. .. ..	2 ( 6.25%)	2 ( 2.4%)
No response .. ..	2 ( 6.25%)	1 ( 1.2%)
Total .. ..	32	83

TABLE V

*Duration of Labour*

	Induction group	
	Primigravida	Multigravida
Average .. ..	3 hrs. 20 mts.	2 hrs. 40 mts.
Shortest .. ..	50 mts.	1 hr.
Longest .. ..	7 hrs. 37 mts.	7 hrs. 40 mts.

TABLE VI

*Mode of Delivery*

	Primigravida	Multigravida	Total
Vertex—spontaneous .. ..	28	78	106
low forceps .. ..	2	1	3
Breech—spontaneous .. ..	1	—	1
C. Section—abdominal .. ..	1	—	1
vaginal .. ..	—	1	1

In the series of cases reported here 95.7% were successfully induced by intravenous pitocin drip while in 4.3% of cases the drip failed to induce labour.

In one case the patient had to be induced a second time and in another induction had to be carried out three times before labour started. The average amount of pitocin



used for completion of labour was 3.5 units, the maximum being 9.1 units and the minimum 1 unit.

### *Discussion*

During the period this work was being carried out only very few cases with specific indications were admitted under our care, hence the small number in this group.

There were 3 cases of eclampsia in whom labour did not commence even 2-3 days after the fits were controlled and in these labour was successfully induced with pitocin drip. Out of 4 cases of pre-eclampsia who did not respond to medical treatment induction with I.V. pitocin drip was successful only in 2 cases, one of 30 weeks pregnancy and the other about 36-37 weeks pregnancy. The number of cases in this group is far too small to assess the efficacy of pitocin induction in such cases. Mauzy and Donnelly (1952), Parker and Robert (1954) and Pattison (1955) have reported induction of labour successfully carried out in cases of pre-eclampsia and eclampsia in spite of unfavourable cervix and they are of the opinion that intravenous pitocin drip is a safe and effective method of inducing labour in cases of pre-eclampsia or eclampsia, when necessary, even if the patient has not reached term.

In the cases of placenta praevia and abruptio placentae pitocin drip was used for hastening the onset of labour after rupturing the membranes. In cases of acute hydraminos pitocin was used after high rupture of the membranes for the same reason.

Elective induction is still not consi-

dered an acceptable procedure by many obstetricians and we are also of the opinion that it is not a procedure for general use, but when the cases are carefully selected, and if carried out under proper supervision, there is very little danger of maternal or foetal injury. By the judicious use of elective induction we can serve our patients better because many pregnant women living some distance away from the hospital are worried and anxious about their being able to reach the hospital in time. Many get themselves admitted on the pretext that they are in labour and many women come for admission thinking that they are in labour when actually the pain is due to bowel trouble. These patients are very reluctant to leave the hospital and we are really doing them a great service by inducing labour, provided they are fit for induction. A good deal of overcrowding in the hospital can also be prevented if elective induction is carried out in these women.

It has been observed by Lubin and his co-workers (1952) that about 60% of cases with premature rupture of membranes go into labour within 1-2 hours and in 90% labour begins within 24 hours after premature rupture of membranes. With delay in the onset of labour the prognosis for mother and baby progressively becomes worse because of the possibility of amniotic sac infection and the greater need for surgical intervention. In our cases of premature rupture of the membranes, induction was started only when labour did not set in within 10-12 hours after the membranes were

ruptured. All except two of these delivered normally.

Our total number of successful cases 95.7% compared favourably with 96.4% obtained by Stone, Gordon and Folsome (1955) and 91.3% by Kaufman *et al.* (1953). For success, proper selection of cases is mandatory.

The status of the membranes is important in determining the success or failure of pitocin induction. According to Lubin *et al.* (1952) and Reynold (1950), when the membranes are ruptured either spontaneously or artificially the chances of success are more than when the membranes are intact, while Bishop (1955) and Stone *et al.* (1955) found no significant difference in the two groups.

In our cases, 98.4 per cent were successfully induced when membranes were ruptured while only 83.3 per cent were successful when the membranes were intact, thus showing a significant difference between the two groups.

The condition of the cervix is another important point. With favourable cervix we had 99 per cent success while only 80 per cent were successfully induced when the cervix was unripe. Labate and Barbaro

(1951) reported 94.6 per cent successful induction with ripe cervix as against 57 per cent with unripe cervix.

The duration of labour appears to be definitely shortened by pitocin drip. The average duration of labour in induced, control and unselected cases is shown in Table VII.

In none of our cases was foetal death attributable to the use of pitocin even though there were few stillbirths, but in these cases the foetus had already died in utero before the pitocin drip was actually started.

There was no rise in blood pressure in any case, not even in the toxæmic group. The absence of vasopressor effect with pitocin drip was reported by McCormick (1951), Stone, Gordon and Folsome (1955) and also by other authors.

The amount of blood loss in the third stage was not actually measured but clinical assessment showed an increase in the blood loss post-partum only in two of our cases where the infusion was discontinued just prior to the delivery of the child. Kaufman *et al.* (1953) noted post-partum relaxation of the uterus with post-partum haemorrhage in 30% of their cases when the intravenous drip was discontinued before the third stage.

TABLE VII  
*Duration of Labour in Induced, Control and Unselected Cases*

	Induction group		Control group	Unselected group	
	Primi.	Multi.	Multi.	Primi.	Multi.
Average	3 hrs. 20 mts.	2 hrs. 40 mts.	7 hrs. 47 mts.	15 hrs. 35 mts.	8 hrs.
Shortest	50 mts.	1 hr.	3 hrs. 20 mts.	—	—
Longest	7 hrs. 37 mts.	7 hrs. 40 mts.	13 hrs. 30 mts.	—	—



### Complications

We had one case of oedema of the cervix. Panena (1949) observed cervical oedema in 1 in 500 deliveries. The explanation for cervical oedema is thought to be due to the reversal of the uterine contractility by which the cervix is transformed into a rubbery, oedematous, bluish structure which makes further dilatation impossible. These cases are ultimately delivered by caesarean section. Our case was delivered by vaginal caesarean section.

The second complication we had was one of non-dilatation of cervix which ended in caesarean section. Steer (1954) took electrohystero-graph recording and from these records he gave the explanation that in these cases normal electrical activity of the uterine muscle was absent, only small groups of fibres react as a unit and as a result the mechanical force is too small to dilate the cervix.

Two of our cases had post-partum haemorrhage. We feel that this could have been prevented by continuing the drip through the third stage.

Other workers have encountered tetanic contraction of the uterus, pituitary shock, increased uterine tone with impairment of placental circulation and cardiac arrest, but we, fortunately, did not come across any of these complications.

There was no maternal mortality, neither was there any maternal morbidity due to the intravenous pitocin drip.

### Summary and Conclusions

1. The technique of induction of

labour by dilute solution of intravenous pitocin drip has been described and 115 cases in which this method was used has been analysed.

2. Elective induction was carried out in 70 cases. The danger to the mother and baby is no more than that exists in labour which begins spontaneously, provided the criteria for selection of the patient are rigidly followed and the patient remains under direct observation of the obstetrician.

3. The actual duration of labour in the pitocin induced cases is shorter than when labour begins spontaneously.

4. Though the number of cases in which the induction of labour by intravenous pitocin drip has been carried out is rather small, the results obtained show that it is an effective and safe method of inducing labour when carried out with all due care and we have much to commend its use in clinical obstetrics.

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