EFFECT OF EXTRAAMNIOTIC MANNITOL AND FOLEY'S CATHETER ON CERVICAL RIPENING AND INDUCTION OF LABOUR*

By

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SUMMARY

To help induction of labour in cases with poor Bishop's score, a new method has been tried to improve cervical ripening and have safe vaginal delivery. In the present study, extraamniotic intsillation of mannitol through a Foley's catheter, which is kept inside for 12 hours, has been tried in a group of cases with Bishop's score of five or below. There was mean improvement of Bishop's score by 3.72 ± 0.78. After removal of Foley's catheter artificial rupture of membranes was done followed by intravenous oxytocin transfusions. Effects of this method of induction on the outcome of labour and delivery, on puerperium and neonates were noted and compared with another group of similar cases with unripe cervix who had traditional method of induction by A.R.M. and oxytocin transfusion. Better results from all aspects were obtained in cases who had mannitol instillation. The present method needs wider trial.

Introduction

Induction of labour is often needed in obstetric practice; its success depends on a number of well-recognised factors such as dilatation of the cervix, its degree of effacement, its consistency, its position within the pelvis and position of the presenting part also called station of the lower pole. Taking into consideration these five factors Bishop (1964) introduced a scoring system and regarded total score of 6 and above as favourable for successful induction whereas total score below 6 as unfavourable. While various modifications of Bishop's scoring system have been used by different authors, all agree that ripenness of the cervix represented by its softness, dilatation and effacement play an important role in the outcome of successful induction. Induction-delivery interval is more prolonged with its hazards and induction of labour often fails in cases of unfavourbale cervix where termination of pregnancy is needed for some reasons or other (Embrey and Anselmo, 1962; Anderson, 1965; Craft, 1972).

With a view to improve outcome of induction of labour, different methods have been tried by workers to make the unfavourable cervix favourable and then to

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induce labour. Prostaglandins in different forms and different ways have been used for the purpose (Anderson *et al* 1971; Karim and Sharma, 1972; Beazley and Kurjak, 1972). Lately Calder *et al* (1977) used extraamniotic PGE_2 gel instillation through a Foley's catheter and Valentine (1977) used oral PGE_2; vaginal PGE_2 have been used by Mackenzie and Embrie (1978) and by Wilson (1978) for ripening cervix and helping induction of labour. Laminaria tents have been used by Cross and Pitkin (1978) and Gupta *et al* (1984) used Isapgol tents for cervical ripening. Foley catheter has been used for the purpose by Ezimokhai and Nwabineli (1980), Varma and Norman (1982) and others. While the success rate of induction of labour has been improved by ripening the cervix by some method or other, no method has been found to be certain and safe and much work is left to be done in this field.

As such, in the present study extraamniotic instillation of mannitol by means of a Foley's catheter retained for few hours was attempted to improve cervical ripening and help induction of labour in cases with unripe cervix. The results were compared with induction of similar cases by orthodox method of amniotomy and oxytocin drip only.

Material and Methods

In the present study, patients at term were admitted from the out-patients department of the Eden Hospital, Medical College, Calcutta. Normal cases as well as those who had indications for induction of labour had been included.

After admission, clinical assessment of the size of the fetus was done; if there was any doubt about the maturity, radiological and sometimes ultrasonographic help were sought for. Only vertex presentation and singleton fetus was accepted for study. All cases were between 18 to 30 years of age. There was no case beyond 42 weeks of pregnancy although some cases were beyond 40 weeks. Only mild degree pre-eclampsia were included and in no case blood pressure was beyond 150/96 mm of Hg. Characteristic features are shown in Table I. By abdominal and vaginal examinations, the inducibility was determined following Bishop's scoring system. Adequacy of pelvis was also noted. Those who had Bishop score of 6 or more were studied for planned accelerated labour—this will not be discussed here. Those who had Bishop score of 5 or below were divided into two groups for the present study.

Group A: There were 62 cases in the group. In the evening these patients were taken to the labour room. Under aseptic conditions, the cervix was exposed by a speculum and its anterior lip was caught by an Allis' forceps. A Foley's catheter of No. 14 size was then introduced through the cervical os for about 5 cm and was balloned up by 10 ml distilled water; it was pulled down so as to fit in snugly over the internal os. 200 ml mannitol was instilled extraamniotically through the catheter which was kept in and the patient removed to the ward. Systemic antibiotic (Ampicillin 500 mg I.M. 8 hourly) was started. After 12 hours, the catheter was removed, if not spontaneously expelled out by that time. Bishop's scoring was done again. Membranes were ruptured if local conditions were favourable, an intravenous oxytocin infusion started (5 units in 540 ml 5% dextdose solution) at the rate of 20 drops per minute increased every 30 minutes by 10 drops till regular uterine

contractions were established, maximum drip rate being 60 drops per minute. Oxytocin drip was continued throughout labour until 30 minutes after 3rd stage. Sometimes membranes were ruptured after the head was fixed during oxytocin transfusion.

Group B: There were 50 cases in this group. In these cases following an enema early morning, in the labour room under aseptic conditions membranes were stripped off from the cervix for 5 to 10 minutes. If the head was fixed the membranes were ruptured, colour of liquor amnii noted and oxytocin intravenous transfusion started and continued in the same way as in Group A. Rupture of membranes was deferred for sometime if the head was not fixed.

In both the groups outcome of labour, complications during delivery, early puerperium and early neonatal period were noted.

Results and Discussion

The characteristic features of the two groups are shown in Table I.

In the present study, a comparatively safe, cheap and easy method of ripening of the cervix and induction of labour has been tried in 62 cases at term (Group A). For this 20% mannitol was instilled extraamniotically through a Foley's catheter kept in the cervix for 12 hours; removal of catheter was followed by artificial rupture of membranes (A.R.M.) and intravenous oxytocin infusion. The concept is that mannitol acts on decidua and damages decidua cells which liberate $PGF_{2\alpha}$ which acts locally and cause ripening of the cervix and goes into the amniotic fluid and help induction of labour. Intracervical Foley's catheter helps mechanical dilatation of the cervix to a little extent and in someway not known as yet helps ripening of the cervix

TABLE I

Characteristics and Improvement of Bishop's Score

	Group A	Group B
Total No. of cases	62	50
Parity		
Nulliparous	49 (79%)	33 (66%)
Multiparous	13 (21%)	17 (34%)
Indications		
Postdated pregnancy	17 (27.5%)	30 (60%)
Pre-eclampsia	6 (9.6%)	9 (18%)
Uncertainty of dates at term	3 (4.8%)	11 (22%)
For study purpose	36 (58.1%)	
Pretreatment Bishop's score		
0 - 2	29 (47%)	7 (14%)
3 - 5	33 (53%)	43 (86%)
Mean score	2.46 ± 1.02	3.2 ± 0.79
Post treatment Bishop's score		
5 or less	24 (39%)	
More than 5	38 (41%)	
Mean score	6.18 ± 1.8	

Mean improvement of Bishop's score 3.72 ± 0.78.

perhaps causing local irritation and inducing Ferguson's reflex uterine contractions.

Simultaneously 50 cases belonging to Group B who had orthodox type of induction of labour by A.R.M. and oxytocin transfusion were followed up and the results compared.

Table I shows improvement of mean Bishop's score to the extent of 3.72 ± 0.78 in Group A cases which is comparable to the results of other workers using different methods (Table II) except that of Calder *et al* (1977) who used extraamniotic PGE_2. However, other workers distended the Foley's catheter with 35 to 50 ml of fluid which may dislodge the head, prevent its engagement and increase chance of cord prolapse.

TABLE II
Improvement of Bishop's Score

Authors	Methods	Mean improvement of Bishop's acore
Cross and Pitkin (1978)	Laminaria Tent	3.7
Ezimokhai and Nwabineli (1980)	Foley's catheter	4.2
Verma and Norman (1982)	Foley's catheter	3.3
Wilson (1978)	Oral PGE_2	1.6
Calder, Embrey and Tait (1977)	Extraamniotic PGE_2	5.3
Present series	Foley's catheter and extra-amniotic mannitol	3.72

The mean induction-labour interval in Group A was 11.73 ± 5.56 hours, whereas that in Group B was 15.95 ± 7.08 hours, the difference was statistically highly significant ($p < 0.01$).

The mean induction-delivery interval in Group A cases was significantly less ($P < 0.05$) than that of Group B being 21.18 ± 6.2 hours and 24.6 ± 6.8 hours respectively. This result is better than those of other workers as shown in those of other workers as shown in Table III. In this series induction-delivery interval was counted from the time of mannitol instillation whereas other workers shown in the Table counted I-D interval from the time of A.R.M. and oxytocin drip which was started 10-12 hours after introduction of Foley's catheter or laminaria tent. Valentine (1977) and Wilson (1978) both used oxytocin drip for 12 hours the previous day before A.R.M. which period of time was not counted. So 10-12 hours extra time will have to be counted while comparing their I-D intervals with those of the present series.

Failure of induction was when there was no establishment of labour within 48 hours of mannitol instillation in Group A and within 48 hours of stripping of membranes in Group B. The failure rates in Group A and B cases were 6.45% and 10% respectively. The figures are much less than the failure rates of Turnbull and Anderson (1968) and Anderson *et al* (1972) who induced cases with unripe cervix by A.R.M. and oxytocin infusion who had failure rates of 22% and 43% respectively. The difference is due to instillation of mannitol in Group A cases and stripping of membranes in Group B cases, both helping liberation of prostaglandins from damaged decidua cells which act locally and induce uterine contractions. This gross difference may be

TABLE III
Induction-Delivery Interval

Authors	Methods	Induction-Delivery Interval (hrs.)
Cross and Pitkin (1978)	Laminaria tents	10.5
Ezimokhai and Nwabineli (1980)	Foley's catheter	8.2
Verma and Norman (1982)	Foley's catheter	11.7
Wilson (1978)	Oral PGE_2	7.3
Calder, Embrey and Tait (1977)	Extraamniotic PGE_2	11.1
Present Study Gr. A.	Foley's catheter and extra-amniotic mannitol	21.2
-do- Gr. B.	A.R.M. and Oxytocin	24.6
Valentine (1977)	A.R.M. and Oxytocin	13.8

partly due to different criteria followed in estimating failure rates.

There is not much difference in duration of labour between the two groups being 9.23 ± 1.40 hours and 8.9 ± 0.74 hours respectively. Comparative results of outcome of successful induction are shown in Table IV.

Incidence of caesarean section in Group B was much higher than in Group A. The results of Group A are comparable with those obtained by other workers using other techniques.

Table V shows effects of induction on baby and mother in the two groups. Fetal distress in Group B was much higher than in Group A. This is due to prolonged oxytocin transfusion and greater induction-delivery interval. Fetal distress was the main reason of increased incidence of caesarean section in Group B. There was no significantly increased in-

TABLE IV
Outcome of Successful Induction

Authors	Methods	Nature of delivery	
Wilson (1978)	Extraamniotic PGE_2	Natural delivery	66.8%
		Forceps	26.6%
		Caesarean section	6.6%
Verma and Norman (1982)	Foley's catheter	Natural delivery	60%
		Forceps	22%
		Caesarean section	18%
Present series—Gr. A.	Foley's catheter and extra-amniotic mannitol	Natural delivery	72.5%
		Forceps	17.2%
		Caesarean section	10.3%
Present series Gr. B.	A.R.M. and oxytocin	Natural delivery	51%
		Forceps	20%
		Caesarean section	29%

TABLE V
Effect on Baby and Mother of Induction

	Group A	Group B
	Total = 62	Total = 50
Complications during labour	(N = 58)	(N = 45)
Incoordinate uterine action	8 (13.7%)	7 (15.5%)
Fetal distress	11 (18.9%)	19 (43.2%)
Cord prolapse	1 (1.6%)	Nil
Early puerperium/postoperative period		
Pyrexia	5 (8.06%)	3 (6%)
Urinary infection	3 (4.8%)	5 (10%)
Postpartum haemorrhage	1 (1.6%)	1 (2%)
Maternal mortality	Nil	Nil
Mean Apgar score	8.56 ± 1.10	7.0 ± 1.18
Early neonatal complications		
Asphyxia	9 (14.5%)	19 (38%)
Physiological jaundice	11 (17.7%)	7 (14%)
Diarrhoea	2 (3.2%)	2 (4%)
Respiratory tract infection	3 (4.8%)	1 (2%)
Neonatal mortality	2 (3.2%)	2 (4%)

cidence of infection in Group A cases. More chance of infection following introduction of Foley's catheter in those cases was nullified by removing it within 12 hours and by prophylactic antibiotic (Vide Table V).

Mean Apgar score was better in Group A than in Group B, and neonatal asphyxia was more in Group B (38%) than in Group A (14.5%). No increased incidence of jaundice was found in Group B although those patients had more prolonged oxytocin transfusions.

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