

Review of the Indian experience with prostaglandins for induction of labour

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Introduction:

Prostaglandins (PG) are present in most cells. They are 20 carbon fatty acids derived from essential fatty acids. They usually function as intracellular mediators, although on a few instances they act as hormones. Generally PGs are synthesized, act, and are catabolized within the same cell. Those PGs which escape the cell are rapidly metabolized in the lungs, liver and kidneys.

The prostaglandins of great biological significance to the obstetrician are PGE₂ and PGF₂ alpha. The precursor of these prostaglandins is arachidonic acid. The highest concentration of arachidonic acid is present in membrane phospholipids. The release of arachidonic acid from phospholipids is controlled by phospholipase A₂ and C. This is one of the important rate limiting steps in the synthesis of prostaglandins.

Arachidonic acid may be metabolized by the lipoxygenase or cyclooxygenase pathways. PGs and Thromboxane A₂ are the products derived from arachidonic acid during metabolism via the

cyclooxygenase pathway. Non-steroidal antiinflammatory drugs like aspirin and indomethacin inhibit production of PGs by inhibiting cyclooxygenase.

Prostaglandins have a physiological role in labour. PGE₂ is particularly responsible for bringing about softening of the cervix by promoting collagen breakdown and dispersion, and fluid absorption by the stromal tissue. Thus the cervix ripens with approaching labour, and this is reflected clinically in the increase in the Bishop score. PGF₂ alpha induces myometrial contractions, and leads to termination of pregnancy at all stages of gestation.

Labour is induced in clinical practice for maternal or foetal indications, to obtain optimum pregnancy outcome in the interest of both the mother and the unborn foetus. Currently, selective inductions of labour in women showing evidence of deteriorating intra-uterine foetal environment has helped to salvage the foetus and reduce the need for caesarean sections for pregnancy termination.

The availability of prostaglandins E₂ and F₂ alpha in the Indian market has prompted many Indian obstetricians to evaluate them in clinical practice for induction and acceleration of labour. Some important studies from the Indian literature have been reviewed in this paper, and a comparison of the efficacy of prostaglandins compared with the results of the time-honoured method of oxytocin induced labour.

Evaluation of prostaglandin gel/oral tablet for cervical ripening:

Cerviprime gel 0.5 mg introduced into the cervical canal below the level of the internal os has a target action on the cervical tissue, causing softening and effacement of the cervix. Oral prostaglandin E₂ tablets (Primiprost) also act on the cervix similarly. The process of ripening of the cervix thus induced improves the Bishop score (Inducibility index) of the cervix and enhances the chances of successful induction of labour. Table I, Gives

a summary of the experience of Indian authors about the effect of prostaglandins on the Bishop scores of women selected for labour induction.

Indications for Induction of Labour:

The need for induction of labour is felt in 5-8% of pregnant women. The common indications include.

- Antepartum haemorrhage beyond 36 weeks of gestation which is not getting controlled, or causing foetal compromise.
- Pregnancy induced hypertension with placental insufficiency, or not responding to medical measures.
- Diabetes mellitus.
- Premature rupture of the membranes
- Hydramnios causing maternal distress.
- Renal insufficiency.
- Infection worsened by pregnancy-pyelonephritis, diverticulitis.
- Postdatism.
- Placental insufficiency.
- Rh-Isoimmunisation.
- Previous history of rapid labour.
- Patient / Physician convenience.

Contraindications: These may be absolute or relative

- Cephalopelvic disproportion.
- Abnormal foetal presentation / lie.
- Previously scarred uterus-Caesarean section / myomectomy / hysterotomy /perforation following previous MTP.
- Grand Multiparity.
- Maternal cardiac disease.
- Unripe unfavourable cervix.

Indian Experience with Prostaglandins for labour induction:

Several Indian workers have used prostaglandin E-2 oral tablets / locally applied cerviprime gel to induce labour. Their experience is presented in tabular form for comparison and easy review. Table I summarises the effects of PGE2 on Bishop score.

Table I.

A summary of the Indian Experience of The effect of cerviprime gel/Primiprost on Bishop scores.

Authors	Year	Patient Number	Bishop score	
			Before	After
Shah M.H. et al	1991	27	3.0	7.0
Bhide & Daftary	1993	34	2.8	8.5
Patki A.S. et al	1993	40	2.6	5.0
Daftary G.S. et al.	1994	60	3.2	7.6
Kamala Jayaram & Rani	1994	50	<2	>8
Gupta S. et al.	1994	45	2.58	>9
Bhattacharya S.M.	1994	97	3.5	8.3
Soni A. et al.	1996	100	4.7	7.4

During the earlier years of our experience with prostaglandin E2 gel and oral tablets, the question uppermost in our minds was to determine whether PG use would lead to an increase in the caesarean section incidence, and whether it was truly superior to the time tested oxytocin infusion with which we were all familiar. The incidence of caesarean section in women undergoing PG induced labours has been summarised in table No.II. Earlier, in India, the obstetricians were exposed to the use of Carboprost injections for second trimester termination of pregnancy. This PG derivative was PGF2 alpha. The side effects of the drug like nausea and vomiting, diarrhoea, bronchospasm, pyrexia and the occasional major complications encountered during it's use in clinical practice like rupture of the uterus, and cervical tears had created a sense of alarm amongst the practitioners, hence the introduction of PGE2 gel and oral tablets with the specific purpose of labour induction had been received with scepticism and a sense of foreboding.

A summary analysis of the experience of Indian authors who have used these drugs for labour induction is presented in Table II. providing data on the incidence of caesarean sections in the cases studied by them.

Table No. II
Incidence of Caesarean sections following PG
Induction of Labour.

Authors	Year	No. of Patients	% of deliveries by C. Section
Bhude & Daftary	1993	34	3.0%
Patki A.S. et al	1993	40	7.5%
Dubey P. et al	1994	50	Nil
Daftary G.S. et al.	1994	60	20.0%
Kamala Jayaram & Ram	1994	50	4.0%
Sasikala A	1994	46	8.6%
Mehta & Gehlot	1994	88	Nil
Bhattacharya S.M.	1995	149	37.6%

The above table shows that the incidence of Caesarean section is not increased after the use of PGE2 gel for induction of labour. Bhattacharya (1995) mentions that the caesarean section rate at his institution is 34%, hence he too categorically mentions that in his opinion the use of PG for induction of labour does not lead to increase in the incidence of caesarean deliveries

Having clarified the doubts on the possibility of an increased incidence of caesarean deliveries following PG induction of labour, a detailed analysis of the labour outcome in cases of PG induced labours was carried out. the results have been summarised in Table III.

The above table based on the experience of several obstetricians from different parts of the country reveals the efficacy and safety of the use of prostaglandins in induction of labour in high risk situations. The APGAR scores are satisfactory and the perinatal loss within acceptable limits.

It was important to analyse data on labour induction with the time honoured method of the use of 'Oxytocin Infusion' for comparison, in order to provide data to enable the Indian obstetrician to make an informed choice about the selection of the method of induction of labour in their own practice.

With the above objective in view, data on 'oxytocin infusion' for labour induction has been reviewed, analysed, summarised and tabulated. The data has been presented alongside that for the use of prostaglandins to provide a quick comparison.

Table No. III
Experience of Indian Authors of effects of PG on Labour Outcome:

Authors	Place	%Vag. Del.	%C. Sec	Foetal APGAR/PND	Outcome	Labour Duration in hours Prim/Multi	
Bhude & Daftary (1993)	Mumbai	90.0%	10.0%	7.8	nil	16.4	
Patki A.S. et al (1993)	Mumbai	92.5%	7.5%	8.1	nil	12.2	7.3
Dubey P. et al (1994)	Kanpur	100%	nil	>8	nil	11.2	8.8
Mehta & Gehlot (1994)	Jaipur	100%	nil	>9	nil	9.1	7.5
Jina R. et al (1994)	Gorakhpur	94.6%	5.4%	—	—	8.2	7.0
Sasikala A. (1994)	Pondicherry	91.4%	8.6%	>8	1/46	—	7.4
Daftary G.S. et al. (1994)	Mumbai	80%	20.0%	>8	nil	10.6	8.4
Handa P.R. et al (1994)	Jamshedpur	85.7%	14.3%	low/8	nil	—	
Gupta S. et al (1994)	Jaipur	79.7%	20.3%	—	nil	12.6	
S. Bhattacharya (1995)	Calcutta	62.4%	37.6%	>8	nil	12.0	8.2
Sandhu S.K. et al (1995)	Amritsar	85.0%	15.0%	—	—	10.3	6.0
Kore S. et al (1996)	Mumbai	88.0%	12.0%	>8	2/100	11.4	7.6
Mukherjee K. et al. (1996)	Allahabad	85.7%	16.3%	—	—	16.3	10.3
Vaneet Kaur & Dhillon (1996)	Jammu	81.0%	19.0%	>8	nil	—	
Soni A. et al. (1996)	Shimla	93.0%	7.0%	>8	1/100	11.3	9.6

Table III
Comparison of Oxytocin and Prostaglandin E2 for Labour Induction

	Prostaglandin	Oxystocin
No. of studies surveyed	15	6
No. of Indian cities covered	12	6
Average Incidence of Vaginal Deliveries	86.6%	72.8%
Average Incidence of Caesarean Sections	13.4%	27.2%
Average Duration of Ind-Deliv.Interval in Hours		
Primigravidae	10.8Hrs.	16.2Hrs
Multiparae	7.6 Hrs.	9.6 Hrs.
Average incidence of low APGAR scores<8	5.2%	12.4%
Perinatal deaths	26/1000	52/1000
Maternal Deaths	Nil	Nil

Conclusions: A broad review of the experience of obstetrician from all parts of the country shows that in obstetric practice about 3-7% of patients need induction of labour. The consensus of opinion is that the use of prostaglandins provide an effective method for achieving the objective. When compared to the use of the oxytocin induction of labour, the results of labour outcome convincingly prove that in patients treated with prostaglandins, labours are shorter, the incidence of caesarean sections is reduced and the foetal outcome in terms of APGAR scores and perinatal outcome is superior.

Prostaglandins have conclusively established their place in obstetetric practice, assuring the obstetric fraternity of a method of labour induction well worth adopting in clinical practice.

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