

Comparison of various applications of prostaglandin E₂ for cervical ripening, and the effect of betamimetics

K. Goeschen

In former studies we have documented that ripening the cervix with intracervical application of PGE₂-gel before medical induction of labor leads to better results than oxytocin- or PGF_{2α}-infusion (1). Nevertheless the success rate, that means the frequency of patients with cervix ripened to at least 8 Bishop-Score points within 24 hours, lay only at 77%. In order to improve the results we performed another set of examinations. The main points of interest were: can the results be improved by 1) changing the type of PGE₂ application, 2) increasing the amount of PGE₂ and 3) shortening the repetition-interval? and 4) does tocolysis with betamimetics reduce the PG effect?

Firstly I will try to give you an answer to the question: Can the results be improved by changing the type of PGE₂-application? The following groups were formed at random: PGE₂-infusion-group, intracervical application of 0,4 mg PGE₂-gel, application of 0,4 mg PGE₂-gel through a balloon catheter placed into the cervix and application of 1,5 mg freshly prepared PGE₂ solution with a portio cap (n = 20 in every group).

Regarding the parity, the groups were similar. In order to compare the degree of cervix ripening in the single groups, we formed a quotient reflecting the increase in Bishop-Score per hour. All methods tried out were effective. The best results were observed in the catheter group. But the statistical evaluation showed no significant differences. Considering the birth duration we also found no difference in the single groups, whilst as far as the interval between start of PG-application and delivery was concerned, the infusion-group seemed to be the best. The explanation for this phenomenon is that we tried more often in the infusion-group than in the other groups to terminate the pregnancy without interruption. This was mainly due to the fact, that the PG-infusion was given only in the delivery ward and therefore patients, doctors and mid-wives felt psychologically compelled to be successful. However, this led to a high cesarean section rate on account of arrest of labor in the infusion-group. Regarding the application frequency no significant differences emerged.

Summarizing the type of application we can say that all the above mentioned methods were effective. Catheter and cap showed the disadvantage that their application procedure was less comfortable for the patients and more time consuming for the doctor. In the infusion-group, on the other hand, we found a high cesarean section rate. Therefore these three methods are not the first that we use in our department.

Secondly, I will try to give an answer to the question: Can the results be improved by changing the amount of PGE₂? In order to answer the question we formed the following groups: placebo, PGE₂-gel 0,4 mg, PGE₂-gel 0,8 mg, Portio-cap with 1,5 mg PGE₂ and PGE₂-gel 0,4 mg in combination with oral application of betamimetics. (n = 15 in every group).

Considering the softening effect we found that placebo did not increase the Bishop-Score. So we could prove that it was not the gel itself or the manipulation of the cervix, but in fact the PG addition that is responsible for the priming.

Furthermore we found that simultaneous tocolysis did not reduce the softening effect. This agreed with our assumption that ripening of the cervix after intracervical PGE₂ application is mostly due to local changes and not due to induction of contractions. No increase of softening was achieved by giving freshly prepared PGE₂-solution in a dosage of 1,5 mg. On the other hand we learned that double dosage of 800 instead of 400 µg PGE₂ did not lead to an improvement in priming, but to an increase in unwanted side-effects. The number of painful contractions in combination with fetal bradycardia rose by four to six times in the 800 group.

Regarding the interval between start of application and delivery or birth duration in the single groups, we found that dosage increase did not shorten these periods of time. Considering the number of PG applications per patient there were also no significant differences.

In answering the question, which advantages and disadvantages occur by an increase in dosage, the following facts emerge: the least expensive and most simple method, namely intracervical application of 0.4 mg PGE₂-gel, proved to be the best. Increase of dosage from 400 to 800 did not lead either to an improvement in softening or to a shortening of the interval from PG application to start of labor or birth duration. On the contrary, the frequency of unwanted side-effects rose by four to six times. Application of 1.5 mg PGE₂ solution with portio cap did not improve the success rate, but was six times more expensive. During the year 1981 we gave a total of 864 PGE application to 710 patients. The cost of one 0.4 mg gel application amounted to about 8 German Marks. This results in a total of 7000 German Marks. If we had given a dosage of 0.8 mg the total would have been doubled. If we had used the portio cap as a routine, the total amount would have been about 44,000 German Marks, that means an extra cost of 18,000 US Dollars.

Regarding the repetition-interval, the following facts emerged: the softening effect was greatly improved by shortening the interval from 24 to 8 hours. Whereas only 77% of patients treated every 24 h started labor within 24 h, 94% had a good softening effect if gel was given every 8 h. (n = 202, respectively, n = 36)

Therefore we are of the opinion that it is important to repeat the gel application after not too long an interval so that the ripening effect achieved by the first gel application does not disappear. From our results it can be seen that an interval of 8 hours instead of 24 hours leads to a clear rise in the success rate without increasing the side-effects.

Taking the above mentioned results and the cumulative costs into consideration, we recommend the following procedure in all cases where cervix ripening is necessary:

- intracervical application of 400 μ g PGE₂ gel with bulb canula under CTG supervision for 2 hours;
- when the cervix has ripened to at least 8 points, induction of labor;
- when the cervix is not ripe enough (8), a second intracervical application after 6 to 8 hours;
- if a third or further ripening process is necessary, placing of a balloon catheter into the cervix and application of 400 μ g PGE₂ gel;
- in cases where increased uterine activity is not wanted, or overstimulation occurs, simultaneous tocolysis.

Reference

1. Goeschen, K., E. Saling: Induktion der Zervixreife mit Oxytocin - versus PGF₂ -Infusion versus PGE₂-Gel intrazervikal bei Risikoschwangeren mit unreifer Zervix. Geburtsh.u.Frauenheilk. 42 (1982) 810

Author's name and address:

Dr. K. Goeschen
Arbeitsgruppe Perinatale Medizin der FU Berlin
Mariendorfer Weg 28
D-1000 Berlin 44