Equivalent Dosages of Prostaglandin and Oxytocin

J. SCHER, P. BAILLIE

SUMMARY

Equivalent doses of oxytocin and prostaglandin $F_2\alpha$ required to produce a specific amount of uterine activity *in vivo* in 6 patients at term, were determined. The ratio of prostaglandin to oxytocin is 3,14 : 1 when potency is compared. For any further studies designed to compare these two drugs to have validity, this ratio must be borne in mind.

S. Afr. Med. J., **48**, 767 (1974).

For over 10 years oxytocin has been used successfully for the induction of labour. It has now been established that the prostaglandins may also be used for this purpose.[1-3] It is fruitless to argue about which is the stronger of the two drugs. The clinician wants safe delivery, and equivalent doses must, therefore, be those which provide this. This goal must be a prerequisite for any model designed to test dosage in a clinical comparison.

PATIENTS AND METHODS

Six primigravid patients who required induction of labour on obstetric grounds were selected. All gave their informed consent to the procedure. The cervices of all patients were effaced and less than 2 cm dilated and the membranes were intact. Intra-uterine pressure was recorded by a transabdominal intra-amniotic catheter inserted after the possibility of an anteriorly situated placenta had been excluded clinically. Maternal and fetal heart rates were recorded by a phonocardiograph.

Oxytocin was administered intravenously at a rate sufficient to produce uterine contractions compatible with early established labour, that is contractions causing a rise of intra-uterine pressure of about 50 mmHg above resting pressure every 2 - 3 minutes, with a uterine activity of at least 150 Alexandria units.[4] The oxytocin was stopped at this point. When uterine activity had returned to the original level the procedure was repeated with prostaglandin $F_2\alpha$.

At the conclusion of the experiment the membranes were ruptured and labour was allowed to continue. All patients were delivered vaginally and all babies were in good physical condition.

RESULTS

The respective doses of oxytocin and prostaglandin required to produce a similar degree of uterine activity in each patient are shown in Table I. It can be seen from the mean doses of the drugs that the ratio of prostaglandin to oxytocin is 3,14 : 1 when potency is compared. There were no maternal side-effects.

However, the cardiotocograph tracing (Fig. 1) shows that an abnormal fetal heart rate pattern was obtained with

Department of Obstetrics and Gynaecology, Groote Schuur Hospital and University of Cape Town

J. SCHER, M.B. CH.B., M.R.C.O.G.

P. BAILLIE, M.B. B.CH., M.R.C.O.G., F.C.O.G. (S.A.)

Date received: 23 October 1973.

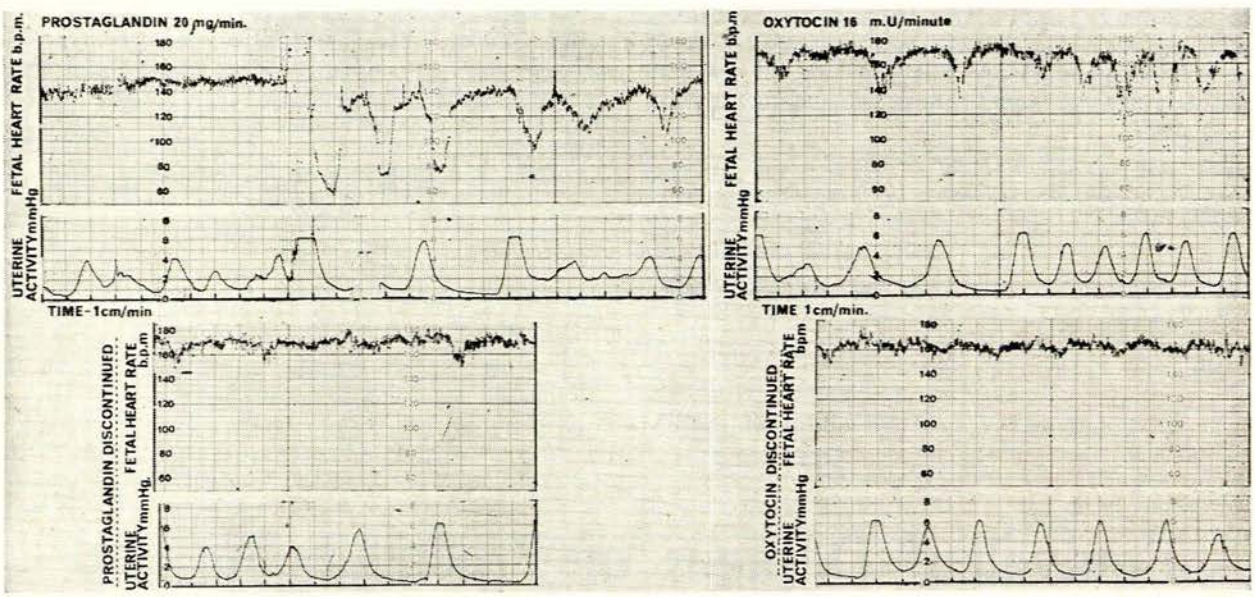

Fig. 1. Cardiotocograph tracings showing the effect of prostaglandin $F_{2}\alpha$ (left) and oxytocin (right) on the fetal heart rate in the same subject.

TABLE I. DRUG DOSAGES AND UTERINE ACTIVITY IN 6 SUBJECTS

	Oxytocin		Prostaglandin $F_{2}\alpha$	
Case	Uterine activity*	Dose (mU/min)	Uterine activity*	Dose (μg/min)
1	200	4	224	24
2	227	4	251	8
3	251	8	230	16
4	196	4	184	16
5	234	4	220	16
6	250	4	260	8
Mean	226	4 2/3	228	14 2/3

* Alexandria units.[4]

prostaglandin. This pattern disappeared on discontinuation of the prostaglandin, but was repeated on substitution of oxytocin in the same patient.

DISCUSSION

Numerous articles have been published comparing the efficacy of prostaglandin and oxytocin in labour induction,[5-8] but no conclusion could be drawn about the relative effectiveness of the two drugs, as comparable doses of oxytocin and prostaglandin had not been used. Dewhurst[9] feels this to be a major criticism of such studies.

Our finding of a 3,14 : 1 ratio of the potency of prostaglandin compared with oxytocin, should be taken into account in future comparative trials of the two drugs. Although the two substances have different molecular weights, our finding gives a clinical approximation, and any investigation designed to compare the efficacy and the maternal and fetal side-effects of different drugs, requires such a study.

In our trial an *in vivo* situation was used which closely approximated the actual conditions at term when the drugs would be used. In order to avoid variation between patients both drugs were given to each subject.

Errors may result from the attempt to relate to clinical work the findings derived either from *in vitro* human studies or from animal studies, whether *in vitro* or *in vivo*.[10]

The importance of selecting a good model for comparing two drugs is brought out in Fig. 1. The fact that the abnormal pattern was obtained with both the drugs in the same patient illustrates that the placental reserve is critical in determining the fetal response, and not necessarily the drug. The finding that fetal distress was produced by both drugs stresses the importance of having control within the same patient over the effects of powerful drugs.

We wish to thank Upjohn (Pty) Ltd for the supply of prostaglandin.

REFERENCES

1. Karim, S. M. M., Hillier, K., Trussel, R. R., Patel, R. C. and Tamusange, S. (1970): J. Obstet. Gynaec. Brit. Cwlth, **77**, 200.
2. Beazley, J. M., Dewhurst, C. J. and Gillespie, A. (1970): *Ibid.*, **77**, 193.
3. Embrey, M. P. (1970): Brit. Med. J., **2**, 256.
4. El-Sahwi, S., Gafaar, A. A. and Toppozada, H. K. (1967): Amer. J. Obstet. Gynec., **98**, 900.
5. Vakhariya, V. R. and Sherman, A. I. (1972): *Ibid.*, **113**, 212.
6. Anderson, G., Hobbins, J., Cordero, L. and Speroff, L. (1971): Ann. N.Y. Acad. Sci., **180**, 499.
7. Beazley, J. M. and Gillespie, A. (1971): Lancet, **1**, 152.
8. Craft, I. L., Cullum, A. R., May, D. T. L., Noble, A. D. and Thomas, D. J. (1971): Brit. Med. J., **3**, 276.
9. Dewhurst, C. J. (1972): Amer. J. Obstet. Gynec., **113**, 221.
10. Pauerstein, C. J. and Zauder, H. L. (1970): Obstet. Gynec. Surv., **25**, 617.