The effect of Fenoterol on maternal and fetal $tcPO_2$ and heart rate

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During the first stage of labor contractions were suppressed with fenoterol (Partusisten^R) in 13 patients. In all cases labor had been completely uneventful before start of fenoterol. After appropriate explanation maternal consent was obtained. The effect of fenoterol on the following parameters was investigated: maternal transcutaneous PO_2, maternal thoracic impedance, maternal heart rate, intrauterine pressure, fetal transcutaneous PO_2, fetal heart rate.

The fetal $tcPO_2$ electrode was applied at a cervical dilatation of 4-6 cms using the method described by Huch, Huch, Schneider, Rooth (1). When a stable fetal $tcPO_2$ was reached fenoterol was given to the mother by intravenous infusion. The initial dose was 0.0011 mg/min. The dose was increased until contractions ceased or until a maternal tachycardia of >140 bpm was present. Maximum dose was 0.034 mg/min.

When contractions were suppressed the mother was instructed to breathe 100% oxygen for 10 minutes. 4 different time periods were assessed:
1. A ten minute period just before fenoterol was given (prefenoterol)
2. a ten minute period when the patient received fenoterol before oxygen was given (fenoterol) 3. a stable 2-3 minute period when the patient received both fenoterol and oxygen (f + O_2). 4. a ten minute period after fenoterol was discontinued (after).

For each minute the fetal heart rate pattern was assessed using a modified score (1). The lowest fetal heart rate score during the 10 minute period was taken for purposes of evaluation.

There were typical changes in fetal scalp $tcPO_2$ with contractions which consisted of an early rise and subsequent drop in $tcPO_2$ once the peak of a contraction was reached. The extent of the drop in $tcPO_2$ showed a significant positive correlation with the intensity of the corresponding contraction. In most instances this drop was less than 2 mm Hg and is explained as an effect of the reduced intervillous space bloodflow during uterine contractions.

During fenoterol administration contractions were significantly decreased (Table 1). When fenoterol was discontinued the contractions returned to their original level.

There was no significant difference between mean fetal $tcPO_2$ before fenoterol and during suppression of contractions (Fig.1).

With the mother breathing additional oxygen a rise in $tcPO_2$ was seen in all cases (Fig.1).

While maternal heart rate showed a significant rise during fenoterol infusion fetal heart rate remained unchanged (Table 1).

There is some evidence from animal experiments (2) as well as measurements in humans (3) that fenoterol induces an increase in uteroplacental blood flow. We have shown that at least in normal term labor suppression of uterine contractions does not result in a significant increase in fetal $tcPO_2$. This is clearly different in cases with mild preexisting fetal hypoxia where fenoterol infusion will together with the suppression of labor give a rise in fetal $tcPO_2$ (4). The most effective improvement in the oxygen supply of a compromised fetus in labor will clearly be achieved with a combination of suppression of uterine contraction with fenoterol plus an elevation of the mother's PO_2 by giving additional oxygen.

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FENOTEROL STUDY

RESULTS
13 patients

	PRE FENOTEROL	FENOTEROL	F + O_2	AFTER
CONTRACTIONS (Montevideo units)	146 ± 46.8	33.4 ± 22.5*	32.6 ± 16.1	113.9 ± 67.3**
FHR SCORE	7.7 ± 0.9	7.7 ± 0.9	7.9 ± 0.8	7.3 ± 1.1
FHR bpm	134.3 ± 9.4	134.3 ± 10.8	136.2 ± 10.8	142.5 ± 8.1
fetal $tcPO_2$	16.9 ± 5.2	17.9 ± 4.8	21.3 ± 4.7**	18.0 ± 4.7
MHR bpm	92.3 ± 15.2	115.0 ± 16.9*	122.8 ± 19.7*****	112.1 ± 13.4***
maternal $tcPO_2$	83.2 ± 10.5	87.0 ± 7.2	235.1 ± 97.8****	102.0 ± 23.2****

* $p < .0001$ **$p < .001$ ***$p < .01$ ****$p < .002$ *****$p < .02$

Table 1 Summary of the effect of intravenous infusion of fenoterol on various maternal and fetal parameters in 13 patients during fist stage of labor.

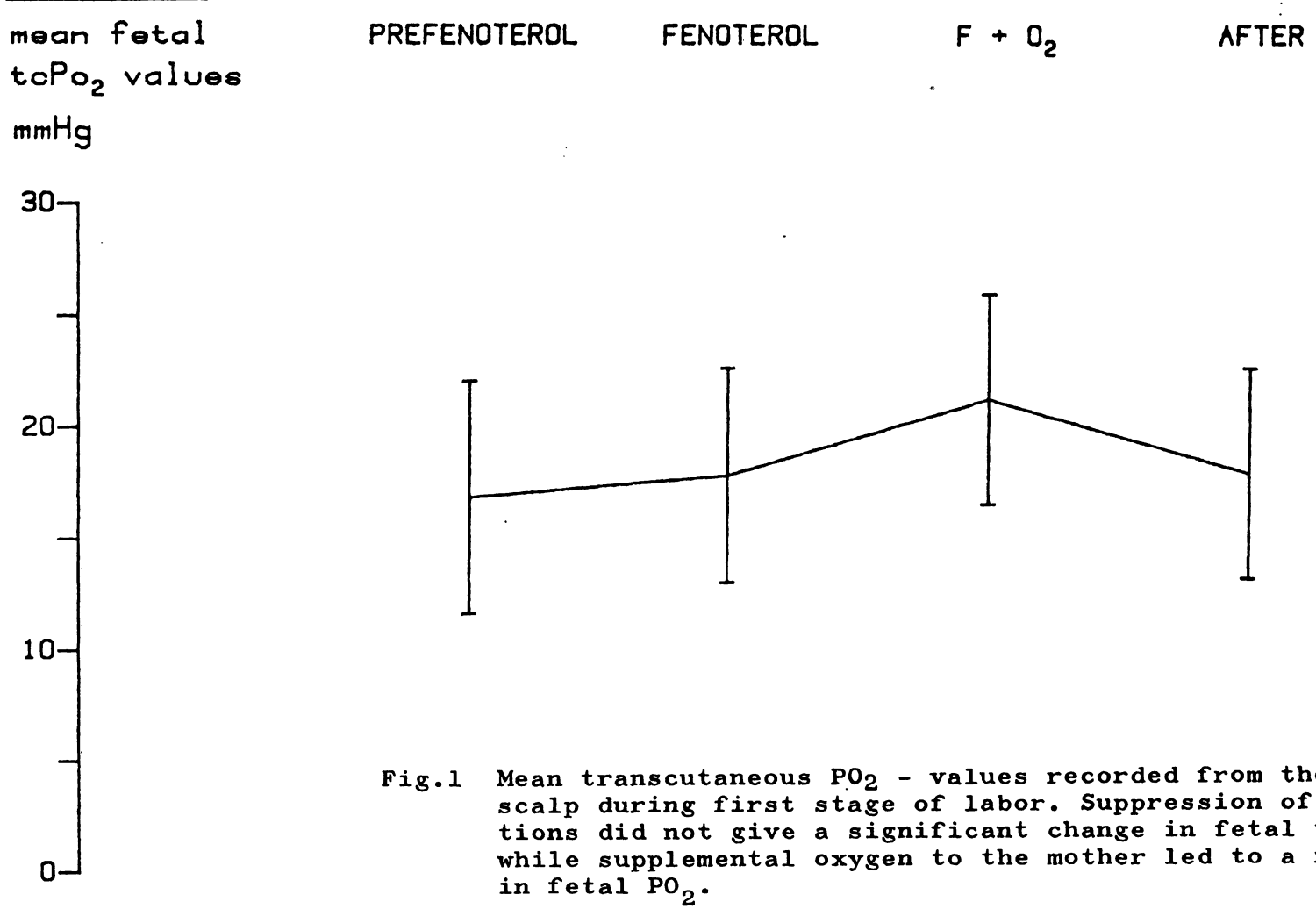

Fig.1 Mean transcutaneous PO_2 - values recorded from the fetal scalp during first stage of labor. Suppression of contractions did not give a significant change in fetal $tcPO_2$ while supplemental oxygen to the mother led to a rise in fetal PO_2.

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