Computerized analysis of CTG and intrauterine measured tcpO_2 of the fetus

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For estimating the correlation between transcutaneous pO_2 and the cardiotocographic parameters as there are labour-activity and fetal heart frequency, we registrated all these signals simultaneously on a tape recorder and analyzed them by a computer. Now, for a computer it is very easy to analyze data, but how to do it that's the problem. For example the calculation of the coefficient of correlation between the alterations of pO_2 and fetal heart frequency is without a result, because it is very difficult to eliminate the varying shifting baseline of pO_2 -signal by an algorithm. But that's only one of the problems. Following, a possible method for analysing these data by computer is demonstrated.

The first trace is according to a 40-min-registration of fetal heart frequency, followed by the plotting of the first derivative (dx/dt FH). The dotted line is the zero level. For example, when fetal heart frequency increases the value of the computed data becomes positive. Furthermore, a shifting baseline rendering more difficult in analysis can be eliminated by this. The other traces represent the pO_2 and the labour activity ("Wehe"). By computer analysis we are able to decide exactly if there were increasing, decreasing, or no-changing parameters during labour activities. We can decide when critical

alterations in pO_2 for itself or combined with fetal heart frequency are connected with labour activity or not. For example, there will be a bad condition for fetus when a very low pO_2 decreases to the zero level during labour activity and does not increase after that. In this case we register decelerations of fetal heart frequency some time later.

Additionally, we can compute a trend analysis of our parameters depending on pharmaca or oxygen application and so on. The efficiency of these manipulations can be described objectively by this.

The results demonstrated in the diagram we have got under different conditions during labour. On the left side there is a decreasing pO_2 during labour activity. This group is divided into the three cases as there are decreasing, increasing, and unchanged fetal heart frequencies. This column representing the period of dilatation has to be compared with the next one of expulsion period. The other two columns represent the data of a corresponding analysis under the influence of 'PIRACETAM'. In the periods of dilatation there is no significant difference between the control group and that one with 'PIRACETAM'. During expulsion periods the ratio of accelerations to decelerations becomes more after 'PIRACETAM'-application.

That's one of the possibilities analysing biological data by computer. This method demonstrated here might be suitable to analyze objectively the influence of pharmaca on the physiological behaviour of fetus sub partu.

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