Fetal pulse oximetry

In the quest to prevent perinatal morbidity and mortality, several techniques have been introduced into obstetrical practice during the last two decades. None of them, however, reached general acceptance for several reasons (e.g. low sensitivity, difficulty of use), except cardiotocography. Electronic fetal monitoring has been connected with an increase in the number of obstetrical interventions without real benefit to the newborn. Obviously, there is still a need to find methods which are more specific, non-invasive and easy to apply. Recently, pulse oximetry has been proposed as an effective method to monitor the fetal oxygen supply during labour, non-invasively and continuously. After the success story of pulse oximetry in anaesthesiology, neonatology, and other intensive care situations, several groups explored how to apply this new technique for the fetus. Although certainly progress has been made, numerous questions have yet to be discussed and investigated.

One of the methodological problems is the assessment of the accuracy of the method. The accuracy might improve if the influence of a changing blood content in the tissue in the neighbourhood of the sensor can be reduced. Another problem is that sufficient strong signals have to be detected continuously from the fetal scalp. Once the accuracy of the method has been established, the question remains if the predictive value of fetal oxygen saturation is high enough to warrant its introduction into clinical practice.

Many questions relating to the assessment of pulse oximetry for application in fetal surveillance were addressed during the ‘International Workshop on Fetal surveillance: new developments in pulse oximetry’ which was organized by the University of Nijmegen, the Netherlands, on December 17–18, 1995. The discussions were continued the day following the workshop when Paul van den Berg [1] and Roel Nijland [2] defended their respective Ph.D. theses at the University of Nijmegen.

The workshop was opened by Professor Saling with the keynote lecture: ‘35 years of modern fetal monitoring during labour and present integration of pulse oximetry’. In his lecture professor Saling showed the many efforts which went into intrapartum fetal monitoring during the last 35 years, and what we should demand of pulse oximetry before this method can be introduced in the clinic. One of his conclusions was that clinical application of pulse oximetry may already be useful if used in combination with fetal blood analysis, and he discussed how to interpret $\text{SaO}_2$ levels below 10%, between 10 and 20%, between 20 and 30% and above 30% [3].

This supplement contains most of the oral presentations of the workshop. It starts with physiological considerations of fetal oxygen saturation (Hanson and Nijhuis) and physio–optical considerations of the measurement principle (Mannheimer et al.). The next three papers discuss the accuracy of the method using animal experiments (Nijland et al.), in-vitro studies (Edrich et al.), and a clinical double sensor study (Davies and Greene). The following six studies describe the status and results of clinical studies from institutes in several countries in Europe, the United States and Japan. The issue concludes with a contribution about the application of antepartum fetal pulse oximetry (Lewinsky and Fine).

References


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