TITLE: Applications of the Transcutaneous Oxygen Electrode in Neonatal Intensive Care

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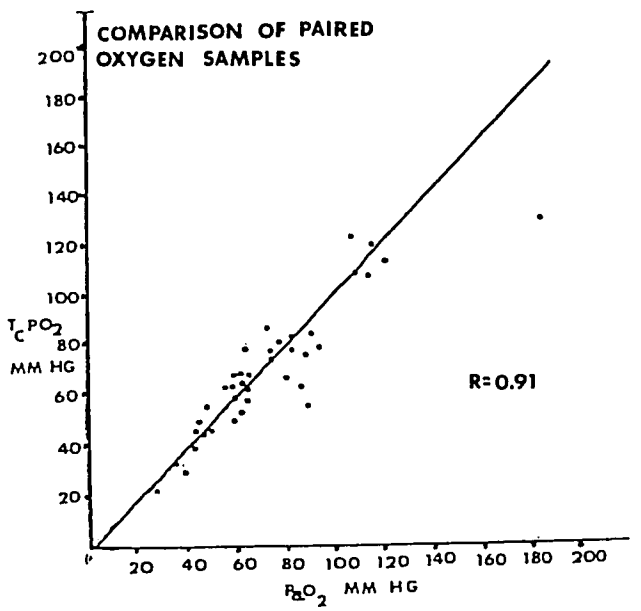
Over the last ten months, the transcutaneous oxygen electrode has played an important role in the day-to-day management of 350 infants with the diagnosis of respiratory distress syndrome and/or persistent fetal circulation. The transcutaneous oxygen electrode has been found to be a practical method of dynamically following changes in oxygen tensions in a wide variety of clinical situations and has correlated well with arterial samples taken from umbilical and radial artery sites (1,2).



Methods:

Retrospective evaluation of 55 paired $TcPO_2$/PaO_2 samples collected over a three month period from sixteen patients receiving IMV or CPAP for respiratory distress syndrome demonstrated a correlation factor of R = 0.91. The above mentioned patients' gestational ages ranged from 25-37 weeks and had birth weights ranging from 508-3447 grams. All arterial samples were analyzed using the Radiometer BMS3, Mark 2 microsystem. Oxygen electrodes were fully calibrated every eight hours and checked for drift at three hourly intervals. The $TcPO_2$ electrode was calibrated, membraned, and placed on the infant by the same respiratory therapist responsible for maintaining the arterial blood gas machines.

Results:

As a result of the use of the transcutaneous oxygen electrode, levels of oxygenation may be more closely assessed and controlled during the performance of such routine nursery procedures as chest physical therapy, suctioning of the trachea, and the use of manual resuscitators (3). The use of the transcutaneous electrode allows for continuous monitoring of oxygenation throughout both the acute and the recuperative phases of the infants' illnesses. The number of capillary blood gases done for assessment of oxygenation may be reduced or eliminated when one develops confidence in the results generated by the transcutaneous electrode.

Discussion:

In the management of infants with bronchopulmonary dysplasia, supplemental oxygen is administered via nasal cannula. Using the transcutaneous monitor, the level of oxygen can be maintained at a more physiologic level and dips below 40 torr can be avoided, especially during feedings. The growth curves of infants managed this way have been found to be superior to infants receiving oxygen via isolette (4).

Two electrodes have been employed simultaneously on the upper chest and lower abdomen in order to determine the existence of right to left ductal shunts and guide the treatment of the infants. Following the intravenous administration of 1.0 mg/kg tolazoline, the electrodes showed graphically the narrowing of difference between upper chest and abdominal wall $TcPO_2$ indicating the functional closure of the ductus arteriosis. Accuracy of $TcPO_2$ measurements was documented by right radial and umbilical artery blood gases.

References.

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