

End-Tidal Carbon Dioxide Monitoring in Children with Congenital Heart Disease During Sedation for Cardiac Catheterization

C.J. Coté, D. Wax, C. Gorski, RN, K. Klippstein, RN, C.L. Heffner, RN

Departments of Anesthesiology and Cardiology, Children's Memorial Hospital, Northwestern University, Feinberg School of Medicine, Chicago, IL 60614

Introduction: Children are often sedated by non-anesthesiologists for a variety of procedures. Monitoring generally consists of an independent observer, EKG, pulse oximetry, and NIBP. The use of expired carbon dioxide monitoring outside of the traditional operating room and ICU environments is rare. The purpose of this study was to examine the feasibility and the accuracy of expired carbon dioxide (ETCO₂) monitoring in an environment where it would be easy to compare the results with arterial blood gases.

Methods: Children undergoing cardiac catheterization procedures were prospectively enrolled after IRB approval and informed consent. The cardiac laboratory nurses sedated the children. End-tidal carbon dioxide monitoring was with a sampling line designed to obtain gas sampling simultaneously from over the mouth and from the nares (Microstream® EtCO₂ Circuit – Smart CapnoLine™ Long O₂/CO₂ oral nasal cannula, Oridion Inc. Needham, MA, USA). Cardiac nurses recorded the ETCO₂ value on the monitor just prior to processing any arterial, venous or mixed blood gas sample. A record was kept of the site of sampling (e.g., superior vena cava, ascending aorta, etc.). Data were analyzed by separating arterial samples from those obtained from the venous side of the heart. Data are presented as mean ± SD; the Spearman correlation was used.

Results: 89 blood gases were taken from 26 patients (mean age 6.5 ± 3.8 yr, weight 23.4 ± 14.8 kg). There was a slightly better correlation of PAO₂ with ETCO₂ than PVCO₂ vs. ETCO₂ but this difference was not statistically significant.

Value	Site	N	Min	Max	Mean	SD
pH	All	89	7.19	7.49	7.34	0.039
ETCO ₂	All	89	26	52	40.91	3.88
PACO ₂	All	89	33	61	43.36	4.45
pH	Arterial	41	7.19	7.49	7.35	0.045
ETCO ₂	Arterial	41	26	51	40.78	4.72
PACO ₂	Arterial	41	33	61	42.06	4.88
pH	Venous	47	7.22	7.38	7.33	0.026
ETCO ₂	Venous	47	35	45	40.74	2.81
PVCO ₂	Venous	47	37	52	44.4	4.03

Spearman correlation = 0.01 ETCO₂ vs. PACO₂ or ETCO₂ vs. PVCO₂

Conclusions: Although the number of samples at this point was small there was a reasonable correlation between ETCO₂ and either PAO₂ or PVCO₂. We conclude that Microstream® EtCO₂ Circuit – Smart CapnoLine™ Long O₂/CO₂ oral nasal cannula accurately tracks ETCO₂ in sedated children.

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