Is Measurement of Cardiac Output Using Impedance Cardiography Accurate?

To the Editor:

I believe the article by Pianosi (February 1997) concerning the measurement of cardiac output using impedance cardiography (ICG) illustrates a potentially serious defect in the evaluation of measurement techniques, related to results calculated using a formula with parameters not directly determined by the proposed measurement. Specifically, the formula for calculation of cardiac output, \( Q \) (stroke volume \( \times \) heart rate) contains variables for the resistivity of blood, \( \sigma \); the distance between electrodes, \( L \) (which is an indirect measurement of height); ventricular ejection time, \( VET \); heart rate; and the measured parameter \( dZ/dt \), \( Z_0 \).

The authors compare \( Q \) determined from this formula to \( Q \) determined from \( \Delta CO_2 \) rebreathing and from oxygen consumption. I suspect that in this experiment, \( VET \) and heart rate contribute much more significantly to the described correlation between differently determined \( Q \)s than does \( dZ/dt \), \( Z_0 \), the presumed basis for the measurement. Without presentation of the behavior of the impedance data related to the alternatively measured cardiac output, it is not possible to establish the contribution of the impedance measurement itself to the final result, and thus it is not possible to conclude that the ICG is any better for measuring changes in \( Q \) than, for example, a value of \( Q \) calculated on the basis of \( VET \) and heart rate alone.

Bernard E. Pennock, PhD
Allegheny General Hospital
Pittsburgh

REFERENCE


Air, By Any Other Name . . .

To the Editor:

I found the “Roentgenogram of the Month” (February 1997) showing a chordoma of the thoracic spine very interesting. Just as interesting was the statement that arterial blood gas tensions were measured while the patient breathed “room air.” The term “room air” has always confused me, since it implies that air outside the “room” is somehow different in composition! I believe that the adjective “room” is usually superfluous and that we simply should describe the usual gas mixture which we all breathe as “air.”

Carl M. Kirsch, MD, FCCP
Santa Clara Valley Medical Center
San Jose, Calif

REFERENCE


An Alternative to the Football Helmet

To the Editor:

Esophageal variceal hemorrhage is an all too common and difficult condition to manage in critical care practice. One treatment for this disorder, balloon tamponade with a Sengstaken-Blakemore (SB) tube, may have utility as a temporizing measure to stabilize patients pending a more definitive procedure to lower portal pressures (eg, transjugular intrahepatic portosystemic shunt, or TIPS). Unfortunately, since balloon tamponade itself is of minimal long-term benefit and is associated with considerable risk of aspiration and esophageal rupture, many centers have no recent experience in its use. Therefore, needed adjunctive equipment (eg, a football helmet with a face guard) to anchor the SB tube in place is often unavailable when urgently needed.

One improvisational anchoring tool we have used in this circumstance is the Ultra-Fit anesthesia face mask (Model #43410—600 Ultra-Fit; Baxter Healthcare Corp; Round Lake Beach, Ill), which is readily available and commonly used with Ambu-bags (Ambu Inc; Lithiculum, Md) or breathing circuits. Our technique is simple. After SB tube placement, the face mask is positioned with the SB tube through the central orifice. The gastric balloon is then inflated, and the tube is pulled tight and then anchored with surgical tape to the mask. The mask itself is then taped or strapped in place on the patient. This device has a number of attributes which make it useful for this purpose: 1) it is readily available in emergency departments and ICUs; 2) it is made of transparent material to allow clear visualization of the patient; 3) it does not preclude use of an endotracheal tube for airway protection; 4) it has soft cushioning at contact points to limit tissue damage; and 5) it is easily removed when necessary.

Paul T. Pianosi, MD
IWK-Grace Health Care Centre
Halifax, Nova Scotia