

# A472

**TITLE:** Impedance Cardiography:  
Validity of Intraoperative  
Measurements

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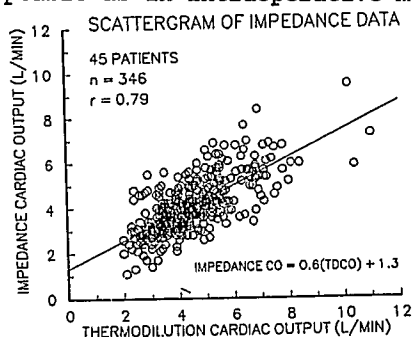
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Impedance cardiography (IC) enables the noninvasive and continuous measurement of cardiac output (CO). Technological advances have recently been introduced to improve the performance of impedance monitors. No studies, however, have examined the validity of this new technology during surgery. This investigation was designed to prospectively evaluate the accuracy of impedance CO monitoring during the intraoperative period.

**Methods:** IC was performed in 50 patients undergoing noncardiac surgery using an ethical committee approved protocol. CO measurements of the impedance monitor (Bomed NCCOM3-R7) represent an average of 16 successive artifact-free beats. As a reference standard, thermodilution (TD) measurements were obtained at end-expiration using room temperature injectate and a calibrated computer (SpaceLabs). Simultaneous IC and TD CO measurements were obtained in triplicate during periods of hemodynamic stability. Statistical analysis employed the method of Bland and Altman as well as linear regression. The ability of IC to track changes in CO was examined by comparison of the percent changes in TD and impedance CO.

**Results:** Five patients were excluded from analysis due to inadequate impedance signals. Comparison of 346 simultaneous impedance and TD CO measurements are presented in the figure below. Bland/Altman analysis reveals a mean error (bias) of  $-0.5$  and a SD of the error of  $1.2 \text{ l} \cdot \text{min}^{-1}$ . Trending data has a coefficient of correlation  $r=0.45$  and IC trended correctly 93 of the 117 times (79%) TD changed more than  $\pm 15\%$ .

**Discussion:** While there is a strong correlation between impedance and TD CO measurements, Bland/Altman and trending analysis reveal significant inaccuracies in IC monitoring. The intraoperative environment, with electrocautery, mechanical ventilation, and surgical manipulations, may induce additional error in IC measurements. Refinement of technique is needed for IC to be acceptable as an intraoperative monitor.



# A473

**Title:** Acute Exacerbation of Carpal Tunnel Syndrome Following Radial Artery Cannulation

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**Introduction:** Acute Carpal Tunnel Syndrome (CTS) has been described following radial artery cannulation. To determine incidence and predisposing factors, 95 patients who had radial artery cannulation perioperatively were prospectively studied.

**Methods:** 20 gauge catheters were inserted percutaneously under local anesthesia in all patients. The number of arterial punctures, perforation of the posterior wall of the artery, the need for wrist extension splint and the duration of radial artery cannulation were recorded. Prior history of CTS and the use of perioperative anticoagulation was documented. Postoperatively, all patients were evaluated on the second and fifth postoperative days by an orthopedic surgeon who performed Tinnels and Phalens tests as well as defining the presence of forearm ecchymosis.

**Results:** Six of the 95 patients developed positive Phalens and Tinnels signs on the side in which the radial artery catheter had been inserted. 5 of the 8 patients with a prior history of CTS developed acute exacerbation of symptoms postoperatively. By contrast, only 1 of 87 patients with no prior history of CTS developed symptoms. (chi square = 33.1,  $p < 0.0001$ ). Twelve patients had multiple arterial punctures or perforations of the posterior wall of the radial artery. Three of these (25%) developed postoperative symptoms of CTS but this did not reach statistical significance. The only patient who developed acute CTS postoperatively who did not have a prior history of CTS, had multiple arterial punctures. The use of perioperative anticoagulation, wrist extension splints and the duration of radial artery cannulation did not influence acute exacerbation of CTS.

**Conclusion:** Patients with a prior history of CTS are at increased risk of developing recurrent symptoms following radial artery cannulation. Further cases are being followed to better define the role of traumatic arterial cannulation in the genesis of CTS.