

The arterial blood gas analysis was drawn from the in situ catheter used by the cardiologist during the invasive procedure. This did not divert the anesthesiologist from airway control.

We were not aware of the existence of a modified airway exchange² that fits over the bronchoscope and will include it in our "difficult airway management" kit.

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Giovanni Landoni MD
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References

- 1 Leoni A, Crescenzi G, Landoni G, Castracane W, Zangrillo A. Use of the laryngeal mask airway and a modified sequential intubation technique for the management of an unanticipated difficult airway in a remote location (Letter). *Can J Anesth* 2003; 50: 523–4.
- 2 Atherton DP, O'Sullivan E, Lowe D, Charters P. A ventilation-exchange bougie for fiberoptic intubations with the laryngeal mask airway. *Anaesthesia* 1996; 51: 1123–6.

Preoperative checkout procedures for modern anesthesia machines in an emergency situation

To the Editor:

Datex-Ohmeda would like to thank Drs. McLean, Houston and Dumais for their recent Letter to the Editor¹ in which they describe an unexpected problem with the ADU anesthesia machine during an emergent Cesarean delivery. Their description serves to remind users and manufacturers of the necessity for developing preoperative checkout procedures originally and why they remain a requirement to this day.² It is also this reminder along with the potentially serious clinical events recounted in the McLean letter that compels us to respond to the Journal.

The authors describe that, after securing adequate ventilation of the patient, it was discovered that the hose from the fresh gas port was connected to the ventilator, not the breathing system. Datex-Ohmeda has conducted extensive testing of the ADU system check to evaluate the various misconnections and whether the system would indicate PASS or FAIL. Despite the misconnections, the system will fail the system check procedure if the hoses are misconnected. The system check failure may occur during either the completely automated section or during the user-validated section of the system check.

The ADU system check procedure reliably identifies possible faults and, while Datex-Ohmeda understands that the time required to complete the check is more than what users may be used to, this time is well spent. The delay imposed by the system check would have been far less than the time required in overcoming the inability to ventilate, as described in the Letter to the Editor.

In earlier anesthesia machines, an abbreviated checkout procedure similar to pressurizing the rebreathing bag may have sufficed. Abbreviated checkout procedures are, however, inadequate for modern anesthesia machines in general, and the ADU in particular. All preoperative checkout procedures, whether full or abbreviated, must be consistent with the type of device being checked. Even though Datex-Ohmeda does allow the user to bypass the preoperative checkout procedure, the user is admonished both on the anesthesia machine screen and in the owner's manual that the checkout has not been completed and that valuable verifications have not been achieved.

Datex-Ohmeda recommends that preoperative checkout procedures, as recommended by the Food and Drug Administration along with machine-specific procedures as described in the ADU owner's manual, be used at all times.

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References

- 1 McLean JS, Houston P, Dumais R. Erroneous connection of the fresh gas flow to the anesthesia circuit (Letter). *Can J Anesth* 2003; 50: 93.
- 2 <http://www.fda.gov/cdrh/humfac/anesckot.pdf>.

REPLY:

In response to Mr. Mitton's comments re our original letter¹ and description of a systems failure with the Datex-Ohmeda ADU, we would like to re-emphasize the following points.

First, despite the most sophisticated computer-assisted anesthesia workstation, there remains a possibility of a grave anesthetic machine/operator error in an emergency situation.

Secondly, this was an emergency situation, not an elective one. A full check on the Datex Ohmeda AS/3™ anesthetic delivery unit requires a minimum of four minutes to complete.² According to the Datex Ohmeda manual, the recommended procedure in an emergency situation is to use the bypass check option.¹ In our case, the anesthetic machine had been checked previously a few

hours before. A full check in this emergency may have led to morbidity or death of the fetus.

Thirdly, anesthesiologists have always had to be prepared to use an anesthetic machine in an emergency situation. With many anesthetic units, the most important aspect is to set the flow of oxygen and to observe if the system pressurizes. However, when the Datex Ohmeda machine is placed in the simulated situation of an erroneous connection, the circuit will pressurize, but the flow of oxygen is absent. If the fresh gas outlet had a unique and non-interchangeable connection or the fresh gas flow hose had been permanently fastened to the outlet as shown in the diagram that accompanied our original letter, the incident never would have occurred.

It is our opinion that issues regarding potential for error of any type in provision of anesthesia must be openly communicated to promote improved safety in anesthetic practice. It was our intention to do so in our original Letter to the Editor.

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References

- 1 McLean JS, Houston P, Dumais R. Erroneous connection of the fresh gas flow to the anesthesia circuit (Letter). *Can J Anesth* 2003; 50: 93.
- 2 Datex Ohmeda AS/3™, Anaesthesia Delivery Unit, User's Reference Manual, Section 4: 10.

Procalcitonin levels do not predict mortality following major abdominal surgery

To the Editor:

Extended abdominal surgery such as esophagectomy, total gastrectomy, pancreas and liver resection performed as an elective procedure carries a risk of morbidity and mortality.¹ It is difficult to predict which patients will develop organ dysfunction within a few days after the operation. The aim of our study was to evaluate the early course and predictive value of organ dysfunction monitored by multiple organ dysfunction score (MODS) and a novel inflammatory marker, serum procalcitonin (PCT), following major abdominal surgery.

In a prospective observational study, 153 patients (130 survivors, 23 non-survivors) were investigated. MODS was monitored daily (t_1, t_2, t_3). Serum PCT levels were determined on admission to the intensive care unit (ICU; t_0), then 24 hourly (t_{24}, t_{48}, t_{72}).

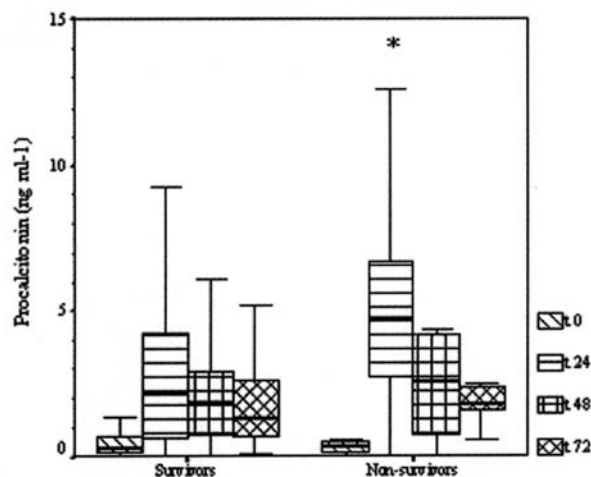


FIGURE The progress of serum procalcitonin (PCT) levels from arrival on intensive care unit (t_0) to 72 hr (t_{72}) postoperatively in survivors and non-survivors. Data are presented as boxes and whisker plots. The boxes enclose the interquartile range and median (middle line in each box); the whiskers enclose the minimum and maximum. Differences between the two groups at each assessment point were tested with Mann-Whitney U test. * $P < 0.05$.

All non-survivors died due to multiple organ failure. Significantly higher MODS were observed in non-survivors throughout the study period. Regarding organ dysfunction the $\text{PaO}_2/\text{FiO}_2$ ratio and the platelet count values were below normal and significantly lower in non-survivors at t_1, t_2, t_3 . Serum PCT at t_{24} increased significantly, and values were significantly higher in non-survivors (Figure). In order to predict outcome, receiver operating characteristic (ROC) curve analysis was performed. The MODS was found to be the most reliable predictor of mortality, area under the curve (AUC) = 0.865, whilst $\text{PaO}_2/\text{FiO}_2$ ratio, AUC = 0.777; platelet count, AUC = 0.704 and PCT, AUC = 0.682 were less sensitive and specific. A logistic regression analysis was also performed where only the MODS showed significant impact on mortality $P = 0.005$ $\exp(B) = 1.017$, 95% confidence interval (CI) = 1.005 to 1.030, compared to platelet count $P = 0.056$ $\exp(B) = 1.014$, CI = 1.000 to 1.029; $\text{PaO}_2/\text{FiO}_2$ ratio $P = 0.775$ $\exp(B) = 0.875$, CI = 0.379 to 2.023 and PCT levels $P = 0.995$ $\exp(B) = 0.996$, CI = 0.877 to 1.132.

In our study, PCT levels followed the same pattern we described previously and were significantly higher among non-survivors.² The significantly higher PCT levels in the non-survivor group may be the result of a clinically undetectable bacterial translocation during