The Medicines and Healthcare Products Regulatory Agency, via their yellow card reporting scheme, have recorded a number of life-threatening or fatal complications involving etomidate, the earliest being reported in 1979. Among the other cardiovascular effects reported, there have been three cases of bradycardia and six cases of cardiac arrest, three of which were fatal [4].

There is very little reported about cardiovascular instability occurring with the use of etomidate. Al-Khudari and Whitwam [2] showed in 1986 that i.v. injection of propylene glycol in the canine model produced autonomic instability with stimulation of the cardiomotor vagus and inhibition of the sympathetic nervous system. In their experiments they concluded, however, that as the cardiovascular effects were observed within 3–5 s of injection, the autonomic effects must be from stimulation of intrathoracic structures as there would not be time for the propylene glycol to reach the central nervous system. In their experiment, the effects on HR were transient and the rate returned to normal within 1 min.

A case report from The Netherlands reported asystole in a patient lasting for 10–15 s followed by nodal rhythm spontaneously reverting to sinus rhythm on induction of anaesthesia with etomidate. In this case, no further problems were encountered and surgery went ahead uneventfully [5]. A more recent report demonstrated conversion of ventricular tachycardia to sinus rhythm during induction of anaesthesia, for DC cardioversion, with etomidate [6].

Etomidate has relatively few cardiovascular side-effects. However, it does have some rare effects which may be potentially life threatening. It is possible that its carrier, propylene glycol, might be the causative agent rather than the drug itself. The use of etomidate in lipid emulsion may be advantageous. It must also be remembered that patients in whom etomidate is used may be on a number of cardiovascular medications, and a drug interaction cannot be ruled out. These potential complications should be borne in mind when considering the use of etomidate as an induction agent.

A. Combeer
Department of Anaesthesia
East Surrey Hospital
Canada Avenue
Redhill, Surrey, UK

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Potential danger hidden behind Vaporizers on Datex-Ohmeda Excel 210 SE

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EDITOR:
We report a problem hidden behind the vaporizers on a Datex-Ohmeda Excel 210 SE (Datex-Ohmeda Limited, Madison, WI, USA) anaesthetic machine that resulted in a vaporizer leak. A 70-yr-old ASA I male required a general anaesthetic for a Thompson's hemiarthroplasty. Before starting the case, the anaesthetic machines were checked and no faults were identified. There were two vaporizers on the Excel 210 SE anaesthetic machine in the operating theatre, an Isotec 4 isoflurane vaporizer (Datex-Ohmeda Limited) and a Datum (Blease Medical Equipment Limited, Buckinghamshire, UK) sevoflurane vaporizer. These were properly seated, locked into position and contained an anaesthetic agent. There was no evidence of a gas leak.

Correspondence to: Rajkumar Rajendram, Department of Anaesthesia, The Horton Hospital, Banbury, Oxfordshire OX16 9AL, UK. E-mail: rajkumarrajendram@doctors.org.uk; Tel: +440 1295 229067; Fax: +440 1295 229067

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Following intravenous induction and insertion of a laryngeal mask in the anaesthetic room, the patient was transferred to the operating theatre. The Isotec 4 vaporizer on the Excel 210 SE anaesthetic machine was set to deliver 3% isoflurane with a fresh gas flow of $1.5\,L\,min^{-1}$ (oxygen $0.5\,L\,min^{-1}$; air $1\,L\,min^{-1}$). Spontaneous ventilation was allowed on a circle system with a soda lime carbon dioxide absorber and confirmed to be effective (saturation 99%; F_iO_2 0.35; end-tidal CO_2 ($ETCO_2$) 5.5 kPa; end-tidal isoflurane 1.2%).

During the case it was noted that the isoflurane vaporizer was almost empty. This was removed and replaced with a full Isotec 4 vaporizer. This was seated properly, locked into position on the back bar and set to deliver 3% isoflurane. However, it was quickly noted that a hypoxic gas mixture (F_iO_2 0.15) was being delivered and the patient's oxygen saturation had fallen (92%) but his $ETCO_2$ remained stable (5.5 kPa). The supply of oxygen was increased to $10\,L\,min^{-1}$, the delivery of air was stopped and all connections were checked. However, the level of F_iO_2 only rose to 0.33 and the oxygen saturations continued to fall. Replacement of the anaesthetic machine immediately corrected the problem with delivery of fresh gas and subsequently improved oxygenation.

Removal of the sevoflurane vaporizer revealed that one of the captive fasteners (1001-4086-000; Datex-Ohmeda Limited) which held the two-stage cover manifold onto the back bar of the Excel 210 SE had been lost. Removal of the isoflurane vaporizer revealed that the other captive fastener was partially displaced. The plate had pivoted on the displaced captive fastener and slipped up approximately 1 mm above the back bar behind the isoflurane vaporizer. Although the vaporizer was correctly seated and locked into position on the back bar, the plate prevented a tight seal on the o-ring and allowed a significant gas leak. On realignment of the plate, re-insertion of the only captive fastener and replacement of the vaporizer, the gas leak was abolished. However, the captive fastener was damaged and could easily be displaced by slight movement of the two-stage cover manifold. We hypothesized that this had occurred when the vaporizer was changed.

This cause of a leak of fresh gas flow has not been previously reported. The captive fasteners which hold the two-stage cover manifold in position should be checked during routine machine maintenance. However, this is particularly important for the Datex-Ohmeda Excel 210 SE as the captive fasteners are hidden behind the vaporizers and can be dislodged easily. In our department, the presence of the captive fasteners and the stability of the two-stage cover manifold are now confirmed at each vaporizer change when the Datex-Ohmeda Excel 210 SE anaesthetic machine is in use.

R. Rajendram, P. Laurie, D. Willatts
Department of Anaesthesia
The Horton Hospital
Banbury, Oxfordshire, UK

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