Update in
Anaesthesia

Case Report

An unusually massive leak caused by sevoflurane vaporiser

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Summary

Leaks in vaporisers are not uncommon and may lead to awareness under anaesthesia.[1,2] When a vaporiser is checked with the concentration control dial in the off position, it may not be possible to detect even major internal leaks which become apparent when the vaporiser is turned on.[1] The mounting mechanism is an uncommon location of vaporiser leak,[3] and we report a sevoflurane vaporiser which caused a major leak during induction of general anaesthesia.

CASE REPORT

A 3-year-old female child weighing 15kg was posted for emergency oesophageal foreign body removal. The anaesthesia machine (Dräger Medical AG & CO, Lübeck, Germany), with a halothane vaporiser and the Jackson-Rees circuit, were checked as per the FDA 1993 Anesthesia Apparatus Checkout Recommendations. The operation theatre assistant was instructed to fit the sevoflurane vaporiser while ketamine (intramuscularly) premedication was being administered. A new sevoflurane vaporiser (Datum, Blease, Beech House, Chesham Bucks HP5 2P5, England) (Figure 1) which was being used for the first time was fitted to the machine.

The patient was brought to the operating theatre and we proceeded with an inhalational induction of anaesthesia using sevoflurane in 100% O_2 (4l.min^{-1}). The breathing circuit was not rechecked after the sevoflurane vaporiser was fitted on to the machine. During induction, inadequate filling of the reservoir bag was noted. Meanwhile, positive pressure ventilation was attempted as the patient started desaturating. The reservoir bag remained collapsed. The anaesthetic gas analyzer showed traces of sevoflurane in the breathing gases. There was no audible leak anywhere in the breathing circuit although there was a smell of sevoflurane.

The concentration control dial was immediately turned to the off position, and ventilation attempted again with no change. The vaporiser was removed and fitted again without any improvement. In the meanwhile, some ventilation was achieved with the help of the emergency oxygen-flush, and oxygen saturation (SpO_2) was maintained at 85-86%. Another source of oxygen was then used to ventilate the child with a mask and resuscitation bag, and the SpO_2 improved to 97-98%. The sevoflurane vaporiser was removed and further anaesthesia was managed using halothane and the same anaesthesia machine. The foreign body was removed uneventfully.

We suspected a problem in the sevoflurane vaporiser since it was the only part of the anaesthesia machine which was not checked at the start of the procedure. We tried turning off the vaporiser to isolate the site of a potential leak, but only removing the vaporiser solved the problem. A detailed examination later revealed an ill fitting mounting mechanism which caused the leak around the inlet and outlet connection on the mounting mechanism (Figure 1). The leak was so significant that it caused a near total cut-off of fresh gas flow (FGF) from the machine. There was no audible leak at 4l.min^{-1} FGF, however it became audible at a FGF >6l.min^{-1}.

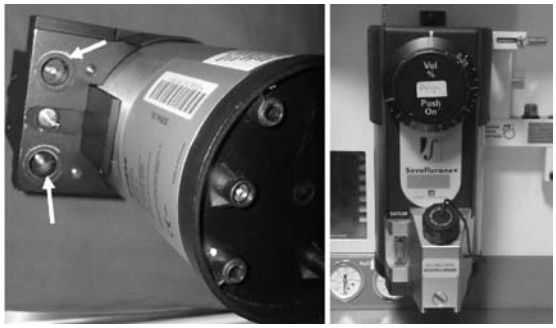

Figure 1. *Sevoflurane vaporiser (Datum, Blease) showing site of leak (arrows)*

DISCUSSION

This case is important because the vaporiser leak caused a near total cut-off of FGF even when the concentration control dial was in off position and the site of leak was uncommon. It is advisable to test the system both with the vaporiser in the 'off' and 'on' positions. The "SNIFF" method to identify vaporiser leak using carbon dioxide/anaesthetic agent sampling tube has been described.[4] The supplier was promptly informed and the vaporiser returned.

Leaks in the anaesthesia circuit or machine may lead to serious problems such as hypoxia, hypercarbia, delayed or difficult induction of general anaesthesia, airway problems because of instrumentation in a lighter plane of anaesthesia, awareness under anaesthesia, pollution of the operating room and wastage of the anaesthetic agent. A self-inflating resuscitation bag is an essential item for every anaesthetic. Checking equipment carefully is the duty of every anaesthetist before every patient. This should be repeated if any part of the equipment is changed.

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