

INADVERTENT RESPIRATORY ACIDOSIS DUE TO DAMAGED WATER TRAP OF CAPNOGRAPH BY ISOFLURANE

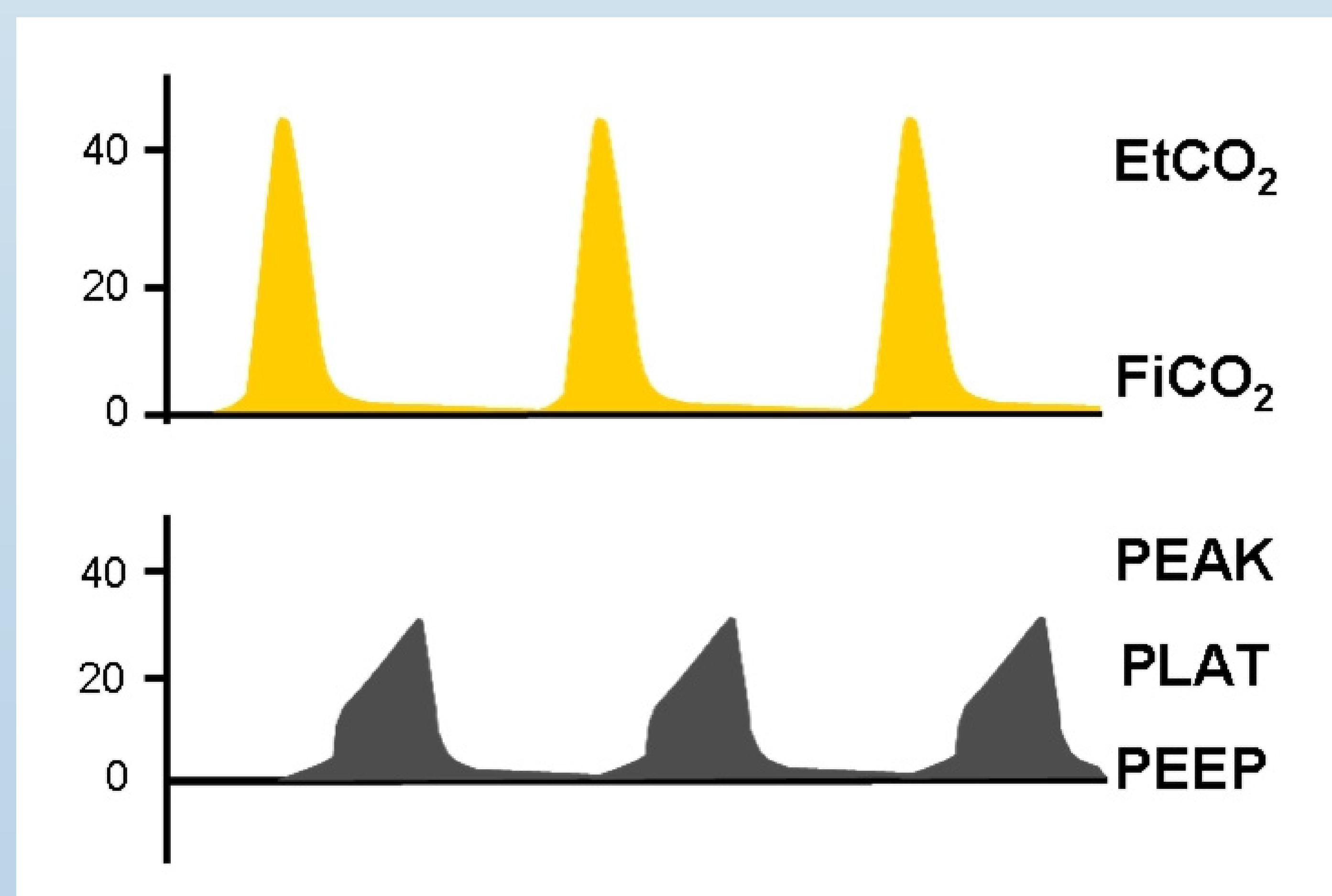
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Introduction: A few reports have documented isoflurane leakage causing damage to the water trap in the Dräger Apollo anesthesia machine. This case describes an abnormal capnograph tracing yielding falsely normal end-tidal carbon dioxide tension (EtCO₂) after breakage of the water trap by isoflurane.

Case: Patient is a 55-year-old male with esophageal adenocarcinoma, undergoing thoracoscopic robotic-assisted esophageal mobilization and laparoscopic total esophagectomy with cervical esophagogastrectomy. Five hours into the surgery, isoflurane vaporizer was refilled and liquid isoflurane spilled into the water trap. Subsequently the patient became tachycardic and hypertensive despite adequate level of anesthesia. An unusual capnograph tracing showing EtCO₂ of 40-45 mmHg and the damaged water trap were then identified. Arterial blood gas (ABG) sample revealed respiratory acidosis (pH 7.16, pCO₂ 83). Upon replacement of the water trap, the capnograph shape returned to normal with EtCO₂ concentrations consistent with subsequent ABG samples. Ventilation was adjusted to restore normocarbia. No arrhythmias or other complications were noted. Patient was extubated uneventfully at the end of the case in a stable condition.



Discussion: Isoflurane, a powerful organic solvent, has been reported to dissolve and damage water trap made of polymethyl methacrylate.¹ Previous cases have cited inability to detect correct placement of the endotracheal tube, problems with absent capnograms and erroneous gas analyzer readings.² The clinical significance of this report is that the damaged water trap of the capnograph registered inaccurate ETCO₂, leading to severe hypercapnea and acidosis. Only after the patient showed signs of hypercarbia was the EtCO₂ discrepancy discovered along with the cracked water trap. Room air entrainment through the cracks resulted in falsely normal concentrations of carbon dioxide in the expired gas analyzer.³

Although most anesthesia machines are configured with the water trap above the vaporizers, the Dräger Apollo machines are designed with the water trap placed directly below the vaporizers.²

This design renders the water traps vulnerable to drippings during the filling process. Exposure to sevoflurane and desflurane has not resulted in similar damage.² Therefore, it is recommended to position the isoflurane vaporizer furthest away from the water trap. Secondly, only the appropriate Dräger filling adaptor should be fastened hand tight inside the vaporizer's filling system.⁴ Thirdly, cardboards can be placed under the vaporizer during the filling process to avoid exposure of the water trap to isoflurane droplets.³ Finally, immediate recognition of abnormal capnograph tracing (as shown in this report) caused by water trap damage can prevent adverse complications to patients under anesthesia.



References:

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