



Figure 1: Dual waveform capnogram showing an EtCO₂ level of 20 mm of Hg

Move the anesthesia workstation cautiously!

Sir,

Inadvertent damage to lines and cords during repositioning of anesthesia workstation after a patient is anesthetized can occur due to carelessness. However, damage to the blood pressure tubing or the sample line tubing of capnograph can affect the anesthesia monitoring significantly. We present a case of erroneous drop in end tidal carbon dioxide level due to damage of the sampling tube during general anesthesia.

A 65 years American Society of Anesthesiologists II male of 51 kg body weight was posted for anterolateral decompression of caries' spine under general anesthesia. Anesthesia was induced with morphine 5mg and thiopentone 300mg intravenous after instituting monitoring in the form of electrocardiography, non-invasive blood pressure, SpO₂ and EtCO₂. Tracheal intubation was facilitated with vecuronium 6mg and the trachea intubated with an 8.0 mm diameter tracheal tube with ease. Anesthesia was maintained with 0.6% isoflurane and 60% nitrous oxide in oxygen along with intermittent positive pressure ventilation (IPPV).

The patient was repositioned in right lateral decubitus position to facilitate surgical exposure. During this process, the anesthesia workstation had to be moved to make room for the OR personnel. Routine auscultation of the chest was done to rule out any displacement of the tube after repositioning and was found satisfactory.

Suddenly it was noticed that the capnogram had changed into a dual waveform [Figure 1]. The EtCO₂ level had also dropped from 34 mmHg to 20 mmHg, the inspiratory and end tidal values of isoflurane changed from 0.5% and 0.4%

respectively to 0.3% and 0.3% and that of nitrous oxide from 54% and 53% to 28% and 35% respectively. There was, however, no change in oxygen saturation or hemodynamic parameters. Chest auscultation was again performed to ensure bilateral equal air entry. Integrity of the sample line right from the sidestream connector was checked that revealed a damaged sample line. The sample line was immediately replaced with a fresh one and the EtCO₂ value returned to the baseline. The capnogram now displayed a normal waveform. Surgery and anesthesia continued and terminated uneventfully.

Important causes for a dual wave form capnogram include mechanical factors like sampling leaks, loose connection between sampling tubes and the monitor, and breaks in the water filter of the carbondioxide analyzer. Pathological causes include severe kyphoscoliosis and differential emptying of the lungs.^[1] Physiological condition like pregnancy and obesity can cause an upswing at the end of Phase III.^[2] Iatrogenic causes include endobronchial intubation, which was ruled out in our case.

Mechanics of change in capnogram with a "tail-up" due to damage to the sample line has been investigated by Tripathi and Pandey.^[3] During IPPV, pressure in the breathing circuit is lower during exhalation, allowing air to enter through the hole in the sampling tube causing a low EtCO₂. The authors hypothesized that with inspiration, the positive pressure in the breathing circuit, transmitted to the sampling tube, prevents air admixture and the upsurge in carbon dioxide that is being displayed, giving the capnograph a "tailsup" appearance.

Isolated drop in EtCO₂ value might have confused us about the possible cause of this change. Typical change in the waveform prompted us to search for a leak. During movement of the workstation, the sample line dangling on the floor was crushed inadvertently as the capnogram was normal before

this. Immediately the waveform changed and the level of inhalational agents and EtCO₂ went down. These changes were reproducible by changing the new sample line with the damaged one.

Patient repositioning during general anesthesia is known to potentially cause injury. Repositioning of workstation may also jeopardize patient safety, as illustrated by this case. This case also emphasizes the significance of monitoring and alarm system during equipment movement under anesthesia. Alarms are often caused by manipulations performed by the medical staff working with the anesthesia workstation and may be annotated as “not relevant,” changing the significance of the alarm.^[4] Also, awareness of this possible cause may help the clinician in narrowing down the reason of sudden decrease in EtCO₂ value due to such a mishap.

Extreme precaution during movement of the work station is needed to avoid such occurrences as a sudden decrease in EtCO₂ value can lead to confusion especially during procedures like neurosurgery or where carbon dioxide is used as insufflation gas.

Prakash K. Dubey

Department of Anesthesiology & Critical Care Medicine,
Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India

Address for correspondence: Prof. Prakash K Dubey,
E34, Indira Gandhi Institute of Medical Sciences Campus, Sheikhpura,
Patna - 800 014, Bihar, India. E-mail: pkdubey@hotmail.com

References

1. Nichols KP, Benumof JL. Biphasic carbon dioxide excretion waveform from a patient with severe kyphoscoliosis. *Anesthesiology* 1989;71:986-7.
2. Dorsch JA, Dorsch SE. Gas monitoring. *Understanding Anesthesia Equipment*. 5th ed. Philadelphia: Wolters Kluwer / Lippincott Williams & Wilkins; 2008. p. 685-727.
3. Tripathi M, Pandey M. Atypical “tails-up” capnograph due to breach in the sampling tube of side-stream capnometer. *J Clin Monit Comput* 2000;16:17-20.
4. Schmid F, Goepfert MS, Kuhnt D, Eichhorn V, Diedrichs S, Reichenspurner H, *et al*. The wolf is crying in the operating room: Patient monitor and anesthesia work station alarming patterns during cardiac surgery. *Anesth Analg* 2011;112:78-83.

Access this article online	
Quick Response Code:	Website: www.joacp.org
	DOI: 10.4103/0970-9185.125735