"Curare crest" can detect breakthrough breathing

Sir,

Breakthrough breathing during intermittent positive pressure ventilation (IPPV) makes a cleft in the plateau phase of capnogram that is known as curare cleft.[1] We report a surrogate marker of breakthrough breathing in oxygen (O_2) waveform. When there appears curare cleft in capnogram, a reciprocal change appears in O_2 waveform. As it appears like a crest and coincides with curare cleft, we name it as curare crest to retain its utility as a monitoring tool for breakthrough breathing during IPPV [Figure 1].

Carbon dioxide (CO_2) waveform and O_2 waveform are mirror images of each other. The reason is reciprocal timing of changes in the concentration of CO_2 and O_2 at Y-piece of breathing circuit. During breakthrough respiration CO_2 concentration decreases at the sampling site due to fresh

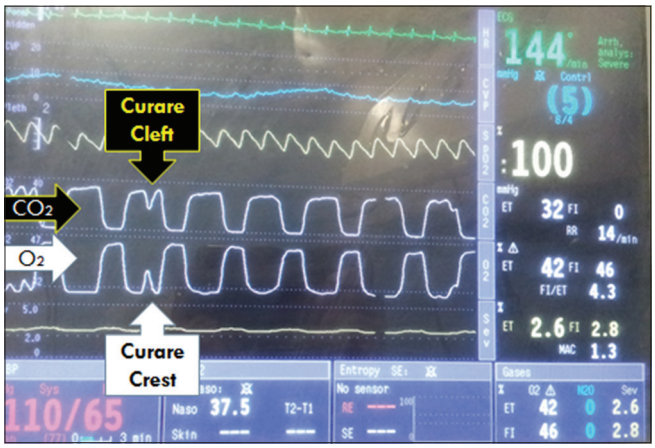

Figure 1: Curare cleft in capnogram and curare crest in oxygen waveform

gas entry, and a curare cleft is seen in the capnogram. At the same time, Oxygen concentration increases and a mirror image of curare cleft appears in the O_2 waveform.

In oxygraphy, peak-to-baseline scale difference can be compressed to as low as 6 mmHg and looks similar to capnogram but mirror image. Hence, a crest cannot be missed in O_2 waveform. It has been found that oxygraphy can detect the breakthrough respiration even earlier than capnography, making it superior to capnography for this purpose.[2] Hence, it can be extrapolated that oxygraphy can detect breakthrough breathing at the earliest although a randomized control trial is required to authenticate the same.

The standards for basic anesthesia monitoring of the American Society of Anesthesiologists state that the concentration of O_2 in the patient breathing system shall be measured by an O_2 analyzer. And, use of more than one device to monitor O_2 is desirable. So, along with pulse oxymeter, O_2 concentration monitoring is desired. Nowadays, anesthesia workstations are equipped for O_2 concentration measurement and display of O_2 waveform. Use of O_2 monitoring helps to detect hypoxia, breathing circuit disconnections, and hypoventilation.[3]

Oxygen concentration is measured by paramagnetic O_2 analyzers whereas CO_2 concentration measurement uses infrared multi-gas analyzer, which does not measure O_2. Hence, in case of nonfunctioning CO_2 analyzer, oxygraphy can well serve to detect breakthrough breathing on itself. We recommend routine use of O_2 waveform monitoring in our clinical practice to gather information beyond just O_2 concentration measurement.

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Conflicts of interest
There are no conflicts of interest.

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