

One laryngospasm, two realities: The impact of data granularity on post hoc analysis of perioperative events

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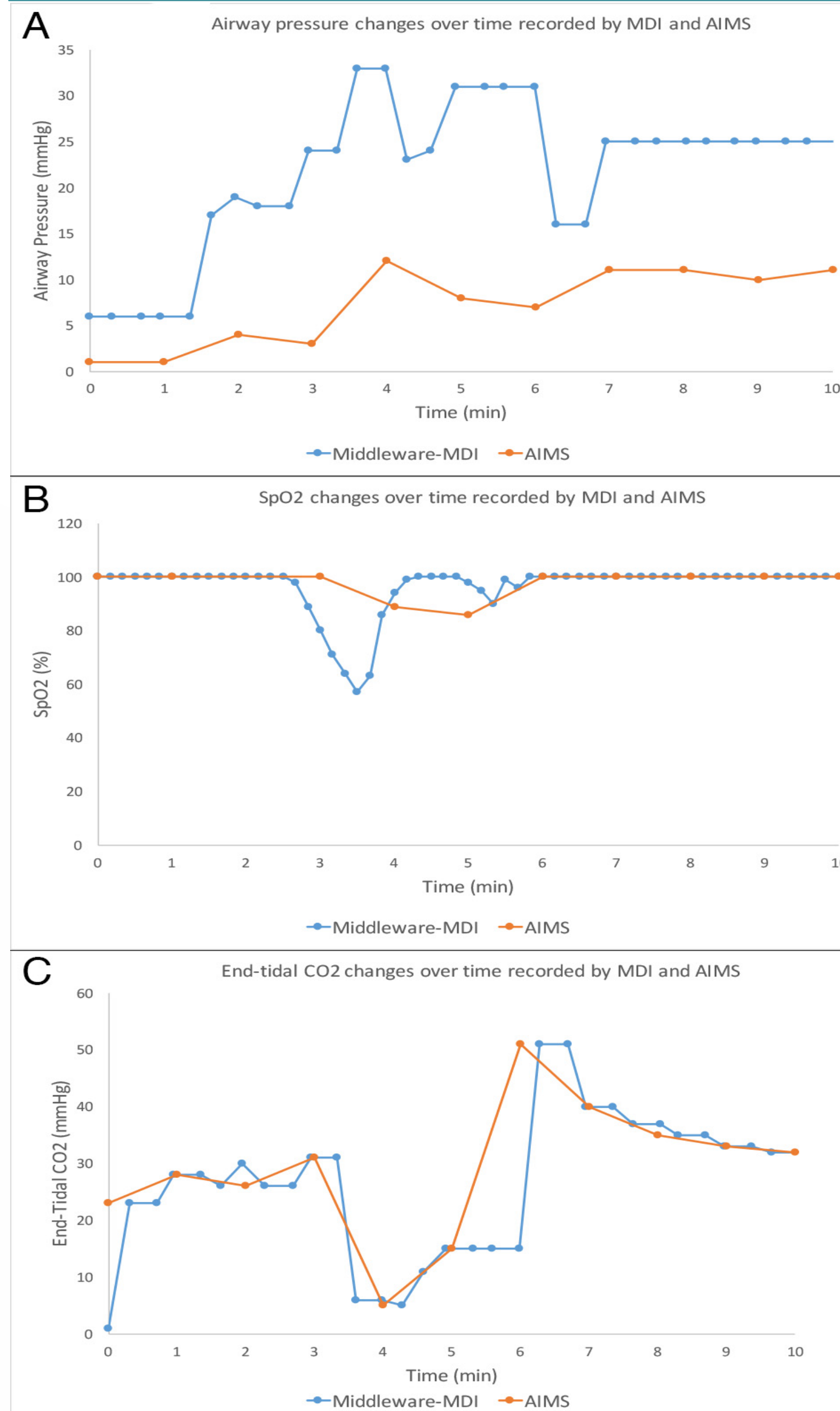
Background

- Anesthesia information management systems (AIMS) record perioperative data in an automated fashion.
- Secondary uses of AIMS data include research and quality improvement efforts
- Concerns have been raised regarding data validity and artifacts in AIMS.
- Physiologic monitors can be configured to transmit data directly to an AIMS or a middleware medical device interface (MDI).
- For example, our institution's AIMS has a sampling rate of 1 minute, while our MDI stores most physiologic data at higher rates depending on the monitor.
- Monitors with a high sampling rate such as the pulse oximeter are stored at much shorter time intervals (every 10 sec) in the MDI, as opposed to a 1-minute interval in the AIMS.
- This case highlights how different data sampling rates can significantly alter the analysis of perioperative events. and MDI data sampling rates can vary.

Case Description

- A 21-month old child presented for surgery.
- During induction of anesthesia, the patient experienced acute airway obstruction consistent with laryngospasm.
- The anesthesiologist immediately intervened with a jaw thrust, approximately 30cm H2O of positive pressure ventilation, and succinylcholine.
- The obstruction resolved quickly and the remainder of the anesthetic was uneventful.

Figure 1



Case Description (continued)

- The AIMS and MDI data recorded during the obstruction event was later reviewed.
- The AIMS data with 1-minute intervals did not display sustained high inspiratory pressures
- However, the higher granularity MDI data showed the use of high pressures (Figure 1a).
- The MDI data showed the SpO2 dropped transiently below 60%; the AIMS data displayed only a brief SpO2 nadir that stayed above 85% (Figure 1b).
- In contrast, the end-tidal CO2 levels are more similar in the MDI and AIMS data, likely due to the slower MDI sampling time for that parameter (Figure 1c).

Discussion

- This case highlights the impact of data sampling rates and granularity on the post hoc interpretation of perioperative events based solely on physiological data
- In pediatric anesthesia, events such as laryngospasm can be extremely brief and perioperative data that are sampled every 60 seconds may not accurately represent the actual physiologic changes.
- Unfortunately, not all hospitals have the financial and technological resources to implement high fidelity MDI systems and store the large amounts of higher granularity data.
- However, if higher granularity MDI data is available, then such data should be examined alongside AIMS data and clinicians' annotations to obtain a more accurate view of perioperative events.
- While AIMS have come a long way as perioperative data recording systems, there still exist some potential pitfalls that should be kept in mind when relying on AIMS data for research and quality improvement efforts.