Learning From Others:

A Case Report From the Anesthesia Incident Reporting System

Anesthesia Quality Institute
ANESTHESIA INCIDENT REPORTING SYSTEM (AIRS)

Review of unusual patient care experiences is a cornerstone of medical education. Each month, the AQI-AIRS Steering Committee abstracts a patient history submitted to the Anesthesia Incident Reporting System (AIRS) and authors a discussion of the safety and human factors challenges involved. Real-life case histories often include multiple clinical decisions, only some of which can be discussed in the space available. Absence of commentary should not be construed as agreement with the clinical decisions described. Feedback regarding this article can be sent by email to **airs@asahq.org**. Report incidents or download the AIRS mobile app at **www.aqiairs.org**.

Case 2017-11: Lessons Learned

A 45-year-old morbidly obese female is described as "Pickwickian." She is a current smoker, has asthma and is likely diabetic. Compliance with medical follow-up is described as poor. She presented for a gynecologic procedure.

Anesthesia was induced. Despite intubation being described as easy, the patient immediately desaturated and no carbon dioxide was seen on capnography. The endotracheal tube was pulled out and replaced three times with the same effect. She was treated with bronchodilators with each attempt. Finally, on the fifth attempt, end tidal carbon dioxide was seen. Each attempt was accompanied by severe hypoxemia.

Level of harm is described as "additional treatment." The case was flagged for QA review because of an unplanned admission to the ICU.

We appreciate all AIRS reports, and especially this one. The reporting physician was no doubt busy, probably on call as the case occurred at night. While dramatic at the time, no permanent harm appears to have come to the patient. Desaturation recovered between attempts. The patient was at very high risk of ventilation and intubation difficulties. She would have desaturated temporarily even if only one intubation attempt had been necessary.

More detail would have helped us all learn more from this case. According to the ASA difficult airway practice guidelines, "The Task Force urges clinicians and investigators to use explicit descriptions of the difficult airway."

Intubation was easy, but was it expected to be easy based on the preoperative exam? Was cricoid pressure applied for the first or any other attempt? While necessary, cricoid could have disrupted laryngoscopy and intubation. Who intubated each time? Was a resident involved? How much help was available? What intubating devices were used? Was the tube visualized passing through the cords on any attempt?

Since "severe hypoxemia" accompanied each attempt, some recovery from desaturation occurred each time. Was the patient easy to mask ventilate? Delayed saturation recovery could have resulted from an endotracheal tube that was in the correct position. If mask ventilation was difficult, was a supraglottic airway inserted between intubation attempts? Were the "bronchodilators with each attempt" delivered via the tube or mask in between each attempt? Did the physicians present think the tube was probably in position, but pull it out because good management says that is what you do if you are not sure?

The difficult airway algorithm (DAA), which is what most of us think of first when we refer to the guidelines, starts with three questions to be evaluated for "all patients of all ages." So, the DAA is in play for every patient we see, always, forever. For most patients, the ones we can reasonably expect to be "easy," we push the algorithm to the back burner. We may even do this without being aware of an active reasoning process, via a cognitive shortcut that Kahneman called a simplifying heuristic. The patient resembles others who do not worry us. Kahneman points out that heuristics are often right but not always. Dismissing the DAA 99 percent of the time makes it harder for us to remember to incorporate it in the 1 percent of cases when it is truly needed.

Had we applied the DAA in the preoperative phase of this case, the patient would have flunked several bullets in question one. Mask ventilation is often difficult in a morbidly obese patient, as are laryngoscopy, intubation and cutting the neck. Cooperation, the fifth bullet, is a ship that sailed by the time she was in trouble. The only bullet in our favor is a supraglottic airway (SGA), which often saves the day in obese patients. An SGA allows easier ventilation, improved delivery of bronchodilators and serves as a channel for fiberoptic intubation. The preoperative airway exam is not entirely useless in the obese patient, but it is not particularly sensitive. A neck circumference measurement may have helped. The difficult airway guidelines support multi-factorial preoperative evaluation in all patients.

Performing all five attempts using direct laryngoscopy (DL) is counter to some recommendations in the literature and to what we often say is accepted practice. The reporting physician certainly knows that and it is a tribute to professionalism that he reported it accurately. The number of DL attempts often exceeds recommendations, even in the literature, and is not

often reported. The reporting physician more than compensated for the limited detail by giving us two "lessons learned":

"Preop breathing rx

Verify ETT with FOB – quick desat making this not tenable"

Perhaps the anesthesia team planned to administer bronchodilators pre-induction but became distracted by other factors. This type of omission has nothing to do with knowledge deficit and everything to do with prospective memory. Prospective memory is behind the success or failure to complete a future action. The time of that action will occur only after other actions and events. Nothing in the environment will remind you to do it at the right time. You are therefore being set up to forget to perform the action.

Prospective memory is something humans are notoriously poor at. How many of us remember the days, decades past, when we would forget to deliver preoperative antibiotics at the proper time? Now preoperative antibiotic administration is etched into our practice and reinforced with automated reminders and pre-briefing practices such as TEAMSTEPPS. There is no automated reminder for the pre-induction administration of bronchodilators. Good practice may dictate the use of a unique checklist, or review of a comprehensive problem list unique to the patient, prior to induction. This is desirable, at least for any patient not of the ASA Physical Status 1 variety.

The first "lesson learned" showed good reflective practice and highlighted a useful principle in Human Factors. The next "lesson" suggests using fiberoptic bronchoscopy for verification. We can sense the frustration of our colleague who reported this case. Reading between the lines, we hear the anesthesia team saying that the lack of a capnogram wave does not make sense. They probably detached the sensor line and blew into it themselves to verify proper function. They may have quickly passed a suction catheter to make sure a mucous plug is not to blame. Our colleagues doubt that they intubated the esophagus five times in a row. If they only had a fiberoptic, they could have used it to rule out obstruction with mucous or blood. But they probably would have had to call for the fiberoptic in the middle of the night, and the desaturation did not allow the luxury of time. We treat capnography such that absent cardiac arrest, it does not miss tracheal placement. Although we may know better, our residents and students often get the wrong message.

For tracheal tube placement, capnography is not 100 percent sensitive and 100 percent specific. If it were, capnography would be an extraordinary exception to all tests in the rest of medical practice. In some studies, the sensitivity and specificity may be as low as 93 percent and 97 percent, respectively. This patient was not in cardiac arrest, so we do not have that excuse for not seeing carbon dioxide despite a proper intubation. However, she probably has severe obstructive and restrictive lung disease. Her dead-space situation might have been such that she may have desaturated before any expired gas could make it to the relatively slow side-stream sampling capnography.

Had the fiberoptic bronchoscope (FOB) been present, it would have been useful. In this case, they may have had the unexpected absence of a capnography wave after seeing the cuff go past the cords. Good practice and all our training says you pull the tube when in doubt. However, it would have taken seconds to insert a fiberoptic scope and either see a tracheobronchial tree or not. Anecdotally, the success of video laryngoscopy has reduced the frequency of FOB. Placement of an endotracheal tube with fiberoptic guidance may become a lost art, especially among those who infrequently handle thoracic or complex ENT cases. Periodic elective intubations with FOB should be performed to maintain this necessary skill. Before the advent of the single-patient-use FOB, having a FOB at every anesthetizing location would have been prohibitively expensive. Now that disposable scopes with a suction/insufflation channel exist, sites should consider if the expense is still prohibitive. Having a FOB ready would have helped in this situation. A FOB can also save the day for otherwise impossible intubations, especially when teamed with a supraglottic airway or a video laryngoscope.

As our aviation colleagues like to say, it is a rare safety gain that can be achieved without paying a price in time, money, readiness or efficiency. We thank our colleague(s) for an excellent case that allowed us to review practice of narrative safety reporting, difficult airway guidelines and algorithm, prospective memory, sensitivity of capnography, and the evolving standard of tools that we should expect to be ready for every patient in every anesthetizing location. Not a bad return for safety.

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