Water contamination of the central air supply: Out of sight, out of mind!

Water in flowmeters may cause bobbin malfunction, deliver inaccurate flows, and lead to hypoxia. Remote location of medical gas pipeline system (MGPS) can deter anesthesiologist from being routinely involved in its day-to-day maintenance and thus, being caught unaware in the case of malfunction. We faced a harrowing incident wherein sudden influx of water column in air flow meter of anesthesia workstation (Datex Ohmeda Aestiva 5) was noticed due to faulty compressed air delivery system.

A 35-week-old preterm neonate was posted for emergency laparotomy under general anesthesia for duodenal atresia. The anesthesia workstation in our emergency OT passed the pre-use check. After rapid sequence induction, the baby was intubated with 3.5 mm I.D. endotracheal tube and control knob of air flow meter was opened for the maintenance of anesthesia. To our great surprise, there was a sudden influx of water in the air flow meter from the needle valve and its level was rising fast. The bobbin got stuck at the bottom and stopped rotating. The circuit was disconnected and ventilation commenced with bag mask device. The pipeline was disconnected from the anesthesia workstation, and sevolurane in 100% oxygen (from cylinder in the standby anesthesia machine) was used for anesthesia maintenance.

Water is a usual contaminant in a compressed air system, and its amount may vary from 2.5 g/m³ to over 40 g/m³ depending on climatic condition. Air gets heated during the compression process and condensed moisture during cooling is removed in the after cooler. However, about 20 g/m³ may still remain in the compressed air unless removed by a dryer. The probable causes of water contaminating the MGPS include manual water drain operated at longer time interval or drain clogging, absence of desiccant air dryer, exposure of central air pipeline to atmosphere and absence of alarms for water level.

Fortunately, we noticed the water column in air flow meter immediately before it could contaminate the fresh gas flow. Detailed investigation revealed that there were reports of ventilator malfunction in the Pediatric Intensive Care Unit earlier due to faulty automatic drain of the compressed air system which was replaced. Subsequently, following a recent ventilator malfunction, fault in desiccant dryer was detected and repaired. Probably, this time purging of some of the “risers and branch lines” was not done. Hence, the water accumulated in the branch line (of emergency OT) as a result of dryer malfunction and exposure of air pipeline to the humid atmosphere (due to rainy season) during the repair of air dryer were probably the main culprits.

All components of MGPS were checked by the service engineer; the pipeline was flushed thoroughly and to guard against such events in future checkups for medical air quality of pipeline were made more frequent. Technical engineer of the anesthesia workstation also confirmed the presence of water in the air flow meter tubing and dried all the channels properly.

In conclusion, maintenance of MGPS should be directly supervised by anesthetists and medical air quality should be checked after maintenance work before its reconnection to the anesthesia machines after though purging.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.
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