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SUDDEN FAILURE OF VENTILATION BY ANAESTHESIA WORK STATION DURING SURGERY: A CASE REPORT

Anaesthesiology

Dr. Ashish Yadav* Senior Resident Department of Anaesthesia PGIMS, Rohtak. *Corresponding Author
Dr Aman Kaur Saini Junior Resident Department of Anaesthesia PGIMS, Rohtak.
Dr Susheela Taxak Senior Professor Department of Anaesthesia PGIMS, Rohtak.
Dr Kanika Assistant Professor Department of Anaesthesia PGIMS, Rohtak.
Dr. Nitish Junior Resident Department of Anaesthesia PGIMS, Rohtak.
Dr. Pooja Junior Resident Department of Anaesthesia PGIMS, Rohtak.
Dr. Rahul Goyat Junior Resident Department of Anaesthesia PGIMS, Rohtak.

ABSTRACT

We encountered a case with sudden and complete interruption of fresh gas flow in anesthesia workstation. On inquiry, it was found out that there was water in the medical gas pipeline system and a simultaneous malfunction of the dryer mechanism that lead to this condition. This case report emphasizes the importance of understanding the capabilities and limitations of the drager machine as well as of any anesthesia workstations being used to administer anaesthesia. In addition, this demonstrates the importance to being able to provide immediate backup ventilation in case of ventilator failure.[1]

KEYWORDS

INTRODUCTION

In 1913, Dr. James Gwathmey, in 1913, developed a simple flow meter type apparatus whereby compressed gases could be administered to the patients.[2] In 1917, DR. H.E.G.Boyle made modifications to the device, creating the first anesthesia gas delivery equipment or anesthesia machine.[3] Since then, modifications in anesthesia machine design system have been made for increased patient safety. Despite the many improvements in design of anesthesia machines made over the past century, anesthesia machine failure, while rare, is a potential cause of mishap.[4] In recent years, there has been a growing concern about relationship between medical gas pipelines and related medical equipment malfunction. Medical gas constitute, by volume, the most common prescription drugs administered in the hospital. However, not enough attention is paid to the packaging and delivery network. NFPA 99 lists odor, water, carbon monoxide, carbon dioxide, gaseous and halogenated hydrocarbons, oil and particulates as major contaminants to monitor and sets concentration purity requirements for medical gas. When air system has been contaminated with water, these areas usually act as reservoirs and support and harbor potentially infectious bacteria in addition to causing anaesthesia machine malfunction. To combat water contamination, desiccant dryers are commonly used to remove water from compressed air/gas.

CASE REPORT

A 50 years old female operated case of carcinoma ovary with metastases and ascites, undergoing exploratory laparotomy was administered general anesthesia using Dräger workstation. Patient was preoxygenated and induction done and after endotracheal intubation, the patient was ventilated manually and then switched to mechanical ventilation. However soon after, the ventilation stopped and there was an alarm “No fresh gas flow, check sensors" in this workstation which had cleared self-test before starting the case. There was no flow at common gas outlet on opening the oxygen cylinder as well. Meanwhile the patient was ventilated using AMBU bag initially and then Bain's circuit with the fresh gas inlet connected to auxiliary oxygen flow meter which was working well.

The anesthesia was further maintained using intermittent boluses of Propofol, Fentanyl, Midazolam and Atracurium boluses for neuromuscular blockade. The patient's recovery was uneventful and she was shifted to ICU for observation for 24 hours. When this critical incident happened the service engineer was called. On troubleshooting it was found that the dryers were out of order and thus water had accumulated in medical air pipeline that caused the fault in the machine.

DISCUSSION

Similar cases have been reported in the literature with minimal complications. M Manjuladevi et al reported a similar case in Nov 2014 in which water was noticed in flowmeter, the patient was immediately disconnected from the machine and was ventilated on AMBU until standby Boyle's machine was ready for use. The study concluded that involvement of anaesthesia personnel in planning and designing can prevent such incidents.[5] Tunay Kandamir et al in their study in Feb 2015 also reported sudden appearance of water in flowmeter in air/oxygen and sevoflurane anaesthesia. In this study, breakdown of dryer in medical air compressor system was determined as the source of the problem.[6] However, in both of the above studies, flowmeters were manual and early detection of water was possible as anaesthesia personnel noticed it immediately. In our case, the flow meters being digital, we came to know about the problem when the workstation got automatically shut down and on further troubleshooting, it was found that water in pipeline has caused this error. The alarms should be incorporated to warn against the presence of water in pipeline at the time of self test only in dragger primus. The failure of anaesthetic equipment as a result of maintaince is extremely rare. The ingress of water into flowmeters of the machine from the piped medical air supply is reported and is possibly unique.[6]The delivery of hypoxic or even anoxic gas mixture during anaesthesia is reported due to pipeline failure.[7] The contamination of the pipeline system with bacillary flora has also been reported.[8] The need of the hour is to identify the rarest possible malfunctioning and to rectify them before hypoxic arrest develops in any patient.

CONCLUSION

With increasing use of medical air supply in health care facilities, it has become prudent to have thorough knowledge regarding correct designing, installation and maintenance of medical air system. Close communication is necessary between anesthesia providers and maintenance personnel of medical air supply system. Periodic testing, validation and certification of medical air are recommended. Eternal vigilance and a knack to think outside the box remains a mandatory requirement for a safe conduct of anaesthesia.

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