CASE REPORT

Safety concerns start well before anesthesia machine

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ABSTRACT

We report a case of sudden onset of an unfamiliar, continuous sound in the operating room during an elective surgical procedure, which was found to be due to leakage of nitrous oxide from a hole in the ballooned up part of the flexible hose pipeline of the anesthesia machine. A slowly leaking hose pipe may be hazardous to the safety of patients as well as staff; a sudden burst of a hose pipe can result in confusion among the busy staff. A need to have guidelines regarding routine checking of hose pipes and printing date of expiry indicating life span of these pipes is stressed.

Key Words: Hose pipe; Leakage; Operating room hazards


INTRODUCTION

Patient’ safety is a major responsibility of the anesthesiologists. We report a case of sudden onset of an unfamiliar, continuous sound in the operating room during an elective surgical procedure, discovered to be due to leakage of nitrous oxide from flexible hose pipeline of the anesthesia machine. Sudden leakage of gases may result in a panic in the operating room or may be disastrous in case of fire. It may also result in delivery of hypoxic mixture to the patient. In our case, possible cause of leakage might be weakening of the hose pipeline beyond its average life. The search of literature did not yield any reliable source quoting their useful life span or any guidelines about their regular replacement after certain period. Routine checking of these pipelines is not a part of daily anesthesia machine check protocols. This report highlights the importance of routine checking of whole length of flexible hose pipeline of the anesthesia machine to avoid any catastrophic incident and emphasizes the need to improve our vigilance protocols and safety measures in the operating room. It also suggests the manufacturers to print an expiry date on the hose pipeline.

CASE REPORT

A 45 years old adult male was undergoing elective functional endoscopic sinus surgery (FESS) under general anesthesia. Neuromuscular block was maintained with cisatracurium and intravenous fentanyl was administered for analgesia. After about 45 minutes of start of anesthesia we heard an unusual continuous sound in the operating room. The sound was whistling in nature and of low grade intensity. We checked our anesthesia machine alarms and found that none of these was active. We informed the surgeon and the circulating nurse to find out the source of the sound and they also declared that it was not from any of their instrument. On thorough search we found that its source was situated behind the anesthesia machine. We checked the central supply flexible hose pipeline connecting anesthesia machine to wall outlet of the central supply and found that there was an aneurysmal dilatation of a segment of hose pipeline of nitrous oxide. This dilatation was of the size about 40 x 25 mm (figure 1). On close examination of the affected part, we found a small hole on the dilated part (shown as black arrow in figure 1) responsible for leakage of nitrous oxide. The anesthesia machine could
not be functional during change of hose pipe. Hence, we decided to change anesthesia machine and disconnected our patient from it supporting ventilation with Ambu™ bag. To avoid awareness, we administered an additional 100 mg of propofol and 50 micrograms of inj fentanyl. A reserve machine was shifted to the operating room and the patient was connected to it with the same ventilatory parameters. The surgeon was asked to resume the surgery. The remaining course of anesthesia and surgery were uneventful. On establishment of adequate breathing the trachea of the patient was extubated and patient was shifted to post anesthesia care unit (PACU). After 40 minutes of stay in PACU, the patient was shifted to the ward with full recovery. Later on all gas pipes were checked by the technical staff and the suspected ones replaced.

**DISCUSSION**

Flexible hose pipelines connect anesthesia machine to central supply outlet, and are of vital importance. This case report highlights the significance of routine checking of flexible hose pipelines of the anesthesia delivery system that has not been probably given proper importance in daily checkup protocols. We are unable to find any recommendation or guidelines regarding this routine checking before start of anesthesia or after any specified period. According to the recommendations of most of the leading anesthesia societies,1,3 controlling authorities4,5 and the manufacturers of anesthesia machine,6 it is expected from anesthetist to check that pipeline hoses are connected and pipeline pressure gauges read about 50 PSI. The recommendations to check the whole length of the flexible hose pipeline is lacking. Leak from such holes in the flexible hose pipeline may result in waste of gases, operation room pollution, fire hazard,7-9 health hazards10,11 and impaired performance of personnel exposed.12-15 Abrupt bursting of the pipe or leakage may result in panic in the operating room and jeopardize patient’s safety.16 On the patient’s end, if hose pipeline is for oxygen, it may well result in delivery of hypoxic mixture,17,18 and if it happens with nitrous oxide, it can result in inadequate depth of anesthesia or awareness. The situation may be even worse if it happens during a surgical procedure, especially in emergency cases or in the presence of relatively less experienced anesthesiologist.19,20 In our opinion, possible cause of the aneurismal dilatation is due to weakening of the wall of flexible pipelines. It might be due to a manufacturing defect or prolonged use beyond its useful life span. Other possible causes may be exposure to very high pressure or exposure to excessive temperature.

On search of literature we did not find any source about the average life of the hosepipe or how frequently these flexible hose pipeline should be replaced. It is astonishing to find that these flexible pipelines, used as a part of an anesthesia machine for delivering vital gases, don’t have either expiry date or any recommendation regarding its replacement after a specified period. The life of these pipelines may be different for different manufacturers and as a safety precaution; we suggest that every manufacturer of the flexible hose pipeline should establish a “Date of expiry” of their product. Additionally, such information should be boldly printed on the flexible hose pipeline at the distance not more than one meter so that no length of the flexible hose pipeline should miss this important information. Furthermore, in the absence of any clear instruction by the regulatory authorities, it is the responsibility of the manufacturers of the pipelines to consider this safety factor. We suggest FDA and other regulatory authorities to look into this matter and improve their recommendations of checking anesthesia machine. As a safety measure, we also suggest our anesthesia colleagues to make their own protocol of checkup and/or replacement of such items after a specified period.

**CONCLUSION**

Leakage from gas hose pipes is a serious matter as it can be hazardous to the safety of the patient as well as the staff, and a sudden burst of weak pipe may create panic among the staff. Hence guidelines on routine checking of hose pipes and ascertain and labeling with expiry dates is stressed to enable periodic replacement of the pipes.

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Fig 1: A hole in ballooned hose pipe (black arrow)
REFERENCES


