Breathing Circuit Leak Caused by Breathing Tube Holder: A Case Report

Poonam Kumari1, Amarjeet Kumar2, Chandni Sinha3, Ajeet Kumar4

ABSTRACT

Breathing circuit leak, obstruction, or misconnects contribute to around 20% of the critical incidents occurring during anesthesia which if not immediately identified may result in serious harm. Circuit damage can occur due to extra-manipulation of the circuit after fixing it inside the tube holder or mishandling of the tube holder with the circuit in situ. Damage to the breathing circuit can be prevented by making the edge of the tube holder groove blunt or by adding some cushion material over the edge of the groove. The anesthesiologist must be vigilant about circuit leaks while administering anesthesia.

Keywords: Anesthesia, Breathing circuit, Circuit leak, Tube holder.

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INTRODUCTION

Breathing tubes connect the anesthesia machine to the endotracheal tube and are composed of inspiratory and expiratory corrugated limbs. Breathing circuit leak, obstruction, or misconnects contribute to around 20% of the critical incidents occurring during anesthesia which if not immediately identified may result in serious harm.1,2 As anesthesia machines become more electronic, more checking is performed automatically and it is for the anesthesia personnel to remain aware of which anesthesia components are tested by these automated self-tests and which ones are not.1 The long length of the corrugated breathing tube allows the anesthesia machine to be located farther from the patients, because of its length and flexibility they tend to hang down below the operating table and put extra strain on the endotracheal tube. This extra strain in association with patient head manipulation may result in accidental tracheal extubation. Breathing tube holders may help to avoid these accidents.3 This case report has been prepared in accordance with the CARE guideline. Written and informed consent for publication was obtained from the patient.

CASE DESCRIPTION

Here, we report a situation in which the breathing circuit was damaged by a breathing tube holder. Following endotracheal intubation, we use breathing system tube support (Intersurgical Ltd., Wokingham, Berkshire, United Kingdom) for intersurgical adult size (22 mm) tubing (Medi Safe International, Delhi, India) during thyroid surgery. We put the patients on ventilatory support, respiratory rate 12/minute, tidal volume 500 mL, and anesthesia was maintained with isoflurane, fentanyl, and oxygen (50%). All the vitals were within the normal limits. After 1 hour of surgery, it was found that tidal volume decreased and oxygen saturation also got decreased. We have given 100% oxygen and also increased the tidal volume but tidal volume has not reached the adequate amount and oxygen saturation has gradually fallen down. After a thorough inspection, we found that the disposable circuit got damaged at the position where the circuit was fixed with breathing system tube support as shown in Figure 1. The circuit was damaged due to the sharp and prominent edge of the groove present in the breathing system tube support as shown in Figure 1. After that, we have changed the damaged circuit following which adequate ventilation and oxygen saturation were achieved.

DISCUSSION

Breathing tube holder is easy to use, cheap, secure breathing circuit, exerted low-pressure over-circuit, and allows easy neck movement of patients during surgery and less chance of facial skin injury. The patient could not be ventilated properly once the circuit was damaged by the sharp edge of the groove of the tube holder, and there are high chances of hypoxia. Always check the circuit after its insertion into the groove of the tube holder. In our case, the circuit was damaged by the sharp and prominent edge of the tube holder groove during its insertion inside the groove. The quality control unit of the manufacturing company should be notified of such an incident as was done in our case.

Circuit damage can occur due to extramanipulation of the circuit after fixing it inside the tube holder or mishandling of the tube holder with the circuit in situ. Damage to the breathing circuit can be prevented by making the edge of the tube holder groove blunt or by adding some cushion material over the edge of the groove. The anesthesiologist must be vigilant about circuit leaks while administrating anesthesia. We also recommend limiting the manipulation of the breathing circuit and tube holder after the fixation of the circuit inside the tube holder groove.

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Breathing Circuit Leak

Fig. 1: Damaged breathing circuit by breathing tube holder

REFERENCES


Orcid

Poonam Kumari • https://orcid.org/0000-0003-0118-2187
Amarjeet Kumar • https://orcid.org/0000-0002-4272-5750
Chandni Sinha • https://orcid.org/0000-0002-4107-2671
Ajeet Kumar • https://orcid.org/0000-0002-1464-6684