Newer design, newer problems: Unusual complication with Limb-O anaesthesia circuit

Sir,

Several types of breathing circuits are available in anaesthesia practice.[1] Complications have been reported with almost all the breathing circuits.[2,3] Pre-use check of anaesthesia machine and circuits is recommended to avoid these complications.[4] Latest addition to the armamentarium of breathing circuit is Limb-O circuit [Figure 1]. This circuit is a '"double lumen"' single-tube breathing circuit. A flexible septum which runs along the entire length of breathing circuit divides the tube into two compartments. The manufacturers claim that this circuit has light weight, lower compliance and is thermally efficient. Here, we would like to report an unusual complication associated with this type of circuit.

A 28-year-old male weighing 75 kg, a case of fracture upper humerus was posted for open reduction and internal fixation with plating under general anaesthesia. Pre-operative assessment and investigations were unremarkable. In the operation theatre, routine monitoring was established. Following pre-oxygenation, anaesthesia was induced with thiopentone, and mask ventilation was attempted. It was noted that the oxygen saturation gradually reduced up to 88% inspite of adequate ventilation with 100% oxygen. We had also observed the inspired CO_2 to be 13 mmHg. While troubleshooting for causes, it was noted that the breathing circuit was connected wrongly. The patient end of Limb-O breathing circuit was attached to reservoir bag end and actual bag end of breathing system was connected to face mask [Figure 2a and b]. Immediately, this was corrected and patient's oxygen saturation improved. The wrong connection was identified only by the blue lining of the circuit [Figure 2c]. The rest of the anaesthesia and surgical procedure was uneventful.

Figure 1: The Limb-O breathing circuit connected to the anaesthesia workstation

We analysed the root cause of the problem and identified that the machine check was not completed properly [Figure 3]. During the pre-use machine check, the ventilator is usually checked by connecting a second reservoir bag attached to the patient end. Ventilation is initiated using the pre-determined ventilator settings for the next patient with minimum fresh gas. This is to find out the leak from ventilator circuits. In our case, as the second breathing bag was not available, the resident had removed the first reservoir bag from bag end and attached to the patient end. The ventilation was started with reservoir bag at the patient end. As the first resident was busy in preparation of the other operation theatre, the second resident stopped the ventilator and connected the face mask to the 'empty' bag end.

The similar problem had happened in another case also, where it was identified during pre-oxygenation,

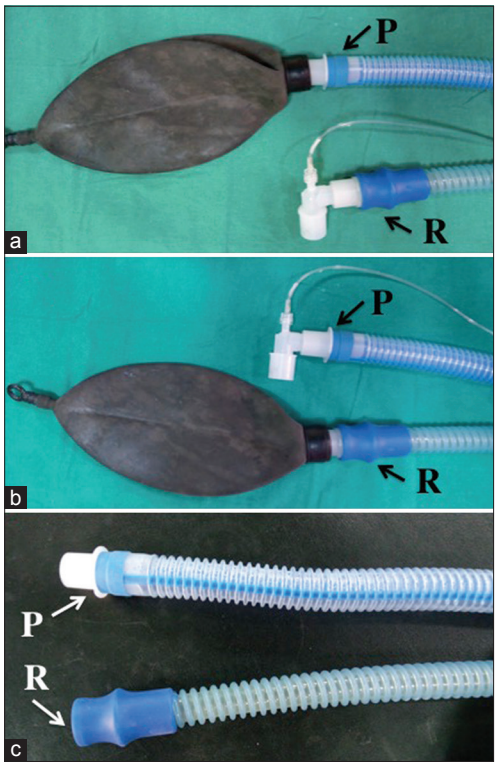

Figure 2: This shows (a) the wrong connection, in which the reservoir bag is connected to patient end (P) of breathing circuit. (b) shows the correct connection, in which the reservoir bag is connected to the bag end (R) of the breathing circuit. (c) shows the blue lining of the Limb-O breathing circuit

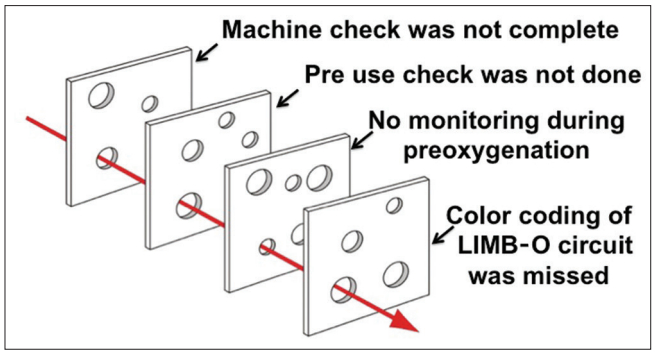

Figure 3: The root cause analysis

and the problem was averted. This was discussed in our departmental review meeting, and possible ways to avoid this complication have been implemented. The problem could have been avoided by several things. The person who initiates the machine check should finish it and put the anaesthesia machine in the final pre-use position. Instead of the second reservoir bag, the 'test lung' can be used to simulate the lung while checking the ventilator. Anaesthesiologist should be always vigilant to prevent any complications.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Access this article online	
Quick response code	Website: www.ijaweb.org
	DOI: 10.4103/ija.IJA_287_17

How to cite this article: Thangaswamy CR, Roushan P, Pooja L, Krishnakumar G, Elakkumanan LB. Newer design, newer problems: Unusual complication with Limb-O anaesthesia circuit. Indian J Anaesth 2017;61:848-9.