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Breathing circuit leak – An unexpected finding

- Letter to the Editor -

Sir,

Disposable breathing circuits are being used more frequently because of decreased chance of pulmonary cross-contamination. These circuits may be a possible source of airway obstruction or leak. [1] Leaks in the breathing circuit occur in more than 50% of tested circuits, which are sorted out during routine machine checks. [2] We report a case of breathing circuit leak due to an unintentional human error that occurred intra-operatively. Written and informed consent was obtained from the patient for publication of this report.

A 17 years old female, weighing 40 kg, was scheduled for left frontal craniotomy and evacuation of left frontal bleed. She had a Glasgow Coma Score (GCS) of 15 with no motor deficits. Patient was a known case of atrial and ventricular septal defects, with tricuspid atresia and her oxygen saturation of 88 percent on room air. Before the start of the case, as a part of routine check-up, the anaesthesia machine had passed the self-test with no error. There was no leaks or defects found in anaesthesia breathing circuit. After induction of anaesthesia, the trachea was intubated with 7.0 mm inner diameter endotracheal tube (ETT) and connected to the ventilator via the disposable breathing circuit. Anaesthesia was maintained with sevoflurane in air-oxygen mixture (50%) with a flow rate of 2.0 L/min. Oxygen saturation of 98-100% and normocapnia was maintained. Surgical site was prepared and the patient was draped with sterile sheets. The skin incision was taken and the skin flaps were retracted using the fish hook retractor. About 10 minutes after the start of surgery, collapse of the ventilator bellows with inability to deliver adequate tidal volume and hypercapnia was noted. The position of ETT, cuff pressure, circuit disconnection, and ventilator malfunction were checked but no leak was detected. Surgery was stopped, the drapes were removed and on closer inspection two minor
holes were found in the breathing circuit. The sharp tip of the towel clip forceps that was used to fix
the fish hook retractor to the drape had punctured the breathing circuit under the sterile drape. [Figure
1] Breathing circuit was changed, no further leak was detected and the rest of the intraoperative course
was uneventful.

Leaks in the anaesthesia circuit can be due to disconnection or damage to the breathing circuit, which
can lead to hypoxia, hypoventilation, inadequate delivery of inhaled anaesthetic gases and
contamination of the operating room. [3] Leak in the anaesthesia circuit can be detected by an audible
leak sound, collapse of the breathing bag and ventilator bellows, inability to ventilate, decrease in
oxygen saturation, fall in capnometry, and decrease tidal volumes and airway pressures (on
mechanical ventilator). [3,4] There have been case reports, citing corrugated circuit leak due to tube
holder, [3] hot air fan, [5] but due to a sharp tip of the towel clip forceps is a unique finding. Thus, it
is important to remember that whenever anything is fastened to the surgical drapes using a sharp
object like towel clips or forceps, it is prudent to feel and identify the objects underneath the surgical
drapes like breathing circuits or intravenous tubings and avoid damage. A routine practice of checking
for any leakage in the breathing system after draping can prevent major mishaps. Leaks in the
breathing circuits may lead to significant complications if it go unnoticed. Hence, anaesthesiologist’s
vigilance and preparedness to deal with such situations, can prevent unwanted outcomes.

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References


**Figure 1:** The sharp tip of the towel clip forceps (a) that was used to fix the fish hook retractor to the drape (b) caused the holes in the breathing circuit (white arrows) leading to leak in the breathing circuit (c).