

## Tight reservoir bag after induction – a rare cause unearthed

**Dear Editor:**

The use of coaxial Bain [1] circuit remains very common in routine anaesthesia practice all over our country and one should be aware of the possible havoc a circuit malfunction can create if subtle defects are not detected on time. There are a lot of well-known tests [2] to detect a leak or a disconnection and in spite of these, instances exist where a test is forgotten or missed which can give rise to unforeseen complications [3].

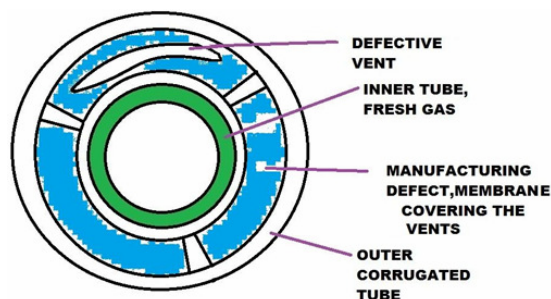
We would like to bring to the notice of our readers an incident where a small manufacturing defect in the patient end of the Bain circuit caused undue anxiety. On a routine elective day a case was posted for partial thyroidectomy under general anaesthesia. The patient was a fifty four year old gentleman with no comorbidities. Anaesthesia was induced with propofol 2mg/kg and fentanyl 1 mcg/ kg and patient intubated after relaxation using Succinylcholine 2mg/kg with an 8.0 size Portex® endotracheal tube. After intubation bilateral air entry was checked, ET Co2 curve confirmed and endotracheal tube connected to a Bain circuit and manually ventilated. It was noticed that the reservoir bag was unusually tight [4] and required more pressure to ventilate. It was initially thought that patient is inadequately relaxed and an initial dose of vecuronium bromide 0.1 mg per kg pushed intravenous and in spite of this, the tightness of the reservoir bag did not resolve.

**Fig-1:** Defective circuit – membranes seen



Although patient maintained 100% oxygen saturation so far, a quick search to ascertain the cause of reservoir bag tightness was started. A senior Anesthesiologist was immediately summoned and Bain circuit was inspected for any possible kinks but it was found to be apparently normal. A quick exchange of the endotracheal tube was done but those efforts were also in vain as the tube did have any blockages or kinks. The possibility of bronchospasm was subsequently thought of and even though patient did not have any audible rhonchi boluses of injection deriphyllin® intravenously were pushed along with hydrocortisone 200mg. As our senior colleague suggested we were now contemplating fentanyl induced chest rigidity [5] as the root cause of our problems. By now it was noticed that end tidal Co2 had gradually increased from 32mmHg to 55 mm Hg and the inspiratory Co2 had touched 12mmHg from baseline.

**Fig-2:** Defective Circuit- diagrammatic representation of cross section



As all these maneuvers were being done, the last thing remaining was a change of the circuit. We decided to change the circuit and once it was done, the airway pressures returned to normal and ventilation was easier with normal bag compliance. After finding out the culprit a thorough search revealed a rare manufacturing defect in the patient end of the

Bain circuit as shown in the photograph. There were plastic membranes partially blocking the vents in the circuit near the patients end causing partial obstruction to ventilation from the reservoir beg as well as obstructing expiratory flow from the endotracheal tube. This defect though small and undetectable by routine examination has caused undue anxiety and stress by mimicking an obstructed airway.

In conclusion regular tests prescribed are not to be missed and are very important for patient safety. In this case we acknowledge that even

though the Pethick test was done prior to the induction of anesthesia the undue slow deflation of the reservoir bag on flushing oxygen was ignored. Hence a great lesson was learnt that even small variations in the tests [6] give a lot of information about the condition of the circuits [7] which cannot be ignored. We would also recommend the routine inspection of the patient end of the Bain circuit to look for plastic mold defects in the form of thin membranes covering the vents surrounding the inner tube of the coaxial circuit.

### References

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