DELAYED RECOVERY RELATED TO FAULTY BAINS (CO-AXIAL) BREATHING CIRCUIT

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Summary:

Any malfunctioning of the anaesthesia equipment can sometimes seriously affect the perioperative status of the patient. Occasionally it can produce delayed recovery. We report a case where an unrecognized disconnection of the inner tube of Bains circuit producing hypercarbia and delayed recovery.

Key Words :

Bain's Circuit, Co axial circuit, disconnection

Case Report :

A 50 year old female patient who had fracture of left humerus, after sustaining road traffic accident was posted for closed interlocking / nailing. She was a known diabetic since 17 years on oral hypoglycemics, started on insulin after hospital admission. She was a known hypertensive on Tab. Enalapril 5 mg OD since 10 years. She had 40 % burns 3 years back in a suicidal attempt and was subjected to repeated anaesthetic exposure for escharotomy, skin grafting and contracture release without any complications.

There was no history of chest pain and she had good exercise tolerance. She had extensive healed burns scars over chest and neck. Her BP was 140 / 80 mm of Hg. She had Hb of 7.5 gm% and hence, two units of blood had been transfused and Hb had increased to 9 gm %. Blood sugar on the day of surgery was 125 mg %. General Endo tracheal anaesthesia was planned as there were extensive burn scars over the neck.

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She was premedicated with Inj. Pethidine 25mg and Atropine 0.6mg I.V. and induced with Propofol 250mg and Pancuronium 6mg., preservative free Lignocaine 60mg I.V., after preoxygenation for 3 min. with Magill's circuit. Patient was shifted to Bains circuit after intubation with 7.5mm oral ETT. She was maintained on O2, N2O, Vecuronium and Halothane 0.5%. She continued to be in lighter planes throughout surgery which lasted for one and half hrs. and required frequent top ups of Vecuronium, and increased concentrations of halothane ; Inj. Ketorolac also was given. Her SBP varied between 160 to 200 mm of Hg and HR was 120/ min. throughout. She was monitored with ECG, NIBP and Pulse oxymeter. Capnogram was not used as only one Capnogram was available which was being used for other patient. Since the patient was attempting spontaneous ventilation she was reversed with Inj. Neostigmine 2.5 mg and Atropine 1.2 mg. she started breathing spontaneously, but was not responding to verbal commands, no spontaneous eye opening ; her breathing was assisted and after 10 min. her BP started falling from 160/100 mm of Hg to 70/40 mm of Hg and Pulse 146/ min.There were no dysrrhythmias. Inj. Dopamine infusion was started, three I.V. lines were started and 5 units of NS and 1 unit of polygeline was rapidly pushed. BP increased to 90/40 mm of Hg. She continued to be unconscious. Capnogram was brought and connected and showed 100mm of Hg EtCO2. Then it was found that the inner tube of Bains circuit ('Anaesthetics' brand) had disconnected at its entry into the outer tube where there is a joint. This meant that the whole length of the outer tube had become a dead space, leading to complete rebreathing. Circuit was changed to closed circuit with CO2 absorber and after ventilating for 5 min, EtCO2 dropped to 40 mm of Hg. She was shifted to ICU and connected to Drager Savina ventilator with CPAP mode with pressure support of 15 mm of Hg, and PEEP 4mm of Hg. Her blood sugar was found to be 400mg %.

After 30 min. she opened her eyes, started responding to verbal commands and was fully conscious .She was extubated after ventilating for 2 hrs. Subsequent post operative course was uneventful. Patient became conscious before blood sugars were corrected and this rules out the possibility of hyperglycemia as a cause of delayed recovery.

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1. Photo showing intact inner tube.

2 and 3. Photos showing disconnected inner tube (Bag and APL valve separated for better visualization).

Discussion :

Bains circuit, which was described by Bain and Spoerel is a co -axial circuit and modification of Mapleson D circuit. This circuit relies for proper function on the introduction of fresh gases very close to the patient's airway. Any leak, disconnection or improper connection of the inner tube can convert the entire length of the breathing tube into added dead space, resulting in hypercarbia, representing a serious hazard to the patient. This case report demonstrates the effect of disconnection of the tube of the Bains circuit.

Bains circuit is one of the most popular circuits used in many of the hospitals. Advantages are that it is light weight, relatively cheap, can be used for both controlled and spontaneous ventilation and permits the anaesthesiologist to stand away from the site of surgery. Because of its low cost and the circuit being available as a disposable unit it can be used for a single patient which also prevents cross infection of patients. We tend to wash and re-use it for reasons of economy. It is known that the integrity of the inner tube is very important as any breach can make the whole length of the outer tube as a dead space i.e. 584 cc instead of 4 cc in an intact unit. One has to check for the inner tube's integrity by either direct visualization through the outer tube which is made deliberately transparent, or by Pethick's test, before using it on the patient.

Bain circuit manufactured by '*Anaesthetics'* Company has a separate portion of the inner tube which is outside the outer tube and is connected to the common gas outlet of the anaesthesia machine. These two portions of the inner tube are joined together as the inner tube enters the outer tube. Since there is a joint, there is always a danger of

disconnection. Hence one of the options to prevent disconnection is also for the manufacturer to redesign the inner tube connected to the anaesthesia machine.

Conclusion :

We offer this case report as a warning and a remainder that the integrity of the co-axial circuit must always be checked (Pethick's test) before initiation of General Anaesthesia.

References :

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