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Pressuring Testing the Anesthesia Machine

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Benjamin Franklin once said “an ounce of prevention is worth a pound of cure”. In the world of anesthesia, the ounce of prevention is performing a pressure test on the anesthesia machine prior to surgery. The Food and Drug Administration's Center for Devices and Radiological Health recommend that the rebreathing circle system holds pressure at 30cm H₂O for 10 seconds. Alternatively, it is recommended that the leak rate required to maintain at 30cm H₂O should be less than 300ml/min. (5th edition Lumb & Jones, p. 63, table 3.4)

The service technicians at Vetamac like to take the recommendations one step further and require the leak rate to be less than 200ml/min. No matter which recommendation is used the most important issue is performing the pressure test correctly and prior to the first surgery of the day.

The pressure test can be conducted as follows:

- 1) Connect appropriate circuit and rebreathing bag to the anesthesia machine.
- 2) Close the pop-off valve. (Picture 1)
- 3) Occlude the patient end of the breathing circuit with your thumb.
- 4) Pressurize the breathing circuit with the flush valve and/or flowmeter to approximately 30cm H₂O. (Picture 2)
- 5) Once the pressure reaches 30cm H₂O, turn the flow of oxygen off completely and observe the manometer for a rise or fall.
- 6) If the system holds pressure for 10 seconds it is free of leaks.
- 7) If the system starts to lose pressure and the flow of oxygen can be set at 200ml/min of flow or less on the flowmeter, then the leak is within the acceptable range.
- 8) If a flow >200ml/min is required to maintain 30cm H₂O, then the leak needs to be located and corrected prior to using the anesthesia machine. (Picture 3)
- 9) If the pressure continues to rise with the flowmeter turned off, then the flush valve is leaking and needs to be replaced. The flowmeter needle valve may also cause this leak and it will need to be repaired or replaced.
- 10) Always release the pressure on the circuit by opening the pop-off valve. This assures the pop-off valve is working properly. (Picture 4)



PICTURE 1



PICTURE 2



PICTURE 3



PICTURE 4

One of the most common source of leaks is the rebreathing bags and circuits. A way to check the anesthesia machine only for leaks is by using a “Test Kit” provided by Vetamac. The Test Kit consists of a piece of 22mm scavenger tubing used in place of the breathing circuit and a 22mm scavenger tubing with a plug to use in place of the rebreathing bag. Picture 5 is an example of the anesthesia machine holding pressure with the use of the test kit.

The pressure is holding therefore the anesthesia machine is free of leaks. The pressure test can then be performed using the breathing circuit and rebreathing bag and if a leak is detected it can be pinpointed to the circuit and/or bag.



PICTURE 5

The non-rebreathing (NRB) circuit should also be checked for leaks prior to each use. Use the following steps to perform a pressure test on a non-rebreathing circuit (pictures show using a Safe Sigh NRB).

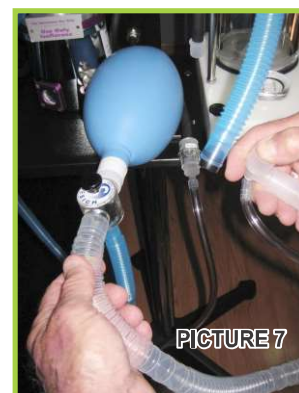
- A. Connect the fresh gas tubing to the fresh gas outlet (FGO) on the anesthesia machine (the FGO will vary on machines). (Picture 6)
- B. Plug the scavenger hose or close the pop-off valve.
- C. Occlude the patient end of the NRB circuit with your thumb.
- D. Fill the rebreathing bag with the flush valve and/or flowmeter. (depending on the location of the FGO, the flush valve may not fill the rebreathing bag).
- E. Most NRB circuits do not have a manometer. Therefore, fill the rebreathing bag completely and watch for a loss of pressure.



PICTURE 6

It should hold for 10 seconds or require <200ml/min of flow. (Picture 7)

If you experience leaks with your anesthesia machine and you call a Vetamac service representative, the first question you will hear is “did you perform a pressure test?” Performing the pressure test can help isolate the area of the leak. This will help the service representative diagnose the problem with you and possibly repair it over the phone.



PICTURE 7

Call your Vetamac service representative if you are interested in obtaining a test kit.