Sir,

Leaks in the low-pressure segment of an anaesthesia machine can affect patients by causing hypoxia, awareness and hypercarbia,[1,2] The low-pressure segment includes the flow tubes, vaporizer manifold, vaporizers and one-way check valve on most modern anaesthesia machines. Leaks in these components are difficult to identify.

Different methods are used to check the low-pressure segment for leaks. The 1993 Food and drug administration universal negative-pressure leak test is one of them. It was named “universal” because at that time it could be used to check all anaesthesia machines, regardless of the presence or absence of check valves in the low-pressure segment. At present, most anaesthesia machines are compatible with this test. It is the most sensitive of all leak tests because it is independent of flow. It can detect leaks as small as 30 mL/min. Several mishaps have resulted from application of a wrong leak test to the anaesthesia machine.[3]

Negative-pressure leak test is performed by creating negative pressure in the low-pressure segment with a negative-pressure leak-testing device. This device is made of a suction bulb and tubing connecting suction bulb to a 15 mm adaptor, which fits the common gas outlet.[4] Suction bulb has unidirectional air outlet valve (as shown in [Figure 1]) to evacuate air from the machine side of the bulb and to create a negative pressure of 65 cm of water.

**ANAESTHESIA APPARATUS CHECKOUT RECOMMENDATIONS, 1993**

Step 5. Leak Check of Machine Low-Pressure System[5],

a. Verify that the machine master switch and flow control valves are OFF
b. Attach a “suction bulb” to the common (fresh) gas out
c. Squeeze the bulb repeatedly until it is fully collapsed
d. Verify that the bulb stays fully collapsed for at least 10 s
e. Open one vaporizer at a time and repeat steps c and d as above
f. Remove the suction bulb and reconnect the fresh gas hose.

Only few anaesthesia machines are supplied with a negative-pressure leak-testing device. With prolonged use, the supplied device gets damaged or lost. One improvised device is shown in Figure 1 to perform the leak test in such situations. A simple suction bulb, used for neonatal resuscitation, is connected to the “a” end of a three-way stopcock connector and the “c” end is connected to a 15 mm adaptor by a piece of rubber tubing used in a mercury sphygmonanometer cuff. All junctions are made leak proof with adhesive.

The negative-pressure leak test with this device is performed by manipulating the three-way connector (as shown in [Figure 1]) and squeezing the suction bulb. This device generates negative pressure of more than 250 mmHg, which was tested by connecting it to a pressure transducer.

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*Figure 1: Improvised device*
### STEPS

1. Verify that the machine master switch and flow control valves are OFF
2. Connector is adjusted to close “b” end and open “a–c” ends. Suction bulb is squeezed completely and device is connected to common gas outlet
3. If bulb fills with air, connector is adjusted to close “c” end and open “a–b” ends to remove air by squeezing it
4. With squeezed suction bulb, connector is turned to close “b” end and open “a–c” ends
5. Steps 3 and 4 are repeated until the bulb is fully collapsed
6. Verify that the bulb stays fully collapsed for at least 10 s
7. Open one vaporizer at a time and repeat steps 3–6
8. Remove the device and reconnect the fresh gas hose

This improvised device is effective. It is easy to make and cheap because the required materials are of low cost and easily available in the operation theatre.

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