



What?

This is a single chamber underwater seal chest drain bottle set.

What's it for?

Once filled with water to the prescribed level, it is connected to an intercostal catheter. It is used for drainage of pleural air (pneumothorax) or fluid (hydro/haemothorax).

How does it work?

The bottle is connected to the patient's pleural space via the intercostal catheter. The bottle is open to the atmosphere. The fluid in the bottle acts as a one way valve. The usual depth of water in the bottle is 2cm. Therefore any increase in pleural pressure above 2cm will cause air to escape from the tube, and bubble out in the bottle. When the patient breathes in, the negative thoracic pressure causes a column of water to 'swing' back up the tube, preventing re-entry of air into the thorax.

Keep an eye out for..

The bottle should always be **below the level of the patient** otherwise water and air will return to the patient's thorax. There should be no clamps on the tubing.

Swinging- this confirms tube patency and correct drain position in the pleural space.

Bubbling- this will be during expiration when spontaneously ventilating, or inspiration when positively pressure ventilating. Bubbling means that there is still some air in the pleural space.

Continuous bubbling- this means that air is continuously getting into the pleural space despite being expelled through the drain. This should suggest bronchopleural fistula formation.

Why would it stop swinging?

There may be a disconnection in the tubing- exclude this first. No swinging could also mean that the drain has catheter has become blocked/ dislodged and is no longer connected to the pleural space. Even if the pneumothorax has resolved, the drain should still swing.

Should it be clamped?

Clamping is dangerous and should generally be avoided- A clamped drain means that there is nowhere for air in the pleural space to escape. If the patient is being ventilated, this will cause a tension pneumothorax. A senior ICM doctor may advise a brief period of drain clamping whilst the drain is moved above the patient (e.g. when proning or during a patient move). It should not be clamped for the duration of a transfer.

What about flushing?

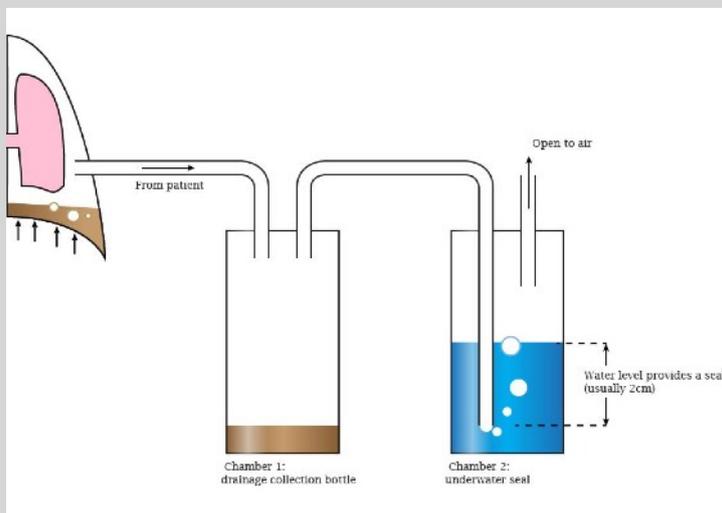
The drain may get blocked with blood or cellular matter. Under the direction of a consultant, it can be flushed but this risks infection and, again, should be avoided.

What's the problem with this set up?

This configuration is not ideal for drainage of large volumes of liquid and air (e.g. heamo-pneumo thorax). Once the blood gets into the water, it will increase the pressure needed to overcome the 'one-way-valve' and may prevent resolution of the haemothorax.

What other configurations are available?

One solution to the above, is to insert 2 drains- apical and basal- you sometimes see this in trauma patients. Another solution is to have a 2 or three chamber drain (in practice these are built together and appear to be one unit):



This allows fluid to collect in chamber one without increasing the fluid level in bottle 2.