A new pleural drainage system was constructed at the Department of Thoracic and Cardiovascular Surgery in Örebro, Sweden. The advantage of this system is that it is easy to handle, cheap, noiseless and reusable.

Drainage of the pleural cavity is necessary after thorax operations and when evacuation of free air or fluid is required. The principles of drainage treatment have been previously described. In a classical manner, the collection of fluids and regulation of the suction force have been managed with a system consisting of one to three bottles. In recent years, such drainage systems have been increasingly replaced by disposable drainage systems consisting of several chambers made of plastic material that are available in various designs. These systems provide more hygienic handling of blood and better control of both suction and negative pressure created in the pleural cavity and reduce leakages at connector points. A great disadvantage with the plastic chambers is that air bubbling in the water-lock section produces noise levels due to turbulence that can be very disturbing, especially in a thoracic surgical ward. Furthermore, when several patients with drainage are in the same room the disturbance causes tiredness due to lack of sleep. Another disadvantage is that they are relatively expensive especially when medical care delivery costs are increasing alarmingly.

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Figure 2. A diagrammatic picture of the Örebro pleural drainage. Unit A is plastic collecting bottle that is connected to the draining tubes coming from the patient. Unit B is the pressure regulation chamber that is connected to a central suction source that creates a negative pressure in the system. The negative pressure is regulated by allowing air to enter the chamber through an air inlet hole present in the lower end of the pressure regulation tube. A ball in the tube shows the pressure level. The chamber can be filled with water through a filling port. The water lock contains a simple valve to prevent backflow of water into the collecting tube. A bacterial filter must be added to the tube between the two units if the system is to be used again.

A Light and Noiseless System

Two years ago, we constructed a new drainage system containing a pressure regulation chamber and a collecting chamber which are connected together before use (Fig. 1). The pressure regulation chamber is made of a small 5.3 × 12.8 cm plastic bottle that contains a water-lock and a pressure regulation tube (Abbot Scandinavia AB, Spånga, Sweden). The function of the pressure regulation tube is to adjust the negative pressure in the system to the desired level (e.g. if the negative pressure is too high, then air enters the tube through an air inlet safety hole at the lower end of the tube which adjusts the pressure to the desired level). There is a small ball in the tube that is lifted by the negative pressure in the chamber and the height of the ball indicates the suction pressure that has been set (Fig. 2). This system avoids bubbling the air in the under-water seal which occurs in disposable systems and avoids making noise. The water lock tube functions as an air leak indicator in patients having e.g. pneumothorax or after thoracotomies or even in cases of false air leakages due to poorly secured tube connections. Air entering the system can be seen as air bubbles in the water seal. A valve is included in the water lock tube to prevent backflow of the water into the collection bottle in case the patient inhales deeply creating a great negative pressure. The chamber can be filled with water through a filling port (Fig. 2).

The pressure regulation chamber is connected to an adequately sized collection bottle of plastic or
The plastic bottles would be disposable whereas glass collectors could be resterilized and used again (Figs 2 and 3). A bacterial filter, Dideco, D645 (Shiley Scandinavia AB, Täby, Sweden) can be placed in the tube connecting the collecting bottle and the pressure regulation chamber, so that the regulation chamber system is maintained sterile and therefore can be reused several times.

The pressure regulation chamber can also be used for the exsufflation of a small pneumothorax. Exsufflation is done using a small catheter which is connected directly to the chamber without connecting the collecting bottle. This allows a gentle exsufflation within few hours without excess negative pressure. When a successful exsufflation is verified, then the catheter is removed.

The advantage of this system is that it is light, noiseless, rests steadily on the floor, and can be used several times for several types of drainage requirements. The only disadvantage with this system is that it requires approximately 30% more negative pressure from the negative pressure source in order to achieve the desired level of suction.

In conclusion the Örebro pleural drainage system is a cheap, and noiseless system that is easy to handle and can be used several times for all kinds of thoracic drainage.

References