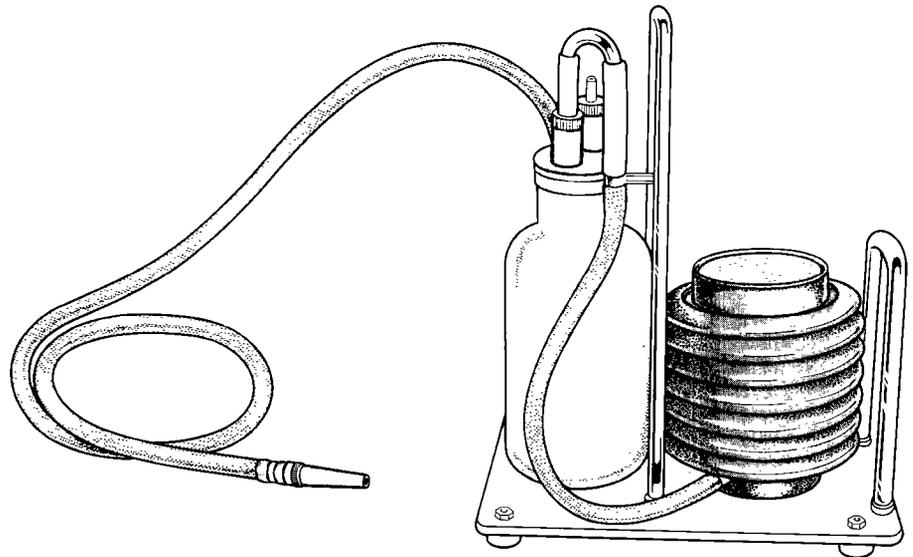


Fig. 5.2. Foot-operated suction machine.

Maintenance and repair

To avoid the possibility of infection, make sure that the machine has been sterilized before starting to work on it; do not put any parts in your mouth, and wash your hands afterwards. **Do not** suck or blow into any part of the machine, and handle all parts with care. Cover any cuts or abrasions, and wear a pair of gloves.

Maintenance of suction systems is for the most part not difficult. The commonly used colour code for a vacuum hose is yellow. Get to know the level of suction to be expected from a unit. Lower levels will indicate a problem somewhere in the system. The most common problem is a leak, which may be in the tubes or inside the machine. It may be that the bottle is not screwed in place properly. Check the sealing washer, and check that the bottle itself is not cracked. To check the bottle and its tubing, remove the tubing where it comes out from the machine and put a finger over the end with the machine turned on. The pressure gauge should go to its maximum. If it does not, then there is a problem inside the machine itself. If it does, the problem is with the bottle or the tubes.

If the problem appears to be inside the machine, take off the covers. If the tubing is not at fault and is tight on the connectors, and if the pressure gauge is working properly, then the fault must lie with the motor. Dismantle the motor in an attempt to locate the problem. A likely cause is a hole in the rubber diaphragm (if it is a diaphragm pump).

If a high vacuum is recorded on the gauge with none at the suction tube, this is usually caused by a blockage in the system.

Surgical diathermy machine

In surgical diathermy, a high-frequency electric current (0.5–2 MHz) is used to produce heat to seal (by coagulation) blood vessels, or to cut and seal at the same time. The heating can be regulated by a variable resistance.

There are two types of diathermy machine: monopolar and bipolar.

In monopolar machines, the current flows from the active electrode through body tissue, along the line of least resistance, to a large indifferent plate electrode and

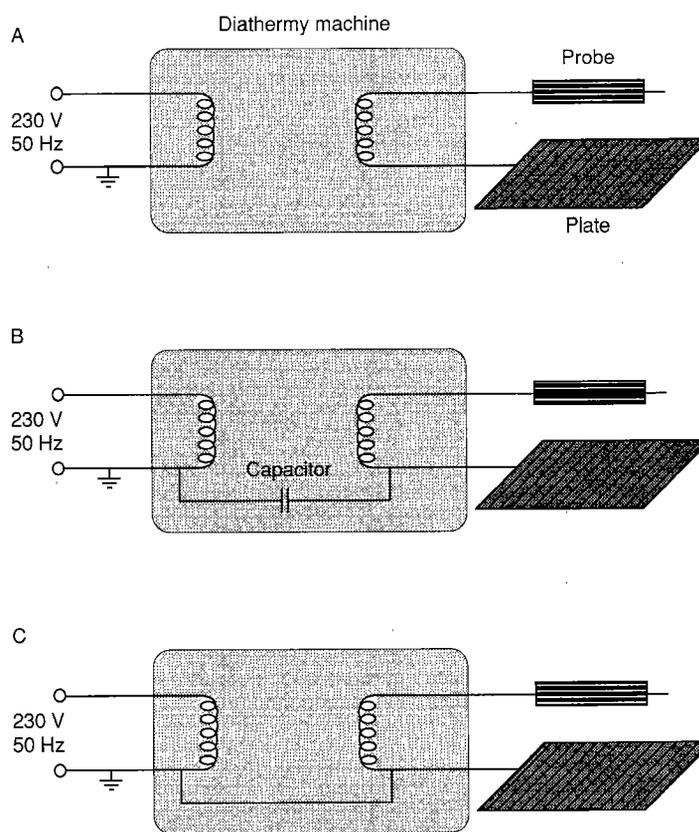
back to the machine. Different waveforms can be used to produce a cutting or coagulating mode. For the cutting mode, the waveform is continuous, while for the coagulating mode, the energy is produced in bursts.

With bipolar diathermy, the two tips of a pair of forceps are the two electrodes; there is no plate electrode. Coagulation occurs when the forceps are closed across a piece of tissue. This technique is very good for dealing with very small blood vessels. The energy output required is low.

Diathermy machines can be classified according to the type of output connection used. The different types are:

- isolated output (Fig. 5.3A);
- radiofrequency earthed output (Fig. 5.3B);
- hard-earthed output (Fig. 5.3C).

Fig. 5.3. Three types of diathermy machine.



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Isolated output machines have both sides of the output floating with respect to earth. This minimizes the risk of possible alternative pathways for radiofrequency current (which can cause burns), or for mains frequency current from the machine itself (which can electrocute).

Radiofrequency earthed output machines have a capacitor placed between the plate side of the output and earth. This permits radiofrequency current to flow to earth. The small value of the capacitor prevents the passage of mains frequency current so that isolation is effectively preserved at the mains frequency; the risks of electrocution are not increased by this method. However, the risk of possible alternative pathways for radiofrequency current to cause burns is greatly increased,

and for this reason a plate current monitor is required on such machines. This monitor senses any difference in current flows between the active and the plate leads, and turns off the output if a difference occurs. The difference represents the leakage current.

Hard-earthed output machines have a plate electrode directly connected to earth, so the patient is also directly connected to earth. This means that the risk of electrocution is very much higher. For this reason machines of this design are no longer produced, and any that are still in use should be replaced.

Maintenance

The routine maintenance needed for these machines is limited. Proper records should be kept of all work done on them. Make a check-sheet of work to be done, and then make routine inspections at least twice a year.

The most important job is the electrical safety check. If you do not have an electrical safety checker, follow the instructions in the section on cardiac monitors (pages 67–69). Keep the inside and the outside of the machine clean. Check the plate electrodes, the leads, and the instruments. Most of the problems will be caused by faulty leads, and in many cases you should be able to repair these yourself.

The instruments (e.g., diathermy forceps) are unlikely to give problems, provided that they are checked after each sterilization.