With appropriate patient selection and proper equipment, laparoscopic liver surgery can take place with relative comfort and safety. Patient selection will be discussed briefly at the end of the chapter.

In addition to the standard instruments described in Chap. 1, it is necessary to have instruments specifically adapted to hepatic surgery. High-quality 30-degree and even 45-degree laparoscopes should be available.

Forceps used on the liver should be flat and atraumatic, without teeth. All the forceps should be insulated, with rotating capability. It is also desirable to have rotating coagulation scissors, and hooks that are entirely insulated at the tip. A spatula is important for hemostasis on flat surfaces. One should only proceed with automatic clip applicators that allow clips to be placed without withdrawing the instrument for reloading. Stapling devices with vascular white cartridges are extremely useful for control of certain vascular pedicles.

Other specific instruments include the argon-beam coagulator, ultrasonic dissectors, laparoscopic ultrasound, and harmonic scissors.

Harmonic shears are also very useful tools in liver surgery. The lower blades oscillate at 55,000 Hz, generating localized heat and coagulation of proteins. It serves as a welding tool and is ideal for hemostasis of smaller vessels. Laparoscopic ultrasound probes are useful especially when coupled with color Doppler. They can help determine the limits and vascular involvement of solid masses, which is critical when a tumor is posterior and dangerously close to the inferior vena cava or the origins of hepatic veins. Fibrin glue (Tisseal, Baxter Inc, Deerfield Il) is used and can be very efficient in achieving complete hemostasis after laparoscopic hepatic resection. Its ideal application is on a decapsulated, dry liver surface. Adhesive fibrin sealant is available in various concentrations and with
various coagulation times. It should be applied without pressure to the raw surfaces of the liver at the end of the resection. Floseal (Baxter Inc, Deerfield IL) is another hemostatic agent in a granular form well adapted to achieve hemostasis crevices and deeper liver breaks. Omentum can then be applied to achieve an omentoplasty. Biliary ducts should be ligated with absorbable monofilament thread (3–0 and 4–0 PDS) and vascular structures can be ligated with silk ties. Specimen retrieval bags must be strong and equipped with a closing system.

The author prefers to stand in the French position (see Fig. 1.1b). The surgeon stands between the patient’s lower limbs, which are spread and placed in sequential compression devices on padded supports to avoid deep venous thrombosis and pressure necrosis. This arrangement is comfortable for the surgeon, who does not have to bend unnecessarily, which may occur when he or she is standing to the side, and it provides a symmetric view of the monitors. This position is also convenient for the assistants on each side.

The monitors are placed on each side of the anesthesiologist near the head of the patient. The scrub technician stands to the right of the surgeon, beside the camera assistant, allowing him or her to pass instruments to the surgeon’s right hand. All traditional instruments for open surgery must be at hand in case immediate conversion becomes necessary. The usual rules of anesthesiology for hepatic surgery are followed, but the anesthesiologist must be aware of the additional hazards of laparoscopic liver surgery, such as a potential CO\textsubscript{2} embolism or massive perioperative bleeding. Sufficient supplies of plasma and blood must be readily available.

A minimum of four ports must be introduced for basic liver procedures (beyond simple diagnostic laproscopy). The ports are placed to allow enough space between them to avoid the knitting needle effect between the various instruments. The port for the laproscope is usually introduced at the umbilicus, the port for the graspers on the right side, and the port for the operating instruments on the left side of the patient. This triangle is enlarged to a rectangle by placing a fourth port for palpation and/or the irrigation/aspiration probe (Fig. 4.1a, b). This arrangement can be varied according to the location of the lesion and the working method to which the surgeon is accustomed; there is no “ideal” arrangement of the ports for this type of surgery.

All ports must be at least 10 mm to allow the camera to be moved from port to port to visualize the hepatic lesion from different angles. Further trocars can be introduced for specific instruments – five or six is realistically the maximum number of trocars if the operating field is not to be overcrowded. This allows two surgeons to perform simultaneously with a “four-handed” approach (Fig. 4.2a). One surgeon manipulates a grasper and dissects with the CUSA while the other surgeon is needed to divide using clips and scissors. This four handed approach minimizes hemorrhage and speeds up the procedure (Fig. 4.2b).