

# Equipment for a colposcopic examination

This chapter describes the equipment needed to perform a colposcopic examination and its more common uses in clinical practice. A step-by-step description of the colposcopy technique and how to optimize the examination follows in Chapter 6.

## 5.1 Colposcope

The colposcope is a relatively simple instrument that allows examination of the cervix under light illumination at various low-power magnifications. It consists of a binocular microscope and light source, often incorporating a beam splitter to allow attachment of a still or video camera. It may either be attached to a central upright rigid bar, as in the original colposcope introduced in Germany in the 1920s, or be connected to a weighted stand with an adjustable arm,

which allows the colposcope head to be placed more precisely and without interfering with the operator's comfort. There are a large number of colposcopes on the market. Fig. 5.1 shows a typical colposcope mounted on a floor stand.

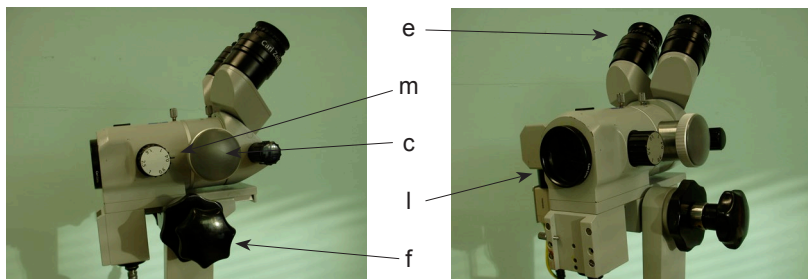
Certain instrument characteristics should be considered before buying a colposcope. **It must be binocular**, so that depth of field may be appreciated. This is particularly important when performing excisional treatment and when trying to assess surface contour and perform examination of endocervical epithelium (Carcopino et al., 2014). The lens should have a focal length of 30 cm, which is short enough to allow the examiner to reach the cervix with instruments, swabs, and spatulas and yet long enough to allow the colposcopist's hands to move between the colposcope and the cervix without

interference. Any shorter and it is difficult to use handheld instruments under direct colposcopic view; any longer and it is too far to comfortably

**Fig. 5.1.** A typical colposcope with a movable base.



**Fig. 5.2.** Two views of the colposcope head, showing the two eyepieces (e), the magnification changer (m), the camera access port (c), and the 30 cm lens (l). Coarse focus is attained by moving the entire colposcope head. Fine focus is achieved using the fine focus handle (f).



reach the cervix. The colposcope head must be universally movable and should be easily fixed once in position, so as to allow the colposcopist freedom of hand movement. A camera attachment (and therefore a beam splitter) is very useful for both training and documentation.

The colposcope head (Fig. 5.2) comprises an objective lens; two eyepieces, which may be adjusted to each person's eye position and may be focused independently; and a light source, which in the instrument shown comes from a light cable attached to a light source. Halogen lights are very powerful, are easily replaced, and are relatively inexpensive. Light-emitting diode (LED)

lamps last longer. Most colposcopes have a green filter, which takes away the background redness so that the vessels appear black and fine vessel changes may be more easily appreciated.

Also, most colposcopes have a magnification changer, although some are variable and allow a zoom capacity. In practice, it is rarely necessary to examine at a greater magnification than 15 $\times$ . There is a trade-off. At greater magnification, the field of view diminishes, the depth of focus decreases, and the light required increases. At higher magnifications, it is sometimes easier to appreciate fine vessel changes. However, it is important to be able to visualize the

entire cervix in one field, especially during treatment. A good colposcope will have a low enough magnification setting to allow this (i.e. 4 $\times$ ). Three or four different magnifications between 4 $\times$  and 15 $\times$  are ideal. Rapid change from one magnification to another is effected with a simple knob (the magnification changer). For coarse focus, the colposcope head can be moved manually, and for fine focus, there is a separate knob.

Before starting a colposcopic examination, one should first confirm personal visual acuity settings, in other words that the colposcope is set up properly for the examiner's eyes (see Chapter 6). It is prudent to do this while looking at an inanimate object at the beginning of a clinic session, before a patient undresses.

Colposcope manufacturers nearly all supply a camera, monitor, and computerized image storage and database package. Fig. 5.3 illustrates an integrated colposcopy system.

## 5.2 Gynaecological couch and operator's stool

For most women, any gynaecological examination couch (Fig. 5.4) that allows the patient to adopt the

**Fig. 5.3.** A colposcope with integrated video camera, monitor, and data collection system attached to the colposcope's movable stand.



**Fig. 5.4.** A colposcopy/hysteroscopy gynaecological examination couch. It may be elevated and flattened independently. A waste receptacle is fitted just below the patient's perineum.



lithotomy or semi-lithotomy position may be used to perform colposcopy. However, it is important that the base of the couch may be tilted so that the TZ on the cervix will become almost perpendicular to the colposcopic line of vision. The back of the couch should also be adjustable, and it should be possible to easily elevate or lower the whole couch. A comfortable couch is hugely important for the patient, who will need to be in position for several minutes in relative undress and who is very likely to be anxious. It is important to be able to elevate or lower and tilt the couch to allow optimal positioning of the patient. Also, an examiner's stool that can be elevated or lowered is very helpful. Being able to quickly flatten the couch so as to deal with the rare vasovagal attack is important. Finally, the same couch may be used for most outpatient gynaecological procedures (e.g. hysteroscopy, intrauterine contraceptive device [IUCD] insertion, and transvaginal ultrasonography).

If a decision is made to perform excisional treatment, it should usually be performed as an outpatient procedure using electro-surgery to resect the TZ epithelium, i.e. LLETZ/LEEP. A loop electrode is attached

to an electro-surgical unit (ESU) (Fig. 5.5). The loop electrode is housed in a so-called pencil. Suction tubing will connect the ESU to the suction speculum, and a ground plate will connect the patient to the ESU. Some ESUs have a suction unit incorporated into the unit; others do not, in which case it will be necessary to have a separate suction machine. The equipment for LLETZ/LEEP, thermal coagulation, and cryosurgery is described in Chapter 11.

### 5.3 Camera system

Almost all of the major camera companies will supply a camera and attachment for a colposcope. Unfortunately, the colposcopes usually need a C-mount for the camera to attach to the colposcope, and C-mounts are expensive. Many modern colposcopes have a camera system incorporated into the instrument, without the need for a C-mount. Nowadays, the cost of a reasonable video camera is almost the same as that of a still image camera, and very high quality video images can be obtained and stored for future reference. This is immensely valuable as a clinical aid in following up screen-positive patients, whether or not treatment

has been performed, and also as an educational tool for attending colposcopy trainees.

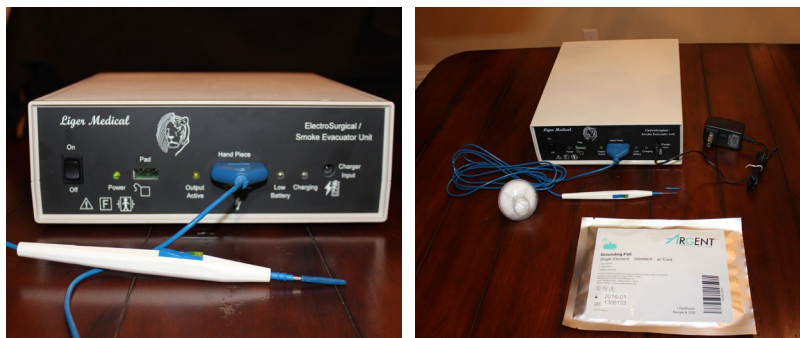
### 5.4 Computerized data management system

Many companies provide a software package that allows sociodemographic, clinical, colposcopic, and laboratory data and image capture as well as automatic audit of colposcopic diagnostic performance. In this way, it is relatively easy to create a full audit of performance for an individual colposcopist and to maintain a clinical database for the clinic service. However, the programs are expensive.

### 5.5 Instrument trolley

An instrument trolley may seem an unnecessary luxury in colposcopy clinics where budgets are tight. However, the reusable and disposable equipment and the fluids needed to perform a proper colposcopic examination have to be housed somewhere, and to have them all to hand in one compartmentalized trolley is both efficient and ergonomically sensible. The last thing a colposcopist or the patient needs is to have to wait for an assistant to find a particular instrument when it is needed. Finally, if instruments are not housed in a compartmentalized trolley they are not within arm's length of the colposcopist, and they should be. Figs. 5.6–5.8 illustrate how some reusable instruments and some disposable equipment may be conveniently housed in a trolley. The contents of the top, middle, and bottom drawers are shown in Figs. 5.6, 5.7, and 5.8, respectively. In Fig. 5.9, the top surface of the trolley shows some instruments laid out for a colposcopic examination. A needle disposal box and a fluid tray are attached on the side (Fig. 5.10).

**Fig. 5.5.** A portable, battery-driven electro-surgical unit incorporating a suction unit. Ports for the electro-surgical pencil and the ground plate are displayed. A simple electrical battery charger access point and the on/off switch complete the display at the front. The suction port site is at the rear of the unit.



**Fig. 5.6.** Open top drawer of a colposcopy clinic trolley, which conveniently stores in adjustable compartments a variety of disposable equipment: lubricating jelly, chlorhexidine gluconate sachets, cork boards for biopsy specimen pinning, dental syringe needles, culture swabs, cotton swabs and jumbo swabs, endocervical smear brushes, and cytology fluid bottles.



**Fig. 5.8.** Open bottom drawer of a colposcopy clinic trolley, which stores colposcopy suction specula of three different sizes.



**Fig. 5.7.** Open middle drawer of a colposcopy clinic trolley, which stores a variety of disposable examination gloves, gauze swabs, and cotton balls.



**Fig. 5.9.** Top surface of the equipment trolley used in many colposcopy clinics. Some of the equipment used during a colposcopic examination and treatment are laid out on an incontinence pad. These include cotton swabs and jumbo swabs, a sponge forceps and cotton balls, a suction speculum of medium size, some dental vials containing local analgesic fluid for injection using the dental syringe system, and a loaded dental syringe.



## 5.6 Reusable instruments

### 5.6.1 Specula

It is fundamentally important to have a full set of different sized specula available when performing colposcopy. A speculum that is too small will not comfortably expose the cervix in

the perpendicular plane, and a speculum that is too large will hurt the patient. Parity and bimanual examination will reveal the appropriate speculum to be used for colposcopy. Specula may be metal or plastic. If LLETZ/LEEP or a “small loop” diagnostic biopsy is to be performed, the speculum should have a suction

tube on the underside of the anterior blade (Fig. 5.11a). **Insulated specula are to be avoided, even if using diathermy.** After several sterilization cycles, the insulated speculum can lose some of its covering, and this may not be noticeable to the naked eye. If this happens, an electrical contact could indeed burn the

**Fig. 5.10.** On the side of the equipment trolley are attached a needle disposal box and a receptacle for the acetic acid and Lugol's iodine spray bottles.



patient's vagina. With the uninsulated speculum, no such risk arises. The area of contact with the vaginal skin is so large that burns are extremely unlikely even if contact with the loop or ball electrode happens accidentally. Also, if one ensures that LLETZ/LEEP is performed at low-power magnification, the entire loop should be visible before and during the procedure, so that contact with the vagina or speculum is extremely unlikely. Occasionally, the patulous parous vagina is so lax that it is not possible to completely visualize the cervix with the colposcope. Although lateral vaginal wall retractors are available to attach to some specula, they are relatively uncomfortable; a condom (Fig. 5.11b) or the finger of a large glove (with its end cut off) is a simpler and often more effective alternative.

### 5.6.2 Sponge forceps

Colposcopists vary in their choice of method for applying acetic acid or Lugol's iodine. Some use cotton balls soaked in the fluid and applied using a sponge forceps (Fig. 5.9).

Others prefer spray bottles, which may be less cumbersome (Fig. 5.10). If the spray bottles are used, it is important to be aware that splashback can occur and to protect one's eyes from exposure either with glasses or with the colposcope.

### 5.6.3 Endocervical forceps

The epithelium that is at risk of developing squamous cervical cancer is usually on the ectocervix in young women, and this is defined in the

IFCPC nomenclature (Bornstein et al., 2012b) as a type 1 TZ. The type 2 TZ, by definition, has an endocervical component but is fully visible to the examining colposcopist. To accurately determine the TZ type, it is necessary to carefully examine the SCJ as fully as possible. Also, when investigating a suspicion of adenocarcinoma or glandular precancer, it is necessary to examine the endocervix. This will usually require the use of an endocervical forceps. There are several good ones on the market. User-friendly ones are the Kurihara and the Desjardins forceps, which are shown in Fig. 5.12.

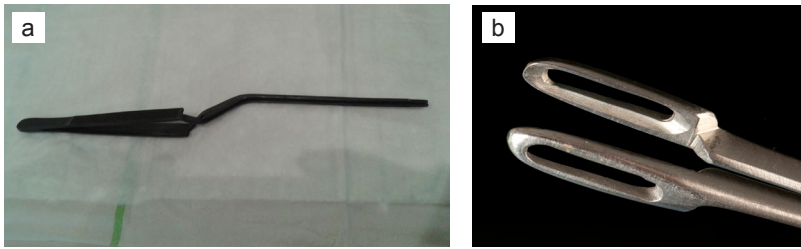
### 5.6.4 Local analgesia (dental) syringes

Metal dental syringes house 2.2 mL vials of either prilocaine with felypressin or lignocaine with adrenaline. They allow attachment of 27-gauge needles, which automatically puncture the vials when they are loaded into the dental syringes, ready for use. They allow exchange of empty vials for new, full ones in a matter of seconds, so that complete local analgesia may be achieved in less than a minute (see Chapter 2). A loaded dental syringe is shown in Fig. 5.13. The loaded syringe is long enough to

**Fig. 5.11.** (a) A Cusco speculum with a suction tube on the underside of the anterior blade for smoke evacuation. (b) A condom (with its end cut off) placed around a Cusco speculum to facilitate examination when the vaginal walls are exceptionally patulous.



**Fig. 5.12.** (a) Kurihara forceps. (b) Higher-magnification view of Desjardins forceps.



**Fig. 5.13.** Loaded dental syringe.

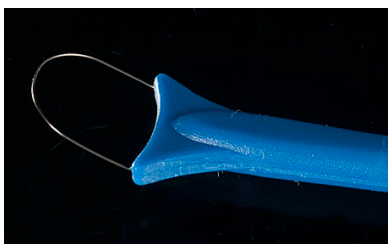


easily reach the cervix, and because the needle itself is relatively short, it will not bend sufficiently to cause a problem with infiltration. Finally, it is narrow enough not to obscure colposcopic vision during infiltration.

### 5.6.5 Tissue sampling instruments

The threshold for taking a biopsy varies from one setting to another. In some colposcopy clinics a biopsy is considered mandatory for every examination, whereas in others a “see-and-treat” policy prevails for women with convincing evidence of high-grade dysplasia (see Chapter 1). Endocervical curettes are routinely used in many practices in

**Fig. 5.15.** A small loop used to take colposcopically directed biopsies using an electrosurgical unit.



**Fig. 5.14.** Punch biopsy forceps.



the USA but are not often used in the United Kingdom. Many patients find an endocervical curette to be uncomfortable; it often produces inadequate material and usually precipitates bleeding. It rarely influences practice, and a good endocervical brush smear sample is considered a superior method by many. Biopsy forceps (Fig. 5.14) need to be sharp if they are to procure adequate biopsies, and some manufacturers make disposable forceps or disposable cutting parts for the reusable biopsy forceps handles. The common ones available are the Kevorkian and

**Fig. 5.16.** An array of loops used for LLETZ/LEEP of different sizes and types of transformation zone, and cervical biopsy loops (pink and green) used for taking diagnostic biopsies.



Tischler-Morgan forceps. When performing biopsies, some colposcopists use infiltration of local analgesic, and some do not. A small, long hook may be used to fix the cervix before taking a biopsy, but it is not usually necessary if the biopsy forceps instrument is sharp. Fig. 5.15 shows a small loop, which is a convenient way of taking a diagnostic biopsy. Fig. 5.16 shows a range of loops that are used for taking biopsies as well as for excising the TZ. Fig. 5.17 shows a ball diathermy electrode, used to achieve haemostasis after excision of the TZ or to seal a biopsy site. Other haemostatic agents include Monsel’s paste (see Annex 5) and silver nitrate sticks.

### 5.7 Disposable equipment

Either a 3% or a 5% concentration of acetic acid may be used to highlight colposcopically recognized epithelial lesions. There is no evidence to suggest that one strength is superior to the other, although some authorities say that the 3% concentration takes a little longer to effect whiteness. What is important is that the same concentration is used for all patients. Care is needed in preparing the solution; disasters have occurred with *glacial* acetic acid, which will de-epithelialize cervical and vaginal epithelium.

**Fig. 5.17.** A ball diathermy electrode, used to achieve haemostasis after excision of the transformation zone or to seal a biopsy site.



Lugol's iodine stains mature squamous epithelium dark mahogany brown and affects immature and dysplastic epithelium variably (see Chapter 8). Saline is advocated by several authorities as a cleaning agent before the application of acetic acid or Lugol's iodine. Cotton swabs are useful to manipulate the cervical epithelium, and jumbo swabs or cotton balls are alternatives (to spray bottles) for the application of acetic acid or Lugol's iodine. If treatment is contemplated, 27-gauge dental syringe needles and vials of prilocaine with felypressin or lignocaine with adrenaline are needed, and various biopsy forceps or small loops are used to take colposcopically directed biopsies. When one

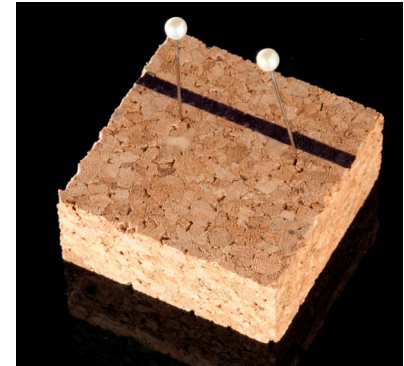
is trying to recognize or rule out the presence of intraepithelial neoplasia, punch biopsy forceps are adequate, but if one is concerned about invasive disease, a small loop electrode (Figs. 5.15 and 5.16) should be considered, because it allows a greater depth and confidence in revealing the basement membrane at histological examination.

### 5.8 Cork boards and pins to mount LLETZ/LEEP specimens

Liaison with one's local laboratory will determine in which way excised LLETZ/LEEP specimens will be received. One option is to open the specimen and then pin it onto a cork

board (Fig. 5.18) before immersion in formalin, so that it may be sectioned longitudinally and an accurate assessment of the SCJ may be reported.

**Fig. 5.18.** Cork board and pins to mount LLETZ/LEEP specimens.



## Key points

- Certain instrument characteristics should be considered before buying a colposcope.
- The gynaecological examination couch should be adjustable, so that it can be elevated or lowered and tilted to allow optimal positioning of the patient.
- Video and/or still images are very valuable as a clinical aid and as an educational tool.
- Reusable instruments and disposable equipment may be conveniently housed in a compartmentalized trolley.