Haemorrhage

Objective

- To knew the classification of bleeding
- Methods used to stop the bleeding

Recognition of types of haemorrhage
Arterial haemorrhage
Arterial haemorrhage is recognised as bright red blood, spurting as a jet which rises and falls in time with the pulse. In protracted bleeding, and when quantities of intravenous fluids other than blood are given, it can become watery in appearance.

Venous haemorrhage
Venous haemorrhage is a darker red, a steady and copious flow. The colour darkens still further from excessive oxygen desaturation when blood loss is severe, or in respiratory depression or obstruction. Blood loss is particularly rapid when large veins are opened, e.g. common femoral or jugular.
Venous bleeding can be under increased pressure as in asphyxia, or from ruptured varicose veins. Portal vein pressures (see Chapter 47) are high enough to cause rapid blood loss, especially in portal hypertension with oesophageal
varices. Pulmonary artery haemorrhage is dark red (venous blood) at around 30 mmHg (4 kPa), whereas bleeding from the pulmonary veins is bright red (oxygenated).

Capillary haemorrhage
Capillary haemorrhage is a bright red, often rapid, ooze. If continuing for many hours, blood loss can become serious, as in haemophilia.

Primary haemorrhage
Primary haemorrhage occurs at the time of injury or operation.

Reactionary haemorrhage

Reactionary haemorrhage may follow primary haemorrhage within 24 hours (usually 4—6 hours) and is mainly due to rolling (‘slipping’) of a ligature, dislodgement of a clot or cessation of reflex vasospasm. The precipitating circumstances are: (1) the rise in blood pressure and the refilling of the venous system on recovery from shock; and (2) restlessness, coughing and vomiting which raise the venous pressure (e.g. reactionary venous haemorrhage within a few hours of thyroidectomy).

Venous haemorrhage, whether primary or reactionary, can tax the skill of even an experienced surgeon, for it may be exceedingly difficult to bring under control. Penetrating wounds involving main veins in the thigh or groin are potentially fatal, as exsanguination may follow the removal of a first aid dressing which has apparently controlled the bleeding (butcher’s thigh). Such a wound should never be treated in a perfunctory manner; it requires careful examination and closure in an operating theatre.

Secondary haemorrhage

Secondary haemorrhage occurs after 7—14 days, and is due to infection and sloughing of part of the wall of an artery. Predisposing factors are pressure of a drainage tube, a fragment of bone, a ligature in an infected area or cancer. It is also a complication of arterial surgery and amputations. It is heralded by ‘warning’ haemorrhages, which are bright red stains on the dressing, followed by a sudden severe haemorrhage which may be fatal. A warning haematemesis may occur in the case of a peptic ulcer, and is a danger signal which it is imprudent to ignore. In advanced cancer, the erosion of a main vessel (e.g. carotid or uterine) by a locally ulcerating growth becomes the way of a swift and merciful termination to the patient’s suffering. Secondary haemorrhage is prone to occur with anorectal wounds, for example after haemorrhoidectomy.

External haemorrhage

External haemorrhage is visible, revealed haemorrhage.

Internal haemorrhage

Internal haemorrhage is invisible, concealed haemorrhage. Internal bleeding may be concealedas in ruptured spleen
or liver, fractured femur, ruptured ectopic gestation or in cerebral haemorrhage. Concealed haemorrhage may become revealedas in haematemesis or melaena from a bleeding peptic ulcer, as in haematuria from a ruptured kidney, or via the vagina in accidental uterine haemorrhage of pregnancy.

Measurement of acute blood loss

Assessment and management of blood loss must be related to the pre-existing circulating blood volume, which can be derived from the patient's weight:

• infant 80—85 ml/kg;
• adult 65—75 ml/kg.

Measuring blood loss

• Blood clot the size of a clenched fist is roughly equal to 500 ml.
• Swelling in closed fractures. Moderate swelling in closed fracture of the tibia equals 500—1500 ml blood loss. Moderate swelling in a fractured shaft of femur equals 500—2000 ml blood loss.
• Swab weighing. In the operating theatre, blood loss can be measured by weighing the swabs after use and subtracting the dry weight. The resulting total obtained (1 g = 1 ml) is added to the volume of blood collected in the suction or drainage bottles. In extensive wounds and operations, the blood loss is grossly underestimated, due to evaporation of water from the swabs before weighing each batch. Prompt transfer of discarded swabs into polythene bags reduces this source of error. Blood, plasma and water are also lost from the vascular system because of evaporation from open wounds, into the tissues, sweating and expired water via the lungs. Indeed, for operations such as radical mastectomy or partial gastrectomy it may be necessary to multiply the swab weighing total by a factor of 1.5. For prolonged surgery via larger wounds, as in abdominothoracic or abdominoperineal operations, the total measured may need to be multiplied by 2.

Haemoglobin level

This is estimated in g/100 ml (g/dl), normal values being 12—16

g/100 ml (12—16 g/dl). There is no immediate change in haemorrhage, but after some hours the level falls by influx of interstitial fluid info the vascular compartment in order to restore the blood volume.
Measurement of central venous pressure
For measurement of central venous pressure (CVP) see later.

The treatment of haemorrhage
Minimise further blood loss by pressure and packing, position and rest, operative procedures (ligation, repair and excision) and then fluid resuscitation as described below.
Restore blood volume by blood transfusion, albumin 4.6 percent, SAG-mannitol (SAG-M) blood, saline, gelatin, dextran and plasma infusions.

Pressure and packing
The first-aidtreatment of haemorrhage from a wound is a pressure dressing made from anything handy which is soft and clean. The dressing or pack should be bound on tightly.
Other examples of pressure used to control haemorrhage include digital pressure, for example the use of forefinger and thumb or a clothespeg for epistaxis. The use of a double balloon in the oesophagus and the stomach to control the bleeding from oesophageal varices is another example of pressure being applied.
Packing by means of rolls of wide gauze is an important standby in operative surgery. If several rolls are used, the ends must be tied together to ensure complete removal later.
N.B. If on removal of pressure or packing, bleeding appears to have ceased completely, one should not assume that all is well, especially when dealing with deep wounds involving large veins. Continued close observation is required and rapid operative action may be called for.
Position and rest
Elevation of limbs (e.g. in ruptured varicose veins) employs gravity to reduce bleeding. Elevation also causes helpful vasoconstriction (Lister). A bed elevator is often used to raise the foot of the bed, and

thus increasing venous return to the heart also augmenting cardiac output. Gravity is also used in certain operations, as in thyroidectomy when the patient is tilted feet downwards (reverse Trendelenburg position) or as in stripping of varicose veins when a head-down tilt is used (Trendelenburg).

Examples of operative techniques in haemorrhage

Artery forceps (haemostats) and clips are mechanical means of controlling bleeding by pressure. The clamped vessel can be ligated or it can be coagulated with diathermy. When an incision is made through the scalp for craniotomy, the profuse bleeding is not easily arrested by direct pressure, so the cranial aponeurosis is picked up by a series of forceps which are everted together, thus exerting pressure. Silver clips (Cushing) may be applied to cerebral vessels.

Suturing may be employed. The vessel can be underrun or transfixed by needle and suture, and then ligated, while if the continuity of a main vessel is to be restored 4/0 silk or polypropylene is used on a 20-mm atraumatic needle.

Pressure by packing, using rolls of wide gauze, has been previously mentioned, but temporary light pressure with a ‘peanut’ of gauze held by forceps aids the sealing of an arterial suture line after reconstruction following trauma, embolectomy or in artery grafting. About 5minutes is required for the platelets to seal the join.

Patches of vein or Dacron mesh may be used to repair a vascular defect. A patch of muscle, lightly hammered, provides thrombokinase to stop a troublesome ooze.

Other topical applications for oozing include gauze or sponge, which is absorbed by the body. ‘Oxycel’ or gelatin sponge provides a network upon which fibrin and platelets can be deposited. This is the modern counterpart of the use of cobwebs by our forefathers, or sphagnum moss by our neolithic ancestors. Gauze soaked in adrenalin (1:1000) can be applied. Bone wax (Horsley) is used for oozing bone.

The whole or part of a bleeding viscus may have to be excised (e.g. splenectomy or partial hepatectomy). A ruptured kidney is treated conservatively if possible (see Chapter 63).

Natural blood volume and red cell recovery

The recovery of blood volume begins immediately by the withdrawal of fluid from the tissues into the circulation. There is haemodilution. Plasma proteins are replaced by the liver. Red cell recovery takes some 5—6 weeks. The iron content will be less than normal if stores are depleted or absorption is impaired, for example after gastrectomy.