

Haemorrhage, types and Causes

Recognition of types of haemorrhage

Haemorrhage can be classified according to the type of vessel bleeding into arterial, venous and capillary 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 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 bright red, often rapid, ooze. If continuing for many hours, blood loss can become serious, as in haemophilia.

Haemorrhage can also be classified according to the timing of occurrence into primary, reactionary and secondary

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 ^{الضريبة} 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 ^{ممل} 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 *أحمق* 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 merciful termination to the patient's suffering. Secondary haemorrhage is prone to occur with anorectal wounds, for example after haemorrhoidectomy.

Haemorrhage can also classified according to whether it is revealed or concealed

External haemorrhage

External haemorrhage is visible, revealed haemorrhage.

Internal haemorrhage

Internal haemorrhage is invisible, concealed haemorrhage. Internal bleeding may be concealed as in ruptured spleen or liver, fractured femur, ruptured ectopic gestation or in cerebral haemorrhage. Concealed haemorrhage may become revealed as 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 *القبضة المُنْتَبَتَة* 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 *الدفعة*. 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 abdomino-thoracic 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 into the vascular compartment in order to restore the blood volume.

- **Measurement of central venous pressure**

Through inserting a catheter into the superior vena cava via the internal jugular or subclavian vein. Normal central venous pressure is up to 5 cm water

Classes of haemorrhage

	CLASS 1	CLASS 2	CLASS 3	CLASS 4
Blood loss(ml)	Up to 750	750-1500	1500-2000	>2000
Blood loss(%)	Up to 15%	15%-30%	30%-40%	>40%
Pulse rate	<100	100-120	120-140	>140
Blood pressure	Normal	Normal	Decreased	Decreased
Pulse pressure (mmHg)	Normal or increased	Decreased	Decreased	Decreased
Respiratory rate	14-20	20-30	30-40	>35
Urine output (ml/hr)	>30	20-30	5-15	Negligible
CNS/mental status	Slightly anxious	Mildly anxious	Anxious, confused	Confused, lethargic
Fluid replacement	Crystalloid	Crystalloid	Crystalloid and blood	Crystalloid and blood