Intravenous induction followed by inhalation maintenance has been the mainstay of anaesthesia for equine surgery for decades. Thiopentone was introduced into veterinary anaesthesia in the 1950s and became the most widely used i.v. anaesthetic agent. In horses it was originally used alone, then with a muscle relaxant to improve the transition from standing to recumbent. More recently guaiphenesin at induction became the most widely used relaxant with thiopentone. Halothane was introduced into veterinary anaesthesia soon after thiopentone, and led to the controlled maintenance of anaesthesia with inhaled agents as we know it today.

Thiopentone and halothane have enabled today's sophisticated equine surgery to develop and the combination has been used successfully in many thousands of horses (Johnston et al. 2002). Both, however, have a number of undesirable side effects, and, in medical and veterinary anaesthesia, they are being superseded by new drugs. This has led to the withdrawal of the older drugs, in spite of the wealth of experience of their clinical pharmacology. Neither thiopentone nor halothane now hold market authorisation for use in horses destined for human consumption and both will soon be unavailable. The European Commission Regulation 1950/2006 allowing use of essential substances in horses, subject to a 6 month withdrawal period, excludes halothane. Thiopentone is in Annex II of the original regulations and can be used with the statutory 28 day withdrawal period.

Thiopentone is a short acting barbiturate anaesthetic. After a single i.v. dose anaesthesia is induced in the time it takes the drug to circulate from the injection site to the brain. Consciousness returns within a few minutes as the drug is redistributed to other parts of the body with a lower blood supply than the brain. Metabolism is slow; incremental doses lead to prolonged recovery because redistribution from the brain can no longer proceed once the concentration gradient is lost. Recovery from thiopentone anaesthesia may be violent and incoordinated unless appropriate premedication has been administered. There is considerable ‘hangover’ after recovery. However, used as a single dose to induce anaesthesia before volatile agent maintenance, the advantages of rapid induction of unconsciousness outweigh the disadvantages. It is not surprising that it became the mainstay of anaesthetic induction.

There are a number of alternatives to thiopentone; alpha-2 adrenoceptor agonist sedatives combined with ketamine are currently the mainstay of anaesthetic induction protocols in horses. Benzodiazepines are commonly included to enhance the relaxation as the animal becomes recumbent. These techniques are controllable, less likely to cause apnoea, and lead to a smoother recovery than barbiturates alone. They are also far more suitable for incremental doses or total i.v. anaesthesia should the need arise.

Volatile agent anaesthesia rapidly became popular as it is easily controlled. Inhalation produces anaesthesia, exhalation leads to recovery; no metabolism is required and hence it is easily ‘switched’ on and off. Precise knowledge of body mass is not required. Halothane is potent; around 1% on a volume basis in the alveoli will maintain unconsciousness during surgery. Its physical properties allow rapid uptake into the brain to produce anaesthesia; the depth and duration are readily controllable. Halothane is, however, a potent myocardial depressant. This single feature is probably its greatest drawback in equine anaesthesia, as the effects are particularly evident in the horse. It is also a significant respiratory depressant. Notwithstanding the physiological effects, the main reasons behind halothane’s disappearance is its relatively high degree of metabolism. This is not required for elimination from the body, and simply serves to produce potentially harmful metabolites. These metabolites, produced in people working in a contaminated atmosphere, are thought to lead to the various reported harmful effects in operating theatre staff.

Isoflurane and sevoflurane are suitable alternatives to halothane, although currently only isoflurane has market authorisation for use in horses. Sevoflurane is included in Commission Regulation 1950/2006. Both of these drugs cause typical volatile agent cardiorespiratory depression, but the myocardial depression is less severe than with halothane (Steffey and Howland 1980). A randomised prospective investigation into the anaesthetic mortality and morbidity with halothane and isoflurane in horses did not show any overall benefit of isoflurane over halothane, but there were less cardiovascular-related deaths in young healthy adults when isoflurane was used (Johnston et al. 2004). Halothane is generally regarded as causing less respiratory depression than isoflurane, and the need to ventilate more horses under isoflurane (Blissitt et al. 2004)....
may be regarded as a disadvantage. There is a general perception that recovery after halothane is smoother than after isoflurane, but few controlled studies support this. Sevoflurane may be a better alternative than isoflurane as spontaneous respiration is more readily maintained and some studies indicate a smoother recovery (Matthews et al. 1998).

We should not lament the loss of thiopentone and halothane, but rather learn from their good and bad points and make use of new developments. “There are no safe anaesthetics, only safe anaesthetists” has never been more apt.

REFERENCES