Is there a role for thiopentone in modern anaesthetic practice?

Thiopentone is a barbiturate first used in 1934 by Lundy and Waters. The classic rapid sequence induction describes the use of thiopentone, for which it was preferred because of its rapid smooth induction and its reliable end point.

Some argue that loss of response to verbal command which occurs with propofol induction is a better indication of adequate dosage than loss of eyelash reflex which occurs with thiopentone. Depending on cardiac output, time to induction of anaesthesia is similar between propofol and thiopentone (Arya et al, 2008). Following induction dose, recovery time from propofol is similar to thiopentone. Direct myocardial depression occurs secondary to propofol administration, causing a greater decrease in blood pressure than thiopentone (McCollum and Dundee, 1986). Cardiovascular depression caused by thiopentone and propofol is related to dose and speed of injection and is exacerbated by hypovolaemia.

Despite disproval of the widely-held belief that intravenous anaesthesia with thiopentone caused more fatal casualties among servicemen at Pearl Harbour than the enemy bombs (Bennetts, 1995), deaths were still caused by over-administration of thiopentone. In emergency situations, neither thiopentone or propofol are the most appropriate agents for induction of anaesthesia in patients in hypovolaemic shock.

Any general anaesthetic performed on partiurents should use thiopentone since this has a reliable and safe record for both mother and fetus, and propofol is not licensed for use in pregnancy. Thiopentone is used in severe convulsions and status epilepticus, whereas propofol is associated with excitatory effects and dystonic movements, particularly in children. Although propofol has successfully been used in intractable epilepsy, it is contraindicated in epileptic patients.

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Propofol is not licensed for sedation of ventilated children and adolescents under the age of 17 years. Neurological, cardiac, renal and hepatic impairment have been reported after sedation of children with propofol in intensive care units (Bray, 1998). Myocardial failure, hyperlipidaemia and acidosis have been reported after prolonged (>2 days) infusion of high doses (>5 mg/kg/hr) in adults (Kam and Cardone, 2007; Fodale and La Monaca, 2008).

Coughing on induction is more common with thiopentone than propofol. Suppression of laryngeal reflexes after propofol administration lends itself to laryngeal mask airway placement. Since thiopentone preserves laryngeal reflexes, without administration of muscle relaxant there is an increased risk of laryngospasm from secretions and during instrumentation of the airway.

Propofol is advantageous in day case surgery as it has a decreased incidence of postoperative nausea and vomiting and causes less of a hangover effect. Recovery of psychomotor function is also faster after propofol anaesthesia than that using thiopentone (Mackenzie and Grant, 1985).

Contamination during preparation for propofol infusion has led to iatrogenic bacteraemia (Yu et al, 2000). There are no similar reported events occurring with thiopentone.

Neurosurgical cases can be safely induced with either propofol or thiopentone as they both decrease intracranial pressure and cerebral blood flow. Thiopentone may be preferable in a patient with history of seizures. Maintenance with propofol total intravenous anaesthesia technique is used in some neurosurgical centres. Thiopentone follows zero order kinetic elimination so it is not used to maintain anaesthesia intraoperatively but is used to treat intractable raised intracranial pressure.

The side-effect profile of thiopentone is among the worst of all the induction agents. It induces hepatic enzymes and can affect the metabolism of other drugs. It has an active metabolite, pentobarbitone, which accumulates in renal failure, whereas propofol has no active metabolites. Thiopentone is a trigger agent for porphyria, and is more likely than propofol to cause severe anaphylaxis. Extravenous injection of thiopentone causes pain and erythema. Intra-arterial injection causes intense pain and can cause distal gangrene secondary to endothelial damage and subsequent inflammatory reaction.

Conclusions

The introduction of propofol revolutionized modern UK anaesthetic practice, allowing easier placement of the laryngeal mask airway because it depresses laryngeal reflexes. Together with a more attractive side-effect profile, this has made propofol the most commonly used induction agent by anaesthetists in the developed world. The new generation of anaesthetists are confident and competent with its use. However, thiopentone is still more appropriate than propofol in some cases, especially for rapid sequence induction and in the neurosurgical, obstetric and epileptic populations. **BJHM**

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