# Thiopental

Thiopental (Pentothal®)

# Thiopental in neurosurgery

- Decompressive craniectomy in aneurysmal subarachnoid hemorrhage: can favorable outcome be achieved?
- A profile of children with traumatic brain injury admitted to the paediatric intensive care unit of Red Cross War Memorial Children's Hospital in Cape Town, South Africa, between 2015 and 2019
- Sedation Practices in Mechanically Ventilated Neurocritical Care Patients from 19 Countries: An International Cohort Study
- Correlation of Preoperative Hippocampal Volume Measured with Magnetic Resonance Imaging and Emergence from General Anaesthesia in Elective Neurosurgical Patients: An Observational Study
- Efficacy and Safety of Ketamine Compared with Placebo and Other Medications for Preventing Propofol Injection Pain in Adults: A Systematic Review and Meta-Analysis
- Letter to the editor: thiopental and decompressive craniectomy as last-tier ICP-treatments in aneurysmal subarachnoid hemorrhage: is functional recovery within reach?
- In vivo study of the utility of selective intra-arterial injection of thiopental for neuroprotection in reversible cerebral ischemia
- Thiopental and decompressive craniectomy as last-tier ICP-treatments in aneurysmal subarachnoid hemorrhage: is functional recovery within reach?

Here are some key points about the use of thiopental in neurosurgery:

Induction of Anesthesia: Thiopental is often used as an induction agent to rapidly induce anesthesia in patients undergoing neurosurgical procedures. Its rapid onset of action makes it suitable for this purpose.

Sedation and Amnesia: Thiopental induces a state of sedation, amnesia, and unconsciousness, which is important for ensuring that patients do not experience pain or awareness during surgery.

Short Duration: One of the advantages of thiopental is its short duration of action. This allows for precise control of anesthesia depth and a quick recovery once the drug is discontinued.

Neuroprotective Properties: Thiopental has been investigated for its potential neuroprotective properties in the context of neurosurgery. It may help reduce the metabolic demands of the brain during surgery, which could be beneficial in cases where brain tissue needs to be protected.

Control of Intracranial Pressure (ICP): Thiopental can temporarily lower intracranial pressure (ICP), which can be important in neurosurgical procedures involving brain tumors or traumatic brain injury. By reducing ICP, it may provide a safer surgical environment.

Barbiturate Coma: In some cases of severe traumatic brain injury or refractory intracranial hypertension, thiopental has been used to induce a controlled barbiturate coma. This coma state is maintained for a specific duration to protect the brain from further damage and reduce ICP.

Administration: Thiopental is administered intravenously, typically as a rapid bolus injection. The dosage and administration rate are carefully controlled by an anesthesiologist to achieve the desired level of anesthesia.

Side Effects: Like all anesthetic drugs, thiopental can have side effects, including respiratory depression, hypotension (low blood pressure), and a risk of allergic reactions. These side effects are closely monitored during surgery.

Availability: The availability of thiopental may vary by region, and its use may be subject to regulatory restrictions. In some places, it has become less commonly used due to concerns about the misuse and availability of lethal injection

# Protocol

May be useful when a rapidly acting barbiturate is needed (e.g. intra-op) or when large doses of pentobarbital are not available. One of many protocols is as follows (note: thiopental has not been as well studied for this indication, but is theoretically similar to pentobarbital):

1. Loading dose: thiopental 5 mg/kg (range: 3-5) IV over 10 minutes  $\rightarrow$  transient burst suppression (< 10 minutes) and blood thiopental levels of 10-30 mcg/ml. Higher doses ( $\approx$  35 mg/kg) have been used in the absence of hypothermia to produce longer-duration burst suppression for cardiopulmonary bypass

- 2. Follow with continuous infusion of 5 mg/kg/hr (range: 3-5) for 24 hours
- 3. may need to rebolus with 2.5 mg/kg as needed for ICP control
- 4. After 24 hours, fat stores become saturated, reduce infusion to 2.5 mg/kg/hr
- 5. titrate to control ICP or use EEG to monitor for electrocerebral silence
- 6. "therapeutic" serum level: 6-8.5 mg/dl

Chemically, propofol is not related to barbiturates and has largely replaced sodium thiopental (Pentothal) for induction of anesthesia because recovery from propofol is more rapid and "clear" when compared with thiopental. Propofol is not considered an analgesic, so opioids such as fentanyl may be combined with propofol to alleviate pain.

Thiopental and decompressive craniectomy are important integrated last-tier treatment options in aneurysmal subarachnoid hemorrhage, but careful patient selection is needed due to the risk of saving many patients a state of suffering <sup>6</sup>.

A study showed that thiopental was associated with a lower risk of neurological complications after clipping of Unruptured Intracranial Aneurysm<sup>7)</sup>.

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### **Test and Answers**

What is the primary purpose of using Thiopental in neurosurgery? a) Pain relief b) Rapid induction of anesthesia c) Prolonged sedation d) Reducing blood pressure

Why is Thiopental chosen for induction in neurosurgery? a) It provides prolonged anesthesia. b) It has a rapid onset of action. c) It reduces intracranial pressure. d) It is an effective analgesic.

Which of the following is NOT a characteristic of Thiopental? a) Short duration of action b) Neuroprotective properties c) Rapid bolus injection d) Long-lasting sedation

In what situations might Thiopental be used to induce a controlled barbiturate coma? a) Routine neurosurgical procedures b) Cases of severe traumatic brain injury c) During outpatient surgeries d) For postoperative pain management

How is Thiopental typically administered? a) Orally b) Intramuscularly c) Intravenously d) Subcutaneously

What is the recommended the rapeutic serum level of Thiopental? a) 1-2 mg/dl b) 6-8.5 mg/dl c) 20-30 mcg/ml d) 50-60 mg/dl

Why has Propofol largely replaced Thiopental for induction of anesthesia? a) Propofol is cheaper. b) Propofol has a shorter duration of action. c) Propofol is more effective at reducing intracranial pressure. d) Propofol has a faster recovery time.

What is a potential risk associated with using Thiopental in neurosurgery? a) Rapid recovery b) Allergic reactions c) Hypertension d) Analgesia

When might Thiopental and decompressive craniectomy be considered as treatment options in aneurysmal subarachnoid hemorrhage? a) As a first-line treatment b) As a second-line treatment c) As a last-tier treatment d) Only in cases of minor bleeding

What did a study suggest about the use of Thiopental in clipping of Unruptured Intracranial Aneurysm? a) It had no impact on neurological complications. b) It increased the risk of complications. c) It was associated with a lower risk of neurological complications. d) It prolonged surgical procedures.

#### Answers:

b) Rapid induction of anesthesia b) It has a rapid onset of action. d) Long-lasting sedation b) Cases of severe traumatic brain injury c) Intravenously b) 6-8.5 mg/dl d) Propofol has a faster recovery time. b) Allergic reactions c) As a last-tier treatment c) It was associated with a lower risk of neurological complications.

## References

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