MiniVet Guide Infographics II

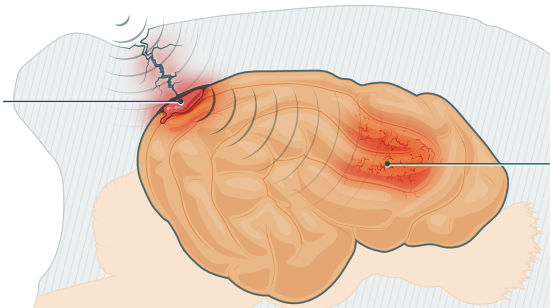
HEAD TRAUMA MANAGEMENT

miniVETguide
COMPANION ANIMAL MEDICINE

1. BRAIN INJURY

PRIMARY BRAIN INJURY

Immediate injury
(e.g. bleeding, bruising, laceration of brain tissue).



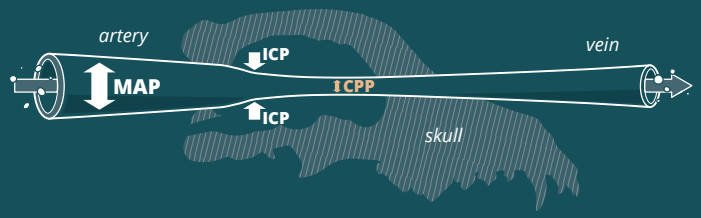
SECONDARY BRAIN INJURY

Ongoing injury that occurs over a period of time (e.g. secondary inflammatory changes, triggered by the release of excitatory neurotransmitters, cause alterations in cellular membrane permeability all of which ultimately result in further destruction of brain tissue).

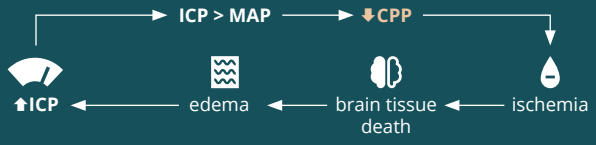
2. KEY CONCEPT

CPP = MAP – ICP

CPP, cerebral perfusion pressure **MAP,** mean arterial pressure **ICP,** intracranial pressure



• Avoid the vicious cycle:



3. MANAGEMENT

A. OPTIMIZING MAP ⟷ *Must maintain CCP by optimizing MAP (A) and minimizing ICP (B)* ⟷ **B. MINIMIZING ICP**

Correction of perfusion deficits

- Replace intravascular volume deficits with isotonic crystalloids, consider 0.9% saline due to potential beneficial effects of increased sodium;
- Administer 10–20 mL/kg fluid boluses over 10 min

Reassess perfusion parameters

- Heart rate
- Capillary refill time
- Gum color
- Pulse quality
- Blood pressure
- Body temperature
- Lactate
- Blood pressure (MAP > 80 mmHg)

Vasopressor therapy

- E.g. dopamine CRI.

Minimize further blood loss

- Bandages and pressure wraps.

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C. ADJUNCTIVE

- Opioid pain relief has minimal effects on blood pressure;
- Tender, love & care.

Main aim is to avoid cerebral vascular vasodilation which leads to blood pooling and increased ICP.

Maintain CO_2 30–35 mmHg

- Hypercapnia leads to cerebral vasodilation;
- Consider mechanical ventilation if PCO_2 > 60 mmHg.

Treat hypoxemia

- Hypoxemia leads to cerebral vasodilation;
- Aim for SPO_2 > 95% = PaO_2 of 80 mmHg;
- Oxygen therapy, oxygen mask or oxygen box safest. Avoid intranasal oxygen lines as they can trigger sneezing which can spike ICP;
- Maintain PCV > 25%, low hemoglobin levels leads to reduced oxygen-carrying capacity of the blood and cerebral vasodilation.

Reduce cerebral metabolism

- High metabolism leads to increased CO_2 and H^+ which results in cerebral vasodilation;
- Controlling any seizure activity (e.g. anesthesia and barbiturates);
- Permissive hypothermia (35–36°C);

Promoting venous drainage

- Minimize venous blood pooling;
- Avoid jugular blood sampling;
- Incline patient to a 15–30° angle.

Reducing cerebral edema

- Hypertonic saline 7%: 4 mL/kg in dogs, and 2 mL/kg in cats; slow IV over 10–15 min;
- Mannitol: 0.5–1 mg/kg IV, over 20 min. Repeat every 4–6h as needed.

4. PROGNOSIS AND MONITORING

- **Modified Glasgow Coma Scale**: can provide information about prognosis but needs to be repeated frequently as there can be dramatic changes in response to therapy.

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