Randomised trial of Epinephrine Dose and Flush Volume in Term Newborn Lambs

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Background & Objectives:

- Neonatal resuscitation guidelines recommends 0.5–1 mL saline flush following 0.01–0.03 mg/kg of epinephrine via low umbilical venous catheter for persistent bradycardia despite effective positive pressure ventilation (PPV) and chest compressions (CC).
- This study evaluated the effects of **1 mL vs 3 mL/kg** flush volumes and 0.01 vs 0.03 mg/kg doses on return of spontaneous circulation (ROSC) and epinephrine pharmacokinetics in lambs with cardiac arrest.

Methods: Forty term lambs in cardiac arrest were randomised to receive 0.01 or 0.03 mg/kg epinephrine followed by 1 mL or 3 mL/kg flush after effective PPV and CC. Epinephrine (with 1 mL flush) was repeated every 3 min until ROSC oruntil 20 min. Haemodynamics, blood gases and plasma epinephrine concentrations were monitored.

ACADEMIC P.E.A.R.L.S

Pediatric Evidence And Research Learning Snippet

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Results: Ten lambs had ROSC before epinephrine administration and 2 died during instrumentation. Among 28 lambs that received epinephrine, 2/6 in 0.01 mg/kg-1 mL flush, 3/6 in 0.01 mg/kg-3 mL/kg flush, 5/7 in 0.03 mg/kg-1 mL flush and 9/9 in 0.03 mg/kg-3 mL/kg flush achieved ROSC (p=0.02). **ROSC was five times faster with 0.03 mg/kg epinephrine compared with 0.01 mg/kg** (adjusted HR (95% CI) 5.08 (1.7 to 15.25) and **three times faster with 3 mL/kg flush compared with 1 mL flush** (3.5 (1.27 to 9.71). Plasma epinephrine concentrations were higher with 0.01 mg/kg-3 mL/kg flush (adjusted geometric mean ratio 6.0 (1.4 to 25.7), 0.03 mg/kg-1 mL flush (11.3 (2.1 to 60.3) and 0.03 mg/kg-3 mL/kg flush (11.0 (2.2 to 55.3) compared with 0.01 mg/kg-1 mL flush.

Conclusions: 0.03 mg/kg epinephrine dose with 3 mL/kg flush volume is associated with the highest ROSC rate, increases peak plasma epinephrine concentrations and hastens time to ROSC. Clinical trials evaluating optimal epinephrine dose and flush volume are warranted.

Key message: To avoid the confusion Neonatal Resuscitation(NR - INDIA (2020) also recommends, larger flush volume (3 mL normal saline in place of 0.5-1.0 mL)

EXPERT COMMENT

"Although Current AAP Neonatal resuscitation guideline (2020) suggest Unidose of IV Epinephrine i.e 0.02 mg/kg (0.2mL/kg) and endotracheal dose (while establishing vascular access) of 0.1 mg/kg (1 ml/kg) but NR-INDIA (2020) still recommending 0.1 to 0.3 mL/Kg for IV route & 0.5 to 1 mL/kg for ET route. However, for flushing IV/IO epinephrine with 3 mL normal saline applies to all weight and gestational ages."

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With warm regards,

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Reference

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