Abstract:

Objective: We compared the efficacy of tibial intraosseous (TIO) administration of epinephrine in a pediatric normovolemic versus hypovolemic cardiac arrest model to determine the incidence of return of spontaneous circulation (ROSC) and plasma epinephrine concentrations over time.

Methods: This experimental study evaluated the pharmacokinetics of epinephrine and/or incidence of ROSC after TIO administration in either a normovolemic or hypovolemic pediatric swine model.

Results: All subjects in the TIO normovolemia cardiac arrest group experienced ROSC after TIO administration of epinephrine. In contrast, subjects experiencing hypovolemia and cardiac arrest were significantly less likely to experience ROSC when epinephrine was administered TIO versus intravenous (TIO hypovolemia: 14% [1/7] vs IV hypovolemia: 71% [5/7]; P = 0.031). The TIO hypovolemia group exhibited significantly lower plasma epinephrine concentrations versus IV hypovolemia at 60, 90, 120, and 150 seconds (P < 0.05). Although the maximum concentration of plasma epinephrine was similar, the TIO hypovolemia group exhibited significantly slower time to maximum concentration times versus TIO normovolemia subjects (P = 0.004).

Conclusions: Tibial intraosseous administration of epinephrine reliably facilitated ROSC among normovolemic cardiac arrest pediatric patients, which is consistent with published reports. However, TIO administration of epinephrine was ineffective in restoring ROSC among subjects experiencing hypovolemia and cardiac arrest. Tibial intraosseous-administered epinephrine during hypovolemia and cardiac arrest may have resulted in a potential sequestration of epinephrine in the tibia. Central or peripheral intravascular access attempts should not be abandoned after successful TIO placement in the resuscitation of patients experiencing concurrent hypovolemia and cardiac arrest.

Reference: