“The primary study objective was to delineate the procedural aspects of intraosseous (IO) infusions responsible for fat intravasation” Rubal et al (2014).

Reference:

Fat intravasation from intraosseous flush and infusion procedures http://ctt.ec/h_tdo+
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Abstract:
Study hypothesis: The primary study objective was to delineate the procedural aspects of intraosseous (IO) infusions responsible for fat intravasation by testing the hypothesis that the fat content of effluent blood increases during IO infusions.

Methods: IO cannulas were inserted into the proximal tibiae of 35 anesthetized swine (Sus scrofa, 50.1 ± 3.5 kg) and intravasated fat was assessed using a lipophilic fluoroprobe (Nile red) and by vascular ultrasound imaging. Effluent blood bone marrow fat was assessed at baseline, during flush, and with regimens of controlled infusion pressures (73-300 mmHg) and infusion flow rates (0.3-3.0 mL per second). Fat intravasation was also assessed with IO infusions at different tibial cannulation sites and in the distal femur. In 7 animals, the lipid uptake of alveolar macrophages and lung tissue assessed for fat embolic burden using oil red O stain 24 hours post infusion. Additionally, bone marrow shear-strain was assessed radiographically with IO infusions.

Results: Fat intravasation was observed during all IO infusion regimens, with subclinical pulmonary fat emboli persisting 24 hours post infusion. It was noted that initial flush was a significant factor in fat intravasation, low levels of intravasation occurred with infusions ≤300 mmHg, fat intravasation and bone marrow shear-strain increased with IO infusion rates, and intravasation was influenced by cannula insertion site. Ultrasound findings suggest that echogenic particles consistent with fat emboli are carried in fast and slow venous blood flow fields. Echo reflective densities were observed to rise to the nondependent endovascular margins and coalesce in accordance with Stoke’s law. In addition, ultrasound findings suggested that intravasated bone marrow fat was
thrombogenic.

Conclusion: Results suggest that in swine the intravasation of bone marrow fat is a common consequence of IO infusion procedures and that its magnitude is influenced by the site of cannulation and infusion forces. Although the efficacy and benefits of IO infusions for emergent care are well established, emergency care providers also should be cognizant that infusion procedures affect bone marrow fat intravasation.

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