Inhaled methoxyflurane (Penthrox®) for fracture reduction in prehospital extremity trauma

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Introduction

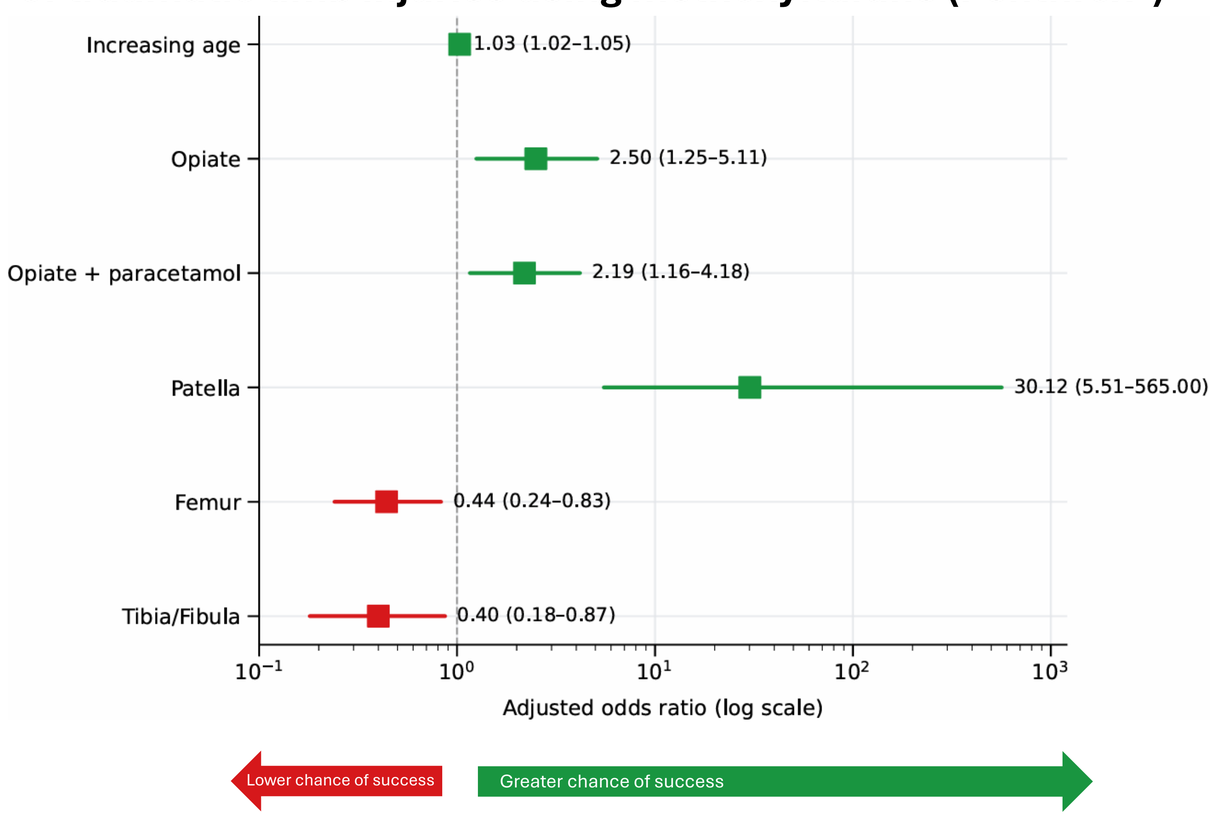
Prehospital manipulation and reduction (M&R) of traumatic limb injuries may be required before transfer to restore alignment, reduce pain and bleeding, and limit secondary neurovascular compromise. In many systems this requires intravenous procedural sedation, which is resource-intensive and not universally available.

Inhaled methoxyflurane (Penthrox®) is a portable, self-administered analgesic used within UK HEMS, but its utility as the primary agent for prehospital M&R is not well described.

Methods

A retrospective observational review of trauma patients attended by EAAA (1 January 2019 to 31 May 2023) who received Penthrox® to facilitate prehospital M&R of an acute limb injury. **The primary outcome was successful M&R using Penthrox® without escalation to intravenous procedural sedation**; failure was inability to reduce and/or subsequent intravenous procedural sedation. Multivariable logistic regression explored associations between success and age, sex, year, pre-reduction analgesia, and anatomical site. Data are reported as n (%), median [interquartile range], and adjusted odds ratios (aOR) with 95% confidence intervals (95% CI); analyses were performed in R.

Figure 1 – Predictors of successful manipulation / reduction of traumatic limb injuries using methoxyflurane (Penthrox®)

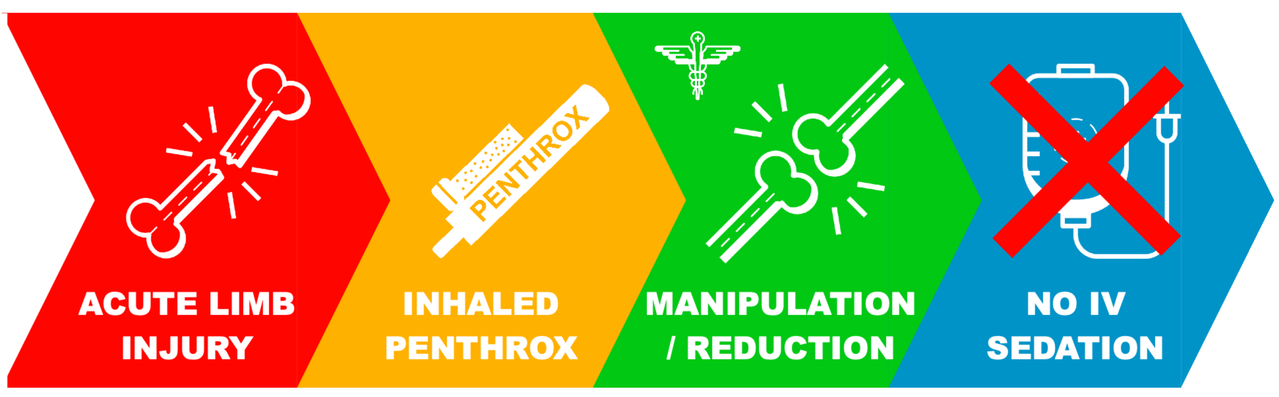


Results

Of 7765 patients attended, 788 received Penthrox® and 309 met inclusion criteria. Median age was 48 [27–67] years and 160/309 (51.8%) were male. **Successful M&R was achieved with Penthrox® in 168/309 cases (54.4%)**; 127/141 (90.1%) failures required intravenous sedation. Increasing age (aOR 1.03 per year; 95% CI 1.02–1.05), prior opioid alone (aOR 2.50; 1.25–5.11) or opioid with paracetamol (aOR 2.19; 1.16–4.18), and patella injuries (aOR 30.12; 5.51–564.57) were independently associated with success, while femoral and tibia/fibula injuries had lower odds of success. **No clinically important adverse events were recorded.**

Conclusion

In this observational HEMS cohort selected for a trial of Penthrox®, just over half of patients with acute traumatic limb injuries underwent prehospital manipulation and reduction without escalation to intravenous procedural sedation. Older age, pre-reduction analgesia, and patella injury were associated with success.



54.4%

patients had successful reduction / manipulation with Penthrox and did not require IV sedation

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Read the full paper here

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