Successful Ultrasound-Guided Caudal Anesthesia in Five Osteogenesis Imperfecta Patients

Undergoing Orthopedic Surgery

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INTRODUCTION
Osteogenesis imperfecta (OI) is an autosomal dominant disorder affecting 1 in 20,000 births. Type 1 collagen mutation manifests a myriad of symptoms: bone fractures, respiratory dysfunction, cardiac abnormalities, and skin laxity1. OI-affected tissues are fragile requiring meticulous care to avoid iatrogenic damage. Femoral rod placement is often performed for toddlers with repeated “long bone” fractures. However, few cases of neuraxial anesthesia have been reported for postoperative pain relief6. To our knowledge, this is the first case-series of ultrasound-guided caudal placement in OI patients.

CASE SERIES
Five patients with OI Type IV aged 12-15 months presented for femoral rod placement. Each received general anesthesia with sevoflurane inhalational induction and maintenance with sevoflurane in 50% N2O/50% O2. After IV placement and direct laryngoscopy with atraumatic intubation, patients were turned to the lateral decubitus position. The skin was prepped and draped in the usual sterile fashion. Sacral cornua identified by transverse scanning with a linear, high-frequency ultrasound transducer. A 22g, 40mm blunt-tip needle was introduced in the out-of-plane approach until a “pop” through the ligament was palpated. The probe was then turned 90° sagittally prior to injecting 1cc/kg 0.125% bupivacaine with epinephrine 1:400,000.

Local anesthetic spread in the epidural space was visualized with subsequent removal of the needle. One attempt was made for caudal placements with all patients who showed hemodynamic stability, without tachycardic response to incision. No patients required opioid rescue and all emerged calmly.

DISCUSSION
OI patients usually suffer many pathologic fractures throughout life, requiring surgical intervention. Eight types of OI have been described, ranging from lethal Type II to normal-survival Type I4. Due to extreme fragility of all connective tissues, anesthesiologists face challenges at every aspect of management: IV placement, positioning, intubation, cardiac and respiratory compromise, platelet dysfunction, and hyperthermia.

An important anesthetic goal is optimal postoperative pain relief. Concerns of severe scoliosis, potential bone fracture, intraosseous injection or increased bleeding risk may deter some providers from performing a neuraxial block in OI patients. Although ultrasonography is gaining popularity in adults, literature on pediatric ultrasound-guided neuraxial blocks remains relatively limited3. In our series, ultrasound-guidance facilitated successful caudal placements in our OI patients while minimizing repetitive trauma and confirming local anesthetic spread.

REFERENCES
1. https://www.genome.gov/25521839