

Sevoflurane rescue for MRI agitation in a child with suspected cutis laxa

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Keypoints

This case provides valuable clinical experience for the anesthetic management of similar cases.

Abstract

Cutis laxa is a rare connective tissue disorder that increases anesthetic risks in pediatric outpatients, especially for MRI sedation. We present a 6-year-old boy with clinically suspected cutis laxa undergoing cranial MRI sedation. Sedation was induced with intranasal dexmedetomidine and oral midazolam; mask sevoflurane rescued MRI noise-induced agitation. The examination was completed uneventfully with smooth recovery and discharge. Structured pre-anesthetic assessment, weight-based sedation, and timely sevoflurane rescue ensure safe outpatient sedation for children with suspected cutis laxa.

Keywords

Cutis Laxa; Anesthesia; Sedation; Pediatrics; Magnetic Resonance Imaging; Sevoflurane; Outpatients; Airway Obstruction

Introduction

Cutis laxa is a rare connective tissue disorder characterized by skin laxity and potential systemic involvement. It may lead to airway soft tissue laxity, reduced respiratory reserve, and increased risk of upper airway obstruction during sedation, which significantly increases anesthetic complexity[1]. Outpatient sedation for pediatric magnetic resonance imaging (MRI) carries unique risks,

including limited monitoring duration, potential delayed adverse events after discharge, and relatively insufficient emergency resources. However, reports regarding anesthetic management for children with clinically suspected cutis laxa in the outpatient setting remain scarce. We report a successful outpatient sedation case to provide practical clinical reference.

Case report

A 6-year-and-4-month-old male (120 cm, 31.5 kg) was admitted to the outpatient department with “unexplained convulsions” (two afebrile episodes in 4 days). He had typical abnormal facial features, including eyelid laxity, drooping mouth corners, and redundant facial skin folds, consistent with cutis laxa. Chromosomal examination after birth was reported abnormal but documents were lost; clinical diagnosis of suspected cutis laxa was established based on characteristic facial features (Figure 1A–B). He was G2P2, full-term vaginal delivery (2.20 kg), no birth asphyxia, with growth retardation and cephalosporin allergy. No contraindications to sedative drugs were identified. Cranial MRI was planned, requiring outpatient sedation. Pre-anesthetic evaluation was performed in the outpatient pre-anesthesia clinic one day before sedation. Physical examination showed no ventilation dysfunction (normal respiratory rate/rhythm, clear breath sounds, SpO₂ 98% on room air), no difficult airway (Mallampati

grade I, normal neck mobility, Figure 1C), ruddy skin, and stable vital signs (HR 98 beats/min, RR 22 breaths/min, BP 95/60 mmHg, T 36.8°C). Routine laboratory tests were normal, with no sedation contraindications. Informed consent was obtained after risk disclosure.



Figure 1. Clinical facial features and airway assessment of the patient. (A) Frontal facial view showing eyelid laxity, drooping mouth corners, and redundant skin folds; (B) Lateral facial view presenting characteristic loose skin appearance; (C) Mouth opening state for preoperative Mallampati classification assessment.

On the sedation day, the child was asymptomatic. Sedation was initiated at 8:40 AM in the outpatient sedation room with intranasal dexmedetomidine 62 µg (0.2 µg/kg) and oral midazolam 15.5 mg (0.5 mg/kg). After 15 minutes, he achieved satisfactory sedation (Ramsay score 4–5, calm and cooperative) and was escorted for MRI. Restlessness occurred due to MRI noise; 2%–3% sevoflurane via facemask was used as rescue at 9:30 AM, with oxygen flow 2 L/min, mask inhalation, and sedation depth monitored every 2 minutes. Restlessness relieved after 5 minutes, and MRI was completed successfully. He returned to the outpatient recovery room at 9:40 AM, with close monitoring of vital signs and consciousness. At 10:15 AM, modified Aldrete score reached 10 points, meeting discharge criteria. The family was instructed to observe mental state, diet and breathing within 24 hours and return immediately if adverse reactions occurred. No adverse events were recorded.

Discussion

Children with cutis laxa have inherent connective tissue abnormalities that lead to soft tissue laxity in the upper airway and reduced respiratory muscle elasticity. These

changes increase the risk of upper airway obstruction, tongue base collapse, and hypoventilation during sedation, even in patients with no obvious preoperative ventilation disorders. Therefore, sedative agents with minimal respiratory depression are strongly preferred in this population.

A critical challenge encountered in this case was the management of MRI noise-induced agitation. The intense acoustic environment of MRI scanners, often exceeding 100 decibels, can trigger autonomic hyperactivity and physical restlessness in sedated children, even when baseline sedation levels appear adequate[2]. This phenomenon is particularly hazardous in patients with connective tissue disorders like cutis laxa, as agitation can lead to rapid desaturation due to their already compromised respiratory mechanics.

The selection of sevoflurane as a rescue agent was based on its unique pharmacokinetic profile. Unlike intravenous boluses which may cause unpredictable respiratory depression, inhaled sevoflurane offers titratability and rapid onset/offset. In this scenario, the application of 2%–3% sevoflurane via facemask not only rapidly suppressed the agitation caused by the noise but also maintained hemodynamic stability. This approach is supported by recent evidence suggesting that low-dose volatile agents are superior to ketamine for rescuing sedation failure in outpatient MRI settings, primarily due to their favorable recovery profile[3].

This case is clinically valuable because it focuses on clinically suspected cutis laxa without genetic or chromosomal confirmation, which is frequently encountered in real-world clinical settings but remains underreported. In addition, the use of sevoflurane rescue sedation for MRI-induced restlessness in the outpatient setting further enhances the practicality of this report.

Outpatient sedation carries unique risks, including delayed postoperative adverse events, limited rescue resources, and lower patient compliance. These risks were minimized by strict weight-based dosage control, extended recovery room observation, non-invasive drug

administration, and detailed discharge education. The sedation regimen was reasonable and consistent with international pediatric sedation guidelines: dexmedetomidine combined with midazolam provides satisfactory sedation with mild respiratory depression and rapid recovery[4]; sevoflurane enables rapid and controllable rescue sedation[5], making it an ideal option for pediatric outpatient MRI procedures.

Limitations

This case lacks genetic/chromosomal confirmation, so the exact subtype of cutis laxa cannot be verified, which may limit the generalizability of the sedation regimen. As a single case report, the safety and efficacy of this protocol require verification by multi-center studies. No long-term follow-up was performed, so the potential impact on neurodevelopment cannot be assessed.

Furthermore, a significant limitation was the lack of intraoperative capnography (EtCO₂) monitoring. While standard pulse oximetry was utilized, the absence of EtCO₂ monitoring meant that early signs of hypoventilation or airway obstruction—common risks in patients with lax pharyngeal tissues—could not be objectively quantified in real-time. We recommend that nasal cannula capnography be considered in future sedation protocols for similar high-risk patients to detect ventilation abnormalities before desaturation occurs. Future studies are needed to establish standardized sedation protocols for children with suspected or confirmed cutis laxa in outpatient settings.

Conclusion

Comprehensive pre-anesthetic evaluation, weight-based sedative administration, timely rescue sedation, and targeted outpatient risk management ensure safe and effective sedation for pediatric patients with clinically suspected cutis laxa undergoing cranial MRI. This case provides valuable clinical experience for the anesthetic management of similar cases.

Ethics approval and consent to participate

This case report has been approved by the Medical Ethics Committee of the Women and Children's Hospital of Ningbo University (NBF-2026-KY-059)

Consent for publication

Written informed consent obtained for publication. Written informed consent was obtained from the patient for the publication of the clinical details and any accompanying images in this study. As a teaching and research-oriented hospital, during the process of obtaining informed consent for anesthesia, the patient was informed that her relevant clinical data may be used for teaching or research purposes, including the publication of related academic papers. Such use for research publication is strictly limited to retrospective observational studies based on existing medical records, and does not apply to prospective controlled interventional studies.

Availability of data and materials

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Authors' contributions

Ding Li and Zhiqiang Sun: conceptualization, manuscript drafting and writing; Qinsong Ye and Song Ye: figure preparation (Figure 1), critical revision of the manuscript for important intellectual content, and final approval of the version to be published.

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