

# Pediatric Anesthesia Considerations for Interventional Radiology



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## KEYWORDS

- Pediatric anesthesia • Interventional radiology (IR)
- Non–operating room anesthesia (NORA) • Vascular access • Sclerotherapy
- Chemosurgery • Radiation safety

## KEY POINTS

- Non–operating room diagnostics and procedures comprise an increasing volume of pediatric anesthesia practice; considerations for pediatric patients are different than adults owing to age and maturity.
- Pediatric patients often require general anesthesia for interventional radiology (IR); planning should consider specific requirements of the procedure.
- Pediatric patients with oncologic processes may present for biopsies and vascular access; some may have anterior mediastinal masses making preprocedural risk assessment and planning vital.
- Sclerotherapy for vascular malformations is a lengthy procedure requiring patient immobility and injection of sclerosing agents with potential adverse effects.
- Risk factors include effects of medications and radiographic contrast media, procedure-specific risks, and exposure of patients and personnel to ionizing radiation.

## INTRODUCTION

Anesthesiologists are increasingly called on to care for pediatric patients undergoing diagnostic imaging and procedures in locations outside of the traditional operating room theater in what has come to be known as non–operating room anesthesia locations. Indeed, in most large pediatric hospitals approximately 30% to 40% of the case volume is accounted for in these non–operating room anesthesia venues. These cases

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can range from short diagnostic imaging studies to significantly longer and more invasive intravascular procedures in interventional radiology (IR). There is significant institutional variation in how these cases are approached, with relatively few studies on optimal management.

There are concerns specific to pediatric patients that the anesthesia provider should take into account when preparing the anesthetic plan. Such planning should take into account the patient's age and comorbidities. Other important considerations include the type of procedure and the constraints of the non-operating room environment that may limit access to the patient or familiar equipment and personnel. Specific procedural considerations include the need for breath holding, patient immobility, and the duration of the procedure, as well as the possibility of certain procedure-specific complications. Patient immobility can be important for safety, particularly for endovascular procedures, and for minimizing doses of radiation for diagnostic studies. In this review, we address specific considerations in planning for IR procedures that are frequently performed in the pediatric population.

## **PEDIATRIC AND PATIENT-SPECIFIC CONSIDERATIONS**

Providers administering anesthesia to pediatric patients must consider each child's ability to cooperate reliably during the procedure as well as their patient's age and any cognitive impairments. Owing to these constraints, children often require general anesthesia for procedures that could be performed under moderate sedation for adult patients. Additionally, medical comorbidities may limit the patient's ability to undergo procedures with sedation safely and comfortably, making general anesthesia the best option.

### ***Oncology Patients***

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Pediatric oncology patients can present for a variety of IR procedures during the course of their initial diagnosis and treatment. These can include biopsy to allow tissue diagnosis and treatment planning, and lumbar puncture to assess for possible spread of malignancy and administration of intrathecal chemotherapy. Vascular access procedures such as short-term percutaneously inserted central catheters as well as indwelling port placements are also common. Patients may be profoundly pancytopenic at presentation, with a resultant increased risk of hemorrhage. Depending on the specific procedure, patients may require platelet transfusion to decrease this risk, particularly before neuraxial procedures.

During treatment with chemotherapeutic agents, patients can be immunocompromised and at increased risk of upper respiratory tract or other infections. Chemotherapy agents can cause systemic toxicity. For example, doxorubicin is known to cause both immediate and long-term cardiac toxicity, and bleomycin predisposes patients to developing pulmonary fibrosis, which can worsen with exposure to high concentrations of inspired oxygen. A full review of anesthetic considerations for oncology patients and related chemotherapy toxicities is outside the scope of this review and has been covered in several comprehensive articles.<sup>1,2</sup> If under active treatment, these patients may have associated nausea and vomiting, with implications for airway management and hydration status. Specific concerns for patients with an anterior mediastinal mass are reviewed elsewhere in this article.

### ***Conjoined Twins***

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A unique situation encountered at large pediatric tertiary care centers is conjoined twins. The prevalence is estimated to range from 1 in 50,000 to 1 in 100,000 births.<sup>3</sup>

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