Title: Anesthesia for Radiation Therapy in Pediatric Oncology – Review of 3850 Cases

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Introduction: In recent years, propofol has become widely used for radiation therapy in children due to its rapid and predictable induction of anesthesia and easily titratable depth, maintenance of spontaneous ventilation with minimal need for airway manipulation and rapid recovery.
Methods: We retrospectively evaluated anesthesia-related complications during pediatric radiation therapy over 24 months.
Results: One hundred and seventy-seven patients received a total of 3850 radiation interventions under propofol-based anesthesia (3833) or sedation (17). The average number of procedures per patient was 21.7. (median 27, range 1-74). The median age at the beginning of the treatment was 3.6 years (range 0.4 to 21.6); age distribution was: 2 yrs (38, 21.5%), between 2 and 4 yrs (60, 33.9%), and >4 yrs (79, 44.6%). The most common diagnosis was brain tumor (102, 57.6%). Others were neuroblastoma (21, 11.9%), Wilms Tumor (14, 7.9%), rhabdomyosarcoma (13, 7.3%), retinoblastoma (7, 3.9%), and other (20, 11.3%). The type of anesthetic techniques and the related complications are presented in Table 1. There were 3611 radiation sessions and 222 simulations. Forty-nine complications were identified (1.28%): 46 airway-related complications and 3 hemodynamic status changes (Table 2). There were no episodes of laryngospasm and no patients required endotracheal intubation. Risk factors for the development of complications determined by univariate analyses were: addition of benzodiazepines, opioids or ketamine to propofol, length of anesthetic, total propofol dose (mg/kg) and simulation treatment. We found no evidence for the development of tolerance to propofol during successive anesthetics.
Discussion: Our overall complication rate of 1.28% was lower than that observed in comparable studies. Risk factors were total propofol dose (mg/kg), use of adjuncts, length of anesthetic and simulations.

Table 1. Anesthetic technique and complications

Type of anesthetic/sedation	Number of anesthetics/sedations (%)	Number of complications (%)
Propofol TIVA	2132 (53.4)	20 (0.94)
Propofol + adjuncts (opioids, benzodiazepines, ketamine)	1701 (44.2)	29 (1.7)
IV sedation (opioids, benzodiazepines, barbiturates)	17 (0.4)	0 (0)
Total	3850	49 (1.28)

Abbreviations: TIVA, total intravenous anesthesia; IV, intravenous

Table 2. Anesthetic-related complications (n 49, 1.28%)

Type of Complications	Definition	n (%)
Minor Airway	Cough, minor desaturation, wheezing, partial obstruction	19 (0.48)
Desaturation	Oxygen saturation <90	10 (0.26)
Airway obstruction	Requiring intervention (oral airway, jaw thrust, chin lift)	11 (0.29)
Apnea	Apnea >15 seconds	6 (0.16)
Hemodynamic changes	Blood pressure or heart rate variations	3 (0.08)