Dexmedetomidine for sedation in pediatric stereotactic neurosurgery. A case report.

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Introduction:
The treatment of intracranial arteriovenous malformations in younger children with stereotactic radiosurgery presents a number of interesting problems for the pediatric anesthesiologists. Dexmedetomidine is a potent alpha2 adrenergic agonist with demonstrated sedative, analgesic and anxiolytic effects [1]. Its unique properties would suggest that it is a suitable agent for this procedure although reports of its use in children are limited [2].

Case Report.
A six-year-old boy presented to our institution for stereotactic radiosurgery of a right thalamic arterio-venous malformation (AVM) which was unsuitable for surgical resection. In the CT scanning suite, appropriate monitoring was instituted and anesthesia induced with sevoflurane. An intravenous cannula was inserted followed by a laryngeal mask airway (LMA) and fentanyl 1.5mcg/kg was administered. Following local anesthesia infiltration, the pins and a stereotactic frame were applied. Dexmedetomidine was commenced via intravenous infusion (0.3mcg/kg/min) and the CT scanning was commenced. Once imaging was complete, inhalational anesthesia was discontinued and the patient was transferred to a recovery area where monitoring was continued and a bispectral index monitor was attached (BIS value 46). The demedetomidine infusion continued as instituted. He quickly regained consciousness (BIS 92), the LMA was removed, the dexmedetomodine infusion was increased to 0.7mcg/kg/min and fentanyl was administered (1mcg/kg). Repeated sudden arousal necessitated the addition of a low dose propofol infusion (20mcg/kg/min). The patient remained sedated (BIS 65-72) spontaneously breathing, easily rousable and hemodynamically stable for the following six hours. Sedation was continued while he was transferred to the treatment area, positioned and treated. Upon completion, sedation was discontinued. He was returned to the recovery area and awoke quickly but remained drowsy for the following 90 minutes. He was discharged the following day with no adverse consequences and no memory of the previous day’s events. He is due to return for a repeat treatment for the deeper portion of the AVM.

Discussion
Anesthesia for stereotactic radiation therapy for intracranial AVMs in children raises a number of difficult issues: The procedure takes place outside the familiar operating room, the nature of the scanning, planning and treatment may involve transfer of an anesthetised patient to multiple areas of the hospital, the patient must remain calm and sedate for a long period of time with an uncomfortable frame on his head. Previously it has been suggested that a younger child may be anesthetised, intubated and ventilated for the entire day [3]. This places a very large demand on nursing, medical, recovery area and intensive care resources. We postulated that general anesthesia was only necessary for the application of the frame and CT scanning. The unique properties of dexmedetomidine would make it a suitable sedative agent for planning and treatment. Dexmedetomidine is an imidazole compound, which has been described as appropriate agent for intraoperative sedation and during invasive radiological procedures [1]. In our case, we found it necessary to co-administer a low dose of propofol to achieve adequate sedation once we had reached maximum recommended infusion rate (0.7mcg/kg/min). These guidelines are for adults and children may require higher rates. The use of a bispectral index monitor was a useful adjunct to guiding sedation in this patient. The use of BIS monitoring for children is at present limited but it has been shown to a useful guide for PICU sedation [4]. In conclusion, we describe a sedative technique using dexmedetomidine guided by BIS monitoring for the stereotactic treatment of an intracranial AVM in a six-year-old child.

References