

ANESTHESIA IN CHILDRENS FOR PERFORMING MAGNETIC RESONANCE IMAGING

SIMONA MARINESCU¹, M. CHIOREANU²

¹Tg.Mures County Emergency Hospital, ²University of Medicine and Pharmacy Tg Mures

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Abstract: Objectives: Anesthesia for magnetic resonance imaging presents environmental features, features related to the procedures, patient, anesthetic technique, which I will present in my study. In about 23 patients, children, undergoing MRI examination, I will present; the scanner, the anesthesia machine, monitoring equipment, anesthesia protocols, efficiency and safety of anesthesia technique. MRI procedures were performed in the Department of Radiology, with MRI scanner G. E. Sigma IOT; Patients were aged between 6 months and 15 years, 11 male, 12 female; Glasgow score of patients between 6 and 15. The pathology taken in study was neurological. We used compatible anesthesia machine: Datex Ohmeda Aestiva/5MRI. Anesthesia technique: general anesthesia with OTI; Children with craniocerebral diseases, require for MRI, general anesthesia with OTI. General anesthesia with OTI is safer and efficient. Complications were within the literature. Anesthesia was performed in collaboration with the radiological team.

Cuvinte cheie: anestezie, particularități, tehnica anestezică

Rezumat: Anestezia pentru rezonanță magnetică nucleară prezintă particularități legate de mediu, procedură, pacient și tehnică anestezică, particularități pe care le voi prezenta în lucrare. În legătură cu 23 de copii supuși examinării RMN, prezint: scannerul, aparatul de anestezie, aparatura de monitorizare, protocoalele de anestezie, eficiența și siguranța acestora. Procedurile RMN au fost efectuate în Departamentul de Radiologie, cu scannerul MRI (Magnetic Resonance Imaging), G.E. Sigma 1 OT. Pacienții au avut vârste cuprinse între 6 luni și 15 ani, 11 de sex masculin, 12 de sex feminin; Scorul Glasgow al pacienților: între 6 și 15 puncte. Patologia luată în studiu este neurologică. Aparatul de anestezie compatibil: Datex Ohmeda Aestiva/5 MRI. Anestezia a fost generală cu IOT (Intubație orotraheală). Copiii cu afecțiuni craniocerebrale, necesită pentru RMN, anestezie generală cu IOT. Anestezia sunt astfel mai sigure și mai eficiente. Complicațiile au fost în limitele celor citate în literatura de specialitate. Anestezia s-a efectuat în colaborare cu echipa de radiologie.

INTRODUCTION

Anesthesia for MRI has features, in addition to those of anesthesia given in outside the operating rooms, including: (6)

- The examination technique, namely the scanner, which generates the magnetic field, noise, heat, ventilation, the cooling systems, and other malfunctions;
- Anesthesia machine, and the equipments for monitoring and resuscitation, which if are not "compatible", may generate malfunctions;
- The procedure itself, isolation from ICU, the position of the patient in the scanner, discomfort, the lack of visibility, limited space for surveillance, monitoring and difficulty to perform resuscitation maneuvers;
- High anesthetic risk level especially for the emergency procedures;
- Technique of deep sedation/general anesthesia used ;

In the context of our experience in anesthesia outside the operating room (10), I will present in the followings, my observations related to the features of anesthesia for MRI

OBJECTIVES

Anesthesia for magnetic resonance imaging presents environmental features, features related to the procedures, patient, anesthetic technique, which I will present in my study.

MATERIAL AND METHODS

The trial was conducted on 23 patients, childrens undergoing MRI procedures for craniocerebral diseases where I practiced general anesthesia, with orotraheal intubation, to provide safety and effectiveness.

I took in the survey: age, sex, body weight, the elective or emergency character of the procedure, the diagnostic for which the procedure is made, comorbidities, ASA risk scale, and the anesthesia technique, in conformity with the protocol of the anesthesia management.

RESULTS

- Patients aged :between 6 months and 15 years, 11 male, 12 female, normal body weight, Glasgow Coma Score between 6 and 12 in 11 patients and 15 points in 12 patients
- The diagnostic for which the investigation is made: myelomeningocele 3 patients, cerebral tumors 2 patients, seizures 2 patients, meningoencephalitis 6 patients, craniocerebral trauma 8 patients, status post cardiopulmonary resuscitation 2 patients
- 15 patients have comorbidities: hydrocephaly 3 patients, acute respiratory infections 4 patients, one patient with asthma, one patient with hypoxic encephalopathy, one patient with seizures in his medical, history, and diffuse

¹Corresponding Author: Simona Marinescu, Clinical County Emergency Hospital Mureș, ATI children compartment, 50, Dr. Gh. Marinescu street, cod: 540136, Tîrgu Mures, Mures Romania; tel + 0265 212111

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axonal injury in 5 patients. And 8 patients were without comorbidity

- From the protocol of anesthesia used by us, I will mention that 12 of the patients
- were hospitalized in the pediatric surgery clinic, in the morning of the procedure, they were examined, evaluated and prepared for anesthesia. The anesthesia induction was made in the operating room with inhalatory induction using sevoflurane 8 %, then we assembled a peripheral venous line. We administered atropine 0,01 mg/bw, midazolam 0,3 mg/bw, propofol 1,5 mg/bw, fentanyl 0,03 mg/bw, rocuronium 0,4 mg/bw, and we performed orotracheal intubation. For maintaining the anesthesia we assembled propofol in continuous endovenous perfusion 6 mg/bw/hour. We transport the patient intubated, mechanical ventilated, continuous sedated and monitored in conformity with standards (EKG, pulse oximetry and blood pressure), in the MRI location where we transfer the patient on the scanner. Anesthesia is maintained intraprocedural with sevoflurane 1,2 MAC from a Datex Ohmeda compatible anesthesia machine, and monitoring is assured with EKG and pulse oximetry with compatible monitoring equipment. After the procedure the patient is transported back to the operating room, intubated, mechanical ventilated and continuous sedated with propofol. We extubate the patient in the operating room, and we supervise the patient in PACU (Postanesthesia Care Unit) for 6 hours. When the discharge criteria are achieved we transfer the patients at the origin clinics or let them go home. 6 patients from ICU, already intubated in conformity with their clinical status were transported intubated, mechanical ventilated and continuous sedated, in the MRI location transferred on Datex Ohmeda anesthesia machine with sevoflurane 1,2 MAC, after the procedure, they returned in the intensive care unit remained sedated and mechanical ventilated with Evita 4 ventilation machine.

DISCUSSIONS

- Deep sedation/general anesthesia is the election anesthesia technique, for children with MRI investigation (13,14,16,17,18,19) adapted at our conditions.
- Adverse reactions/complications in 0,7% cases (18) at 2 patients, one with desaturation and other with psychomotor agitation at awakening, shows that this technique is safe and efficient, every investigation was completed without problems. (7,11,12).
- The management of anesthesia technique, must apply to the anesthesia standards, more so the patient is transported in a different location, far away from the intensive care unit, transferred into the scanner, who represents a "suigeneris" place, (isolated, noise, heat, radiations) where is difficult to observe the patient, to monitorize or do resuscitation maneuvers.
- Anesthesia techniques, most common used in the literature for MRI (3) are: propofol/ketamine (4,5,18,19), pentobarbital/midazolam/fentanyl (9,15), midazolam/ketamine (8,9,18,19), halogenated anesthesia agents: sevoflurane (9,19), or clorally hydrate (9,19).
- The most common complications are: nausea, vomiting, desaturation, psychomotor agitation, allergic reaction, sedation failure, prolonged drowsiness confusion. (7,11,12)
- The management of anesthesia for MRI respects the international recommendations
- and standards (1,18,19), and SRATI recommendations.

CONCLUSIONS

- Anesthesia for children - subjects for MRI investigations must be efficient for the procedure and safe for the patient safety similar to the anesthesia in the operating room
- Deep sedation/general anesthesia is of choice for MRI in children with neurological problems
- Features related to the environment, transportation, location, procedure itself, the inherent risks (attraction of ferromagnetic objects, claustrophobia, difficult access to the patient in case of accidents: accidental extubation, paravenous administration, low temperature, noise, limited space for reaction in case of complications, anesthesia machine monitoring and resuscitating equipment compatible), requires organizational measures, very well trained and experienced anesthesia team, and also a very good collaboration with the radiology specialists
- Complications in general in our study in particular were in small percentage 0,7 %.
- Although we have ideal conditions of work, we tried to align at the national and international standards for the anesthesia outside the operating room, with competitive results.

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