



Research Article

RETROSPECTIVE STUDY OF ANAESTHESIA MANAGEMENT OF PAEDIATRIC PATIENTS FOR CT MRI

Sandhya Gujar., Pradnya Jagtap., Sumesha

PGIMSR ESIC Hospital, Andheri, Mumbai, Maharashtra, India

ARTICLE INFO

Article History:

Received 7th December, 2017

Received in revised form 26th

January, 2018 Accepted 13th February, 2018

Published online 28th March, 2018

Key words:

CT/MRI, Conscious Sedation, General Anaesthesia, Paediatric Patients

ABSTRACT

Introduction – With the development of new technology CTMRI procedures have become very common and routine investigation for perfect diagnosis and management of patient. A typical MRI takes 30 to 40 min. and it is very important to keep patient absolutely immobile for this period.

Issues for the anaesthesiologist are:

1. Head and torso of patient remains in MRI machine and are unavailable for airway management.
2. Loud banging noise makes patient claustrophobic.
3. Remote location of MRI machines for safety reasons, so comfort ness and availability of expert help and resuscitative methods are not accessible.
4. Patients are taken on an emergency basis routine preoperative checkups and preparation are compromised.
5. Patients for MRI are usually with cerebral palsy, newborn babies with congenital, neurological and cardiac defect. Including TPGA Transposition of great arteries, hydrocephalous Meningocele, ASD, VSD all these patients will be very high risk for general anaesthesia or even for sedation as ASA GRADE 3 OR GRADE 4 RISK.
6. Ferromagnetism causes iron or any other metal item to get attracted towards machine can cause dangerous complication including death.

Methodology – Our institute is equipped with MRI compatible anaesthesia machines and monitors we have studied requirement of anaesthesia and sedation in 100 patients from 1 month old to less than 12 years old. Study was conducted over period of 1 year and methods used were:

1. Pedichloryl 40-50 mg /kg body wt orally
2. inj. Fortwin and Midazolam in whom only sedation failed
3. complete general anaesthesia in ASA grade III or ASA grade IV , in patients were above methods failed and in patients when duration was more than 2 to 3 hours Anaesthetic induction agents were required mainly Ketamine and Propofol Older children with proper counselling were managed mainly by sedation method.

Patients were observed for adverse events like airway obstruction with hypoxia, immobility, hypothermia, and these complications were mainly present in only sedated patient, and with higher ASA grade status

Conclusion – Proper counselling of patient, taking care to avoid claustrophobia, preventing hypothermia with proper wrapping of patient, especially neonates, will make MRI successful in most of patient's cases .patients with higher ASA status, or critically ill were better managed with proper general anaesthesia with ETT or LMA.

Copyright©2018 Sandhya Gujar., Pradnya Jagtap., Sumesha . This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Magnetic Resonance Imaging (MRI) is a frequently used technique that produces particularly good images of soft tissue providing greater contrast between different types of tissues

*Corresponding author: **Sandhya Gujar**

PGIMSR ESIC Hospital, Andheri, Mumbai, Maharashtra, India

than computerised tomography. It is used extensively for CT/MRI of CNS, CVS, musculoskeletal system, pelvis and liver. An MRI study usually consist of multiple image sequences each taking up to 10 minutes to acquire an image and any movement during this time will produce profound distortion of image. The number and duration of scan is variable sometimes taking up to 2 hours. The MRI scan is noisy and produces claustrophobic environment with almost restricted access to patient.1

The aim of anaesthesia is therefore to provide immobility to obtain best possible images while maintaining patient safety and comfort throughout procedure. This is achieved by either general anaesthesia or deep conscious sedation both of which require meticulous organization, education and training of staff involved.² Anaesthesia management for CT MRI patients is different from routine procedure as these patients are on emergency/day care basis and routine checkups and preparation is compromised. As the patient head is positioned inside MRI machine access to airway becomes most difficult and this makes anaesthesia management even more complicated.

Aim of study

1. To study effect of proper counselling of patient and parents in decreasing requirement for sedation.

When proper counselling is done for calming the patient and anxiety of patient is decreased, minor procedures like MRI of lower limb and abdomen can be accomplished without any sedation. Patient less than 1 year old were tried after complete covering of patient before placing them in duct to prevent hypothermia and ear plugs were put to decrease noise level.³

2. To study rate of incidence of adverse events mainly:
 - Respiratory complications like hypoxia, airway obstruction.
 - Inability to keep child quiet resulting in failed scan.
3. No. of patients requiring rescanning because of failed sedation and identifying patient who require general anaesthesia, from the beginning for safe and successful procedure.
4. To assess quality of scan images by Radiologists.

Inclusion criteria was All children between ages of 1 month to 12 years of age, Children's with ASA grade III and IV , children in whom sedation was unsuccessful with primary care physician.

Children who were intubated and ventilator dependent and Children hospitalised before procedure were excluded from the study.

MATERIAL AND METHODS

After proper informed consent taken from patient's parents study was started.

This is retrospective clinical cohort study of 100 patients aged 1 month to 12 year old over a period of 1 year. Preanaesthetic examination and preparation of patient with appropriate fasting and venous access was done .Patient for CTMRI was divided into mainly two groups.

1. Group 1 - For elective procedure,
2. Group 2 - For emergency procedure

Group 1 - For elective procedure

Proper preanaesthetic checkups were done in anaesthetic OPD. Required investigations were done including respiratory and cardiology opinion of children of ASA grade 3 and 4. Optimisation of patient with antibiotics, antihistaminic, chest physiotherapy before procedure was done as far as possible to make patient free of risk of anaesthesia.

Group 2- For emergency procedure

Patients who need CT MRI for emergency procedures like abscess drainage, shunt procedure, diagnostic procedures.

These patients were evaluated clinically and checked for respiratory and cardiovascular status.

After counselling of patient and parents, these methods used are:

1. Children who are calm and without anxiety were tried without sedation by CT MRI personnel.
2. With Sedation/Anaesthesia used were
 - a. **Pedichloryl –chloral hydrate:** 50-100 mg/kg body weight given 1 hour before procedure. Sedation was given by nurses trained at CT MRI centre.
 - b. **Pentazocine and midazolam:** 0.3-0.6 mg/kg and 0.1-0.2mg/kg respectively were given, (1) Either as sole agent or (2) After scan failed with only pedichloryl solution.
 - c. **Conscious sedation with Propofol:** with continuous infusion used, when both above methods failed or as an initial anaesthesia in preselected children mainly patient with cerebral palsy, patient with continuous neurological irritation and uncontrolled movements.
 - d. **IV Ketamine:** 0.5-1.0 mg/kg body wt. was used to keep patient movement under control as a single bolus dose at critical moment of scanning.

The decision to give general anaesthesia was based on the requirement of complete stillness at time of scanning.

Patient who may develop airway obstruction with deep sedation were kept at the discretion of attending anaesthesiologist assigned to CT MRI dept.

Documentation of data include

1. Patient characteristics,
2. ASA physical status,
3. Significant medical history and examination,
4. Drugs given and their route of administration,
5. Time from start of sedative administration to start of procedure,
6. Total duration of procedure, and
7. Time to discharge home that is recovery.

Criteria used for discharge to home were similar for both sedation and general anaesthesia.

Documentation of complication and events was as follows:

1. Respiratory event
 - a. Hypoxemia (decrease in SPO₂ by >10% of baseline for >30 seconds).
 - b. Upper airway obstruction: Tachycardia, hypoxia, irritability
 - c. Inadequate sedation: Was defined as difficulty in complete scan because continuous movement of child. Patient was given additional drug if possible.
 - d. Failed sedation complete obstruction of procedure requiring rescanning
 - e. Over sedation i.e. prolonged sedation more than 30 minutes after completion of procedure. This was documented if patient required prolonged monitoring, transferred to recovery room or ICU admission
 - f. Nausea, vomiting or aspiration.

Documentation of quality of scan was done by senior radiologist with good, adequate and bad opinion requiring rescanning

RESULTS

100 patients aged between 1 month and 12 years of age were studied for management of anaesthesia. Proper counselling of patient, making patient (very small children less than 1 year) comfortable by proper covering to prevent hypothermia, putting ear plugs to prevent noise causing irritation (claustrophobia have made MRI screening unsuccessful in almost 10 % of patients).

Small children aged between 6 months to 5-6 years were given 50-100mg/kg of Pedichloryl as a first choice. Pedichloryl was administered by staff in CT MRI dept orally early in morning at least 50 minutes to 1 hour before procedure. Once child was asleep procedure was done in the presence of anaesthesiologist. At least 50 % of patients have allowed scanning for duration of 45 minutes to 1 hour without any additional sedation. If scan was prolonged and when child started moving patients were brought out of scan room and were administered inj. midazolam 0.1mg/kg body wt. keeping dose to minimum required as airway obstruction and postponement of scan was more likely with deep sedation.

Children with age more than 5-6 years up to 12 years were not convinced properly and did not allow procedures to be completed with only sedation. Additional sedation with inj pentazocine 0.3mg/kg up to 0.6 mg/kg along with Phenergan were administered to these children. Children who required additional sedation required monitoring for longer period for more than 2 hours.

6 children aged between 3 to 10 years required monitoring in anaesthesia recovery room in main operation theatre by senior residents who were on call duties. These patients were required to be admitted to the hospital for 1 day and had to spent more cost for procedure.

Adverse reactions such as hypoxia, airway obstruction were present in almost 5 -10 % patients.

On detection of decrease in saturation MRI scan was stopped, patient brought out of machine and additional airway manoeuvre was done to maintain saturation. When the child could not maintain saturation, procedure was aborted and child was reposted for scan on some another day.

Almost 20 patients mainly aged bet 5 to 12 years were given general anaesthesia. Actual amount of drug used was compared to only sedation with Propofol infusion. No respiratory event resulted in long term sequel because of early intervention.

DISCUSSION

Considerable debate exist regarding merits of sedation and general anaesthesia for MRI as it is associated with many issues mainly remote location, specific patient characteristic like ASA grade III and IV, limited access to patient, ferromagnetism requiring MRI compatible anaesthesia machine and infusion pump, implanted metallic devices like pacemaker, cochlear implant, aneurismal clips.^{4,5}

Injection of contrast can cause anaphylactic reactions and also can be dangerous in a patient with renal disease and most important is noise causing claustrophobia making it impossible for patient to sleep quietly.

If MRI compatible anaesthesia machine and infusion pump are available anaesthetic technique should not be much problematic either with LMA OR ETT with relaxant technique. Continuous infusion with Propofol is also quiet compatible with patient's safety.

CONCLUSION

Although failed scans due to inadequate sedation are reported, if patient's anaesthetic requirement exceeds conscious sedation, former general anaesthesia with LMA or ETT is preferred to deep sedation with proper protection of airway which may increase complication rate including admission to ICU and prolonged monitoring.

References

1. Statement on non-operating room anesthetizing locations. Committee of Origin: Standards and Practice Parameters. American Society of Anesthesiologists, 2008. Available at: <http://www2.asahq.org/publications/>
2. Sethi DS, Smith J. *Pediatric sedation*. Anesthesia Tutorial of the Week 2008. Available at: <http://www.anaesthesiologists.org/2008/11/10/paediatric-sedation-105/>
3. Guidelines for Monitoring and Management of Pediatric Patients During and After Sedation for Diagnostic and Therapeutic Procedures: An Update. American Academy of Pediatric dentistry, 2006. Available at: www.aapd.org/media/policies.asp
4. ASTM F2503-13, Standard Practice for Marking Medical Devices and Other Items for Safety in the Magnetic Resonance Environment, ASTM International, West Conshohocken, PA, 2013. Available at: www.astm.org.
5. IEC 62570 Ed.1.0, Standard practice for marking medical devices and other items for safety in the magnetic resonance environment.

How to cite this article:

Sandhya Gujar., Pradnya Jagtap., Sumesha (2018) 'Retrospective Study of Anaesthesia Management of Paediatric Patients for Ct Mri', *International Journal of Current Advanced Research*, 07(3), pp. 11233-11235.
DOI: <http://dx.doi.org/10.24327/ijcar.2018.11235.1941>
