ANAESTHESIA FOR DIAGNOSTIC IMAGING

Diagnostic Imaging (DI) includes CT scan, MRI and angiography. It may be purely diagnostic or interventional.
There are CT, MRI and Angiography facilities in KKH but there are occasions where cerebral angiography procedures may be done in NNI or SGH.

The CT scanner and MRI are located in the DI department at Basement I and the Angiography suite is located next to the Major operating theatre suite on Level 2 Children's Tower.

Patient Listing

Elective patients

All patients are listed through Diagnostic Imaging, KKH at 6 394 2250 / 2253
Diagnostic Imaging faxes the list of patients to the Major Operating Theatre, Children's Reception; 63942227

Emergency requests for MRI / CT scan / Angiography suite

All emergency requests requiring GA are to be directed to the Anaesthetic Consultant on-call.

Patients who can be listed as Outpatients

- ASA 1 and 2 patients
- Full term infants who are 4 months of age and older

Patients requiring admission

- As a general guideline, *all patients less than 4 months of age* should be admitted the day before.
- Ex-premature babies of Post Conceptual Age < 60/52.
- Patients with poorly controlled underlying medical problems that are poorly controlled e.g. brittle diabetics, poorly controlled asthmatics.

- Patients with obvious airway problems or intrathoracic /mediastinal masses, which may cause airway compromise after sedation/induction of general anaesthesia
- All ASA 3 and 4 patients

Patients requiring anaesthetic assessment:

Patients with stable but complex medical/ congenital heart disease who are currently stable should be referred to the Anaesthetic Consultant doing the list.

The child can be reviewed at Children's Operating Theatre Reception area (as a non urgent consultation, for example, on the same day that the child is seen at the Specialist Outpatient Clinic and listed for the imaging/procedure). All relevant case-notes should accompany the patient and the anaesthetist reviewing the child must record in the anaesthesia chart relevant history, physical exam / investigations. This chart MUST be stapled to the DI investigation form so that it accompanies the child when he/she presents for the DI procedure.

Fasting guidelines

See fasting guidelines in chapter on paediatric anaesthesia

Laboratory investigations

No investigation are required if patient is a day case and or is otherwise fit and well.

Consent

DI has a separate procedural consent form. Anaesthesia consent must be separately obtained.

Anaesthetic Management

The CT Scan, MRI and Angiography suites are equipped for general anaesthesia. Generally, assistance for cardiac catheterization in the Angiography suite is provided by AU nurses from major OT. For all other diagnostic and interventional radiological procedures, assistance is provided by AU nurses from DI.

For children undergoing CT/ MRI under GA, there is a separate induction and recovery area located just outside the MRI.

Equipment check

As in the operating theatre, all equipment should be checked prior to induction of anaesthesia.

CT Scan & MRI

The Induction area is located in zone 2 of restricted public access (supervised) within the MRI facility
This induction area also serves as reversal and immediate recovery for CT and MRI patients. Equipment includes:

- Drug trolley
- Anaesthesia machine (Drager Titus)
- Airway equipment including Ayre's T piece
- Monitors; 2 pulse oximeters, NIBP and capnograph and anaesthesia agent monitor
- Suction apparatus
- Patient warming devices
- Infusion pumps

MRI room

Anaesthesia machine is Drager Fabius MRI which is MRI conditional and mounted with sevoflurane.
Strict observation of MR safety rules i.e. no metallic objects, which may cause injury to both patients and staff.

Monitoring

There is a central physiologic and respiratory agent monitor that sends signals to a remote monitor in the control room.

Conduct of anaesthesia

General considerations

For patients undergoing CT scan or MRI, induction and reversal *must* be done in the induction area, *on a trolley that allows Trendelenburg position.*

General anaesthesia is the preferred technique; usually spontaneous respiration with an LMA. Intubation / IPPV may be required in small infants or children at risk of raised intracranial pressure or in any child in whom spontaneous respiration is inadequate.
Sedation techniques may occasionally be used.

All airway devices must be well secured.
The child must be well oxygenated and sufficiently deepened before transfer from induction area to scan room.

Transfer of patients

For the heavier children > 20kg or with unstable cervical spine, avoid carrying the patient in and out of the scanning rooms.
The MRI table can be pushed out into the induction area for the child to be transferred directly onto the table.

The CT scan room is situated at a separate location a short distance away from the induction room (MRI facility). For CT scan, the trolley carrying the child can be pushed into the room and child transferred onto the scanning table. Should there be anticipated delay in the transfer from induction room to the CT scan room, consider ventilating the patient during transit (ambu bag/ T piece with O2 cylinder) and prepare for equipment.
Smaller children may be carried into the scanning room.

In the scan room

IV drip flushed and tested to ensure smooth flow.
The position of airway must be re-checked.
All monitors are placed and checked for good signals.
All pressure points must be protected.

Blankets and plastic wraps should be used to keep patient warm.

Patient's mask and oral airway should be brought into the room together with the child in the event of accidental dislodgement of LMA or ETT.

MRI considerations

Check that the patient has no metal pieces on e.g. earrings, religious bangles or on the clothes before transferring into the MRI scan room.

Intubated patients from ICU may have endotracheal tubes secured with zinc oxide tape that might interfere with imaging and has to be replaced with silk tape.

In MRI patients, the skin must be cleaned and prepared with a special abrasive gel before application of ECG leads. (allows good adhesion of ECG leads). This is a very important step taken to reduce the incidence of burns at this site.

Soft earplugs are inserted and eyes taped and protected.

In the scan room, when ECG leads are placed ensure that the leads do not cross each other.

All monitors must be placed and good signals are obtained in both the main and slave monitors.

Common problems

1. Desaturation

This can occur with dislodgement of the LMA or ETT. The patient must be removed from the coil and patency and position of the airway checked and appropriate management instituted.

2. Hypotension

This is uncommon and can be due to prolonged fasting and inappropriately high levels of volatile agents. Boluses of crystalloid can be given and volatile depth adjusted.

In the event of a critical cardio-respiratory event (especially in the MRI scanning room), the patient should be quickly transferred to the induction area for resuscitation. **No resuscitation is to be done in the MRI room!!**

Recovery

Patients are observed in the induction / recovery area till they wake up.

The outpatient can be transferred to the waiting area till the discharge criteria are met.

In the event of complications that require admission of the child, arrangements with the referring physician must be made and the parents informed.

Critically ill patients

Presence of accompanying physician for In-patient scans:

All ICU patients will require the presence of a suitably qualified physician during transport to and from the Diagnostic Imaging areas.

For all other categories of patients, the primary physician will decide on the necessity of an accompanying doctor.

Accompanying staff members and equipment of ICU / HD patients – on ventilator or otherwise – will need to be assessed for MRI safety before entry into the scan room.