



DEPARTMENT OF ANESTHESIOLOGY AND PAIN MEDICINE

INTRODUCTION

Neurofibromatosis (NF) treatment plans include frequent surveillance MRI scans (magnetic resonance imaging) often lengthy with thin cuts.

We present a case of extreme hyperthermia most probably from the resonant frequency (RF) of the scanner.

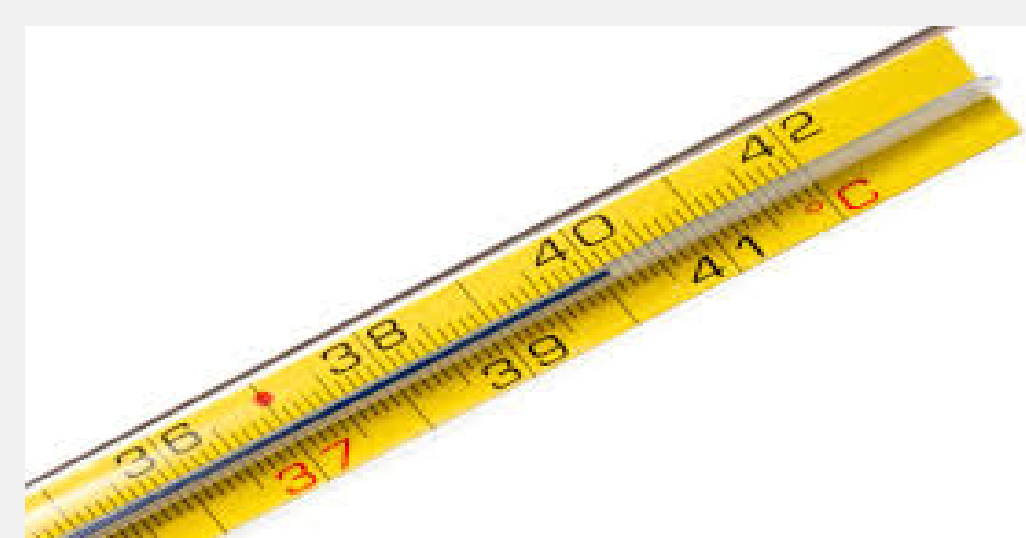
There is variability amongst oncologist plans for interval frequency and radiologist directed surveillance protocols.

Radiofrequency fields during MRI from powerful radio transmitter interacting with patient tissue can lead to power dissipation within the patient.

- Heats patients and can cause hyperthermia
- Creates a risk for burns if non-uniform due to conductive material (i.e. non-MRI monitoring sensors)
- Humidity and clothing contribute to heat absorption
- Bore fan, cool room temperature promotes heat dissipation
- Imaging techniques can decrease SAR (Specific Absorption Rate)

The anesthesiologist contacted the oncologist and radiologist to create a plan for this patient given the incidence of hyperthermia following last anesthetic to discuss:

- Surveillance frequency
- Splitting the scan into two anesthetic events
- Should a CXR or CT scan be done prior to anesthesia to evaluate for interval growth of the chest mass, involvement of anterior mediastinum and worsening of deviation/compression?



CASE

4 year old patient with NF type 1 scheduled for a surveillance total body MRI with 4 hours of scanning time.

- Chest fibroma causing tracheal deviation
- Optic nerve fibroma
- Fever to 104 F with lethargy post anesthesia discharge following last MRI at an outside hospital
- Otherwise healthy child

Pre-anesthesia concerns:

Tracheal deviation: Prior scan 1 year ago showed gradual deviation but no compression of the airway or vessels.

- Oncologist reported no clinical changes
- Radiologist reported serial growth does not suggest rapid or anterior mediastinal involvement

Hyperthermia: outside records revealed a trigger free anesthetic with propofol only - decreased the likelihood that the fever was a result of malignant hyperthermia or hyperthermic rhabdomyolysis.

- Oncologist agreed to split the scans to two events
- Radiologist decreased the number of sequences and divided into 2 occurrences

Intra Procedure Anesthetic Management:

- **Sevoflurane** induction and maintenance
- **Core temperature** monitored

Post Anesthesia Care

- First scan of brain and orbits, 1.5 hours and no fever reported
- Second scan of chest and thoracic spine, 3 hours temp 38.7°
- No fever in the recovery room or post discharge home



DISCUSSION

Pre Anesthesia planning allows time to optimize and coordinate care:

- **Pre-anesthesia assessment** including directed questions regarding anesthetic complications of the patient and the family is paramount.
- **Multidisciplinary** planning of complex scans (ordering physician, radiologist, anesthesiologist) can be initiated by the anesthesiologist and provides opportunity to minimize both the anesthesia and RF exposure.
- **Surveillance protocols** for MRI in children with tumors and fibromas should include consideration of cumulative anesthetic exposure and risks of prolonged scanning including SAR induced hyperthermia.
- **Dividing long MRI scans** into 2 anesthetic events resulted in decreased hyperthermia in this patient.
- **Balancing risks** of hypothermia from exposure and hyperthermia

REFERENCES

Wilson SR et al. Guidelines for the safe provision of anesthesia in Magnetic resonance units 2019. Anaesthesia. Vol 74. Issue 5.

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