

Anesthetic Considerations For Radiofrequency Ablation In A Child

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Citation

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Abstract

Radiofrequency ablation of hepatocellular tumors are associated with complications. There are very few case reports of radiofrequency ablation procedures in children. We discuss about the anaesthetic management and considerations in a child undergoing radiofrequency ablation for a hepatocellular carcinoma.

INTRODUCTION

Radio Frequency Ablation techniques were introduced in medicine in the 1980s, by interventional cardiologists to treat cardiac arrhythmias¹. The procedure requires directly placing an electrode into the tissue and attaching it to a Radiofrequency (RF) generator. RF energy is emitted from the electrode into the surrounding tumor/tissue so as to create an RF electrical field. The alternating electric current, in the range of RF waves (usually 400–500 kHz), causes ion agitation in the tissue and a localized heating effect, followed by coagulation necrosis and finally cellular death². Such RF coagulation is called desiccation. Sonography plays an important role in the guidance of both percutaneous and intraoperative RFA procedures. It provides real-time images for positioning the RF electrode and monitoring the thermal lesion.

Radiofrequency ablation (RFA) to treat tumors in adults has been widely reported. With the exception of osteoid osteomas, there have been few reports in which RFA has been used to treat tumors in children^{3, 4}

A 9 year old female child, a known case of tyrosinemia type I, with history of icterus since the age of one year presented to us with hepatocellular carcinoma. She was being prepared for orthoptic liver transplantation. Radiofrequency ablation of the hepatocellular carcinoma was planned as a bridge procedure to transplantation. Examination revealed vital signs were within normal limits but she had peripheral signs of liver cell failure. On investigation hematocrit was 39%, platelet count – 43000/cubic mm, APTT was prolonged by 10sec and INR was 1.53. Echocardiogram showed a

clinically insignificant PDA of 1mm.

She was premedicated with oral lorazepam 1 mg, 1hr prior to the procedure. Coagulopathy was corrected with 2 units of FFP and 2 units of platelets. Monitoring included ECG, SpO₂ NIBP, ETCO₂ and temperature. She was induced with fentanyl 1mcg/ kg body wt, propofol 2 mg/ kg body wt and a 2 ½ size LMA was placed. Anaesthesia was maintained on spontaneous ventilation with air, oxygen and sevoflurane. Preoperative hypothermia was not induced due to smaller size lesion and the procedure was done in an airconditioned room.

The tumor was localized with ultrasound and skin was infiltrated with 2% lignocaine. RITA () RF system was used for the procedure. A 15cm RF needle (StarBurstXL 15 cms length, 3-5 cms ablation) was used with ultrasound guidance. A 10ml bolus of propofol was given intravenously and breath was held during the time when needle was introduced into the lesion. There was no abdominal distension during breath holding The target temperature was set at 105 degrees C. The probe was gradually opened upto 4cm. Once the target temperature was reached, RF ablation was performed for 8 min. The needle was retracted with track ablation. Procedure was uneventful. Patient was shifted to pediatric ICU for monitoring. Child was discharged 48 hours post procedure without any complications

SOME CONSIDERATIONS FOR RFA IN CHILDREN

1 RFA is often done under conscious sedation and local anaesthesia in adults.⁵ Children, require general anaesthesia since they find it difficult to lie still, cannot tolerate pain and

have difficulty in understanding and following instructions (e.g. breath holding).

2. The complications of anaesthetising a child in a remote location.

3. Standard grounding electrodes are often too large for small children and smaller ones may be needed. Since pediatric grounding pads have less cross-sectional area than adult pads, the maximum wattage (60 W) should be maintained below the manufacturer's instruction-for-use (90 W) to reduce the possibility of creating skin burns at the pad sites³.

4. Intra and post procedural complications include hyperthermia (hyperthermia is more in a child compared to adults due to higher heat delivery relative to body volume)^{6,7}, tumor lysis syndrome (cell death)⁸, fever and flu like symptoms(inflammatory mediators)⁹, pain, subcutaneous hematoma, thermal injury to adjacent organs.

RECOMMENDED ANAESTHETIC MANAGEMENT FOR CHILDREN UNDERGOING RFA INCLUDES

- General anaesthesia with adequate pain control,
- Availability of emergency drugs and equipment as it is remote location anaesthesia
- Baseline and post procedural electrolytes,
- Induction of hypothermia for larger lesions⁷,

- Adequate hydration,
- Intraoperative measurement of temperature and
- Post procedural admission in hospital for monitoring.

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