An Asleep Awake Asleep Anesthetic Technique for Intraoperative Language Mapping in the Fringe Fields during Interventional Magnetic Resonance Imaging Guided Neurosurgery

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Introduction

Speech mapping is necessary during neurosurgical procedures in the vicinity of the sylvian fissure of the dominant hemisphere. During interventional magnetic resonance imaging (iMR) guided neurosurgery patients may be confined in a narrow space during scanning procedures. When airway assessment, airway access and airway management options are limited during surgical procedures that may require deep sedation, a secure airway is advantageous. A technique that combines general anesthesia with endotracheal intubation and full wakefulness during language mapping has previously been described.(1) The present report describes the application of this anesthetic technique during interventional magnetic resonance guided neurosurgery.

Methods

Information is obtained by retrospective chart review and review of data on anesthesia complications collected prospectively. During the last year an Asleep Awake Asleep anesthesia technique was used during interventional magnetic resonance imaging guided neurosurgery in 5 patients who required intraoperative language mapping. Awake language mapping procedures were performed in the fringe field of a 0.2 Tessla Siemans Magnetom Open MRI. The iMR-OR Suite is equipped with a rotating surgical table that pivots the patient´s head from operating position (in the weak fringe fields) to imaging position.

Results

Fiberoptic endotracheal intubation was performed at the beginning of each case. The fiberoptic endoscopes (Olympus America Inc) and light source (Model 481C, Karl Storz Inc) functioned properly and were safe adjacent to the head with the surgical table in operating position. A modified endotracheal tube was used to provide topical anesthesia of the airway prior to emergence, extubation, and awake speech mapping. After general endotracheal anesthesia was established each patient was positioned with the head turned to the right and fixed in a rigid MRI compatible skull clamp. An MRI compatible anesthesia machine (Excel 210, Datex-Ohmeda, Inc); ventilator (Omnivent, Omnitech Medical Inc); and monitoring equipment (3150 MRI Physiologic monitor and 3155 Remote Display Controller, InVivo Research, Inc) were used. Monitoring for craniotomy included electrocardiogram, inspired oxygen monitor, end tidal carbon dioxide monitor, invasive and noninvasive blood pressure, and pulse oximeter. After positioning a field block was established by infiltration of bupivicaine. The surgical table was then rotated to imaging position and planning MR images were obtained. After the craniotomy was completed patients were awakened and language mapping procedures were performed with the patient in the operating position (with the head in the weak fringe fields.) Immediately prior to awakening and extubation of the trachea a MRI compatible stand and MRI compatible IV poles were positioned to tent the surgical drapes and provide the anesthesiologist with access for airway management and the neurophysiologist with access for language testing. Speech mapping was successfully performed in all patients. Despite the field block and local anesthetic infiltration of pin sites one patient complained of marked headache during speech mapping procedures. When awake speech mapping was completed reintubation of the trachea was performed either fiberoptically (3 patients) or over a tube changer left in place during speech mapping (2 patients) and general anesthesia was induced. The system of drape supports was removed, the drapes were repositioned to cover the face and allow the surgical field to be moved into the narrow opening of magnet for intraoperative imaging. The duration of general anesthesia prior to awake mapping was 3.7±1.2 hours, of awake language mapping was 1.4 ± 0.6 hours, and of general anesthesia after awake mapping was 3.6 ± 0.6 hours . There were no adverse sequelae of anesthetic procedures or technique.

Discussion

In the iMR guided neurosurgical procedures described the Asleep Awake Asleep anesthetic technique was an effective and safe method for combining awake language mapping in the fringe fields and intermittent intraopertive MR imaging.

References

1.Huncke K et al: The Asleep Awake Asleep Technique for Intraoperative Language Mapping Neurosurgery. 42:1312-1317,1998