Deep brain stimulation (DBS) is a relatively new therapy which is used principally in the treatment of movement disorders. It is an implanted device which acts by generating impulses via electrodes inserted into specific brain nuclei in an adjustable and reversible fashion. DBS is approved for use in essential tremor, Parkinson’s disease, dystonia and more recently for OCD and epilepsy. With the increasingly widespread use of DBS therapy, anaesthetists are now more likely to encounter these devices in other surgical settings. The management of these devices in non-DBS surgery will be discussed. This talk will mainly focus on anaesthesia for insertion of DBS. The majority of patients undergoing DBS surgery have Parkinson’s disease and the particular challenges that this patient group presents for the anaesthetist will be covered.

For DBS patients undergoing other surgery the device should be turned off and surgery should be conducted using bipolar diathermy. MRI is contraindicated in the presence of DBS. Should MRI be necessary, the device company should be contacted to advise and make model-specific adjustments. All interruptions to DBS function need to be covered with Parkinson’s medication.

Anaesthetic techniques vary between centres and range from local anaesthesia (LA) to asleep-asleep (AAA) to general anaesthesia (GA). At our centre AAA supplemented with LA infiltration without airway instrumentation is used for electrode placement. Optimal electrode positioning relies on anatomical targets, electrophysiological monitoring and clinical assessment of patients. This approach uses:

- preoperative MRI and frame-based imaging techniques using CT scan to establish coordinates of target nuclei, usually subthalamic nucleus (STN) for Parkinson’s, ventralis intermedius nucleus (Vim) for essential tremor, globus pallidus (GPI) for dystonia
- intraoperative microelectrode recording (MER)
- clinical macrostimulation of the electrode in the awake patient to confirm clinical improvement and monitor for undesirable side-effects

Once the microelectrodes are successfully placed, GA is induced and the battery inserted, usually in the anterior chest wall.

Preoperatively Parkinson’s medications are withheld and other usual medications continued. No benzodiazepine premedication is given. A preoperative visit with full explanation is very reassuring for the patient. Intraoperatively at our centre propofol TCI and fentanyl supplements are used with LA infiltration by the surgeon. Propofol is titrated to achieve an awake state for electrode insertion and testing. Provided propofol is ceased in a timely fashion there is minimal interference with MER during the awake phase. Dexmedetomidine has been successfully used and has advantages of less respiratory depression and less hypertension than propofol.

Potential surgical complications are intracranial haemorrhage (ICH), seizure activity and, theoretically, venous air embolism. Because the risk of ICH is greater in chronic and acute hypertension, active management of intraoperative hypertension is required.

For the anaesthetist airway management of the sedated patient in a fixed head frame poses a significant challenge. Care with positioning, airway support and judicious use of sedation all help to minimize airway complications. However for those patients in whom airway difficulties are anticipated GA is considered a safe and viable alternative.
There have been several case series studies reporting no difference in short and long term outcome for patients undergoing DBS insertion under GA. Propofol, inhalational agents and ketamine have all been reported for use in GA for DBS insertion. There is clearly a need to conduct a prospective randomized study comparing outcomes in GA and LA groups in this rapidly growing area of surgery.

References:
