

## Anaesthesia for cataract surgery in a patient with deep brain stimulator

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Dear Editor,

Deep brain stimulators (DBS) are implanted neurostimulator devices used in the treatment of certain neurological conditions including Parkinson's disease (PD). We describe the anaesthetic management of two such patients with DBS posted for phacoemulsification. The first patient was a 69-year-old lady who had been diagnosed with PD ten years ago and underwent DBS implantation (Medtronic Activa PC) 2 years ago. She had history of frequent falls and had undergone orthopaedic surgery under general anaesthesia for fixation of hand fracture, during which the neural pacemaker had been switched off. The second patient was 65 years old and had a DBS implanted 6 years ago (no records available), whose battery had been replaced six months earlier. She had no tremors and only bradykinesia.

She had undergone uneventful cataract surgery for the other eye 5 years ago at a different centre. These patients had cataract of grade NS1 and NS2 respectively and were posted for cataract surgery under monitored anaesthesia care. On the morning of surgery, the patients were kept nil by mouth for six hours, an intravenous line was secured and high-risk informed consent was taken. In the operating room, standard monitors including ECG, pulse oximeter and non-invasive blood pressure were attached. The DBS was not switched off and the patient's therapeutic controller was used to note the settings of the pacemaker before the procedure (Figure 1).

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Figure 1: Deep Brain Stimulator (DBS)

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The cataract surgery was done under topical anaesthesia as neither of the patients had head or truncal tremors that would interfere with the surgery. The procedure was done by expert surgeons using the Alcon Centurion Vision system (with Active Sentry) using the phaco probe in the “continuous” mode. The procedure lasted around 15 minutes and was uneventful. The device functioning was checked and confirmed using the hand-held programming device at the end of the surgery. The post-operative visual acuity improved to 6/6 from counting finger close to face (CFCF) in the first patient and to 6/12 from 3/60 in the second patient.

Neurostimulation of deep brain structures like thalamus, globus pallidus and subthalamic nucleus is effective in controlling rigidity, bradykinesia and tremors in PD and other movement disorders as well as chronic pain, psychiatric illness and epilepsy.<sup>1</sup> The pulse generator is implanted in the anterior chest wall while the insulated leads run subcutaneously through the neck and through a burr hole to the electrodes in the deep brain. The device can be programmed using an external device which is usually in possession with the patient. The manufacturer warns against the use of diathermy (short wave or microwave, as used in physiotherapy for pain relief and joint conditions) as well as electrocautery.<sup>2</sup> For any procedure to be safe, it must not produce increase in heat energy or induce electric current in the vicinity of the leads as this may be conducted to the brain electrode and cause irreversible neurological damage. The heat induced injury may occur even if the device is switched off. The Medtronic safety manual does not provide any safety protocol for phacoemulsification.

The ultrasonic probe uses the piezoelectric effect, that produces acoustic waves to deliver energy, to break the cataract. As a side effect, heat energy is produced at the phaco tip. The “pulse” mode generates less heat energy than the “continuous” mode of power modulation. Early case reports mention switching off the device and doing the case under general anaesthesia as head tremors would render cataract surgery under local anaesthesia impractical.<sup>3</sup> Other authors have reported the safety and lack of interference of the DBS with phacoemulsification.<sup>4,5</sup> Few measures suggested to reduce the rise in temperature in the anterior chamber include a proficient surgeon, thereby reducing the phaco time, use of cold saline (4°C) for irrigation, appropriate volume for irrigation, use of “pulse” mode of the ultrasonic probe and horizontal vibration.<sup>4,5</sup> Nevertheless, the risk of thermal injury to the implanted lead wires during phacoemulsification remains hypothetical at best, as the first structure to bear this insult would be the cornea and globe itself. We reiterate the safety and feasibility of phacoemulsification in patients with an active DBS system. This however needs to be mentioned in the equipment manual too.

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### **Conflicts of interest**

There are no conflicts of interest.

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