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Interventional MRI for functional neurosurgery: an audit of our practice

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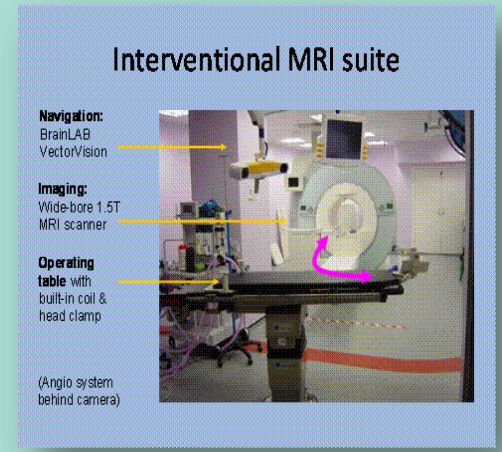
Introduction:

Deep Brain Stimulation (DBS) surgery in an Interventional MRI (iMRI) suite is relatively new. At our institution functional neurosurgery moved to the iMRI suite in 2011 when we opened the first unit in the UK.

Prior to this, surgery was performed in the operating theatre with transfers to the radiology department for MRI scanning preoperatively to guide surgical planning and intra operatively to verify lead location (1). This reflected on the operative time with 40 cases performed per year as only one procedure was performed per day.

The majority of our patients have a general anaesthetic for the procedure and undergo insertion of both electrodes and battery in the same setting (2,3). Our aim was to review the employment of iMRI for functional neurosurgery at our institution and to see how our practice has changed as a result.



Methods:

Patients who had undergone functional neurosurgery between January 2013 and January 2014 were identified using a database.

Patients' demographics, details of the surgical procedure and complications were then gathered from the case notes.

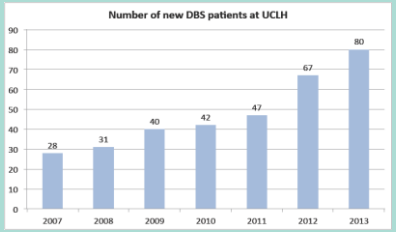
Table 1: indications for functional neurosurgery

Surgical indication	Number of patients [n=80]
Parkinson's disease	36
Chronic headaches	12
Dystonia	17
Essential tremor	7
Obsessive-compulsive disorder	3
Tourette's syndrome	4
Depression	1

Results:

80 patients were identified. The median patient age was 55 (19-74) years with 64% [n=51] patients being male. The primary indication for deep brain stimulation was Parkinson's disease [table 1]. The average surgical time in the iMRI suite was 3 hours and 29 minutes [SD +/- 2 hours 5 minutes] which allowed an increase in our through put to 2 patients per day [graph 1].

We have had no significant peri-operative complications or safety issues as a result of operating in an iMRI suite. One patient had a grade 1 pressure sore, this we believe was because the iMRI operating table was not sufficiently padded to protect pressure areas when compared to a standard operating table.



Conclusion:

We believe that the use of iMRI for functional neurosurgery has reduced the total time needed for surgery by eliminating transfers to the MRI scanner which therefore allowed us to insert the battery under the same anaesthetic. This is better for our patient population, many of whom rely on frequent oral medications for their condition; the duration of anaesthesia is shorter allowing faster recovery and improved patient experience. The system has also increased our efficiency, allowing us to double our patient throughput in 2 years thus reducing waiting lists. We expect to operate on between 80 to 100 patients in the coming year. We have had no major complications despite this being a relatively remote site i.e. not within the main operating theatre complex and surgery being performed within the vicinity of an MRI scanner.

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2. Bergese SD, VenkatraghavanPuenta EG . Anaesthesia in the intraoperative MRI environment. *Neurosurg Clin N Am 2009 ; 20:155-62.*
3. Lashmi; Manninen, Pirjo. Anaesthesia for deep brain stimulation *Current Opinion in Anaesthesiology*: October 2011 24 (5): 495–499