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1. A 72-yr-old man with H/O Parkinson's disease (PD) presents for deep brain stimulator (DBS) placement. Contraindications for DBS include all of the following except,

#### A. Coagulopathy

- B. Uncontrolled hypertension
- C. Permanent pacemaker
- D. Cognitive impairment

Go to Q2







• Coagulopathy can be associated with an increased risk of intracranial hemorrhage. Hence coagulopathy is a contraindication for DBS placement







• Uncontrolled hypertsension is also associated with an increased risk of bleeding. Intracranial hematoma can be life threatening. Gorgulho et al. found that SBP <140 mmHg was associated with lower risk of intracerebral hemorrhage.

Ref: Gorgulho A, De Salles AA, Frighetto L, et al. Incidence of hemorrhage associated with electrophysiological studies performed using macroelectrodes and microelectrodes in functional neurosurgery. J Neurosurg 2005;102:888–96.

Incorrect



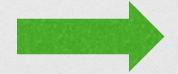
# C. Permanent pacemaker

• A permanent pacemaker is not a contraindication for DBS placement., although precautions must be taken to limit possible DBS generator-PPM electrical interference

Back to the Question



**Next Question** 





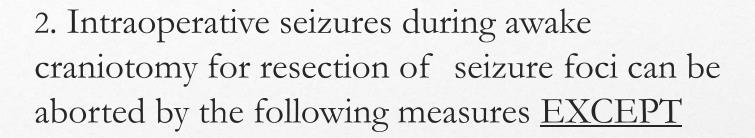


- Cognitive impairment is the one of the most frequent causes of exclusion for DBS placement. Cognitive changes after STN-DBS can occur in patients without preoperative cognitive impairment and worsening of pre existing cognitive impairment after DBS.
- Ref: Krack P, Batir A, et al. Five-year follow-up of bilateral stimulation of the subthalamic nucleus in advanced Parkinson's disease. N Engl J Med 2003;349(20):1925–34.

Incorrect







A. Stop cortical mapping

B. Ice cold saline applied directly to the cortical surface

C. Propofol bolus

D. Phenytoin bolus

Go to Q3

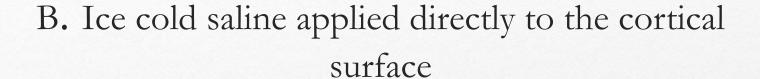




• Most intra-operative seizures occur secondary to stimulation by cortical mapping. They are usually aborted by surgeon stopping the stimulus.







• Most seizures that occur intraoperatively can be stopped by applying ice cold saline directly on the cortical surface. Ice cold saline reduces the seizure threshold and aborts the seizures.





#### C. Propofol bolus

Seizures that do not stop by application of cold saline or stopping the stimulation will need to be treated with small doses of benzodiazepines, propofol bolus or barbiturates.





# D. Phentyoin bolus

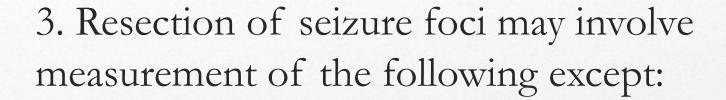
Risk factors for intraoperative seizures include surgical stimulation, hemorrhage, edema and ischemia. Phenytoin should be given as an infusion not as a bolus. Most patients present for resection of seizure foci because their seizures are not controlled by anti-epileptic medications. Additional phentyoin will not be useful, but may increase side effects.

Back to the Question



Next Question





A. EEG( electro-encephalography)

B. ECoG (electro-corticography)

C MER( micro-electrode recording)

D. MEP(motor evoked potentials)

Go to Q4





# A.EEG

• EEG is used commonly to diagnose seizures especially sub-clinical seizures.







### B. ECoG

• ECoG is used intraoperatively to reproduce as a seizure aura. In some patients subdural grids are placed. Postoperatively, a period of ictal electrocorticographic recordings and cortical stimulation delineate the site of seizure onset and functional anatomy.



Incorrect





### C. MER



• Micro electrode recordings are used during placement of DBS. The MER demonstrate changes in spontaneous neuronal firing as the electrode enters the nuclear or thalamic brain tissue. The MER guide lead placement in DBS.

Back to the Question



Next Question







- Not used commonly. The seizure focus may lie in or near eloquent brain (motor, sensory language, memory, vision). Mapping while the patient is awake is useful during surgical resection of intractable seizuer foci and minimize resection of eloquent areas of the brain.
- If the patient is not awake, MEP may be used in the rare situation.







- A. Essential tremor
- B. Parkinson's disease
- C. Major depression
- D. Migraine headaches

Go to Q5







- Essential tremor may cause significant disability in otherwise healthy patients and significantly improves quality of life.
- DBS has been found to be very effective and received FDA approval in 1997.
- Ondo W, Jankovich J, Schwartz K, et al. Unilateral thalamic deep brain stimulation for refractory essential tremor and Parkinson disease tremor. Neurology 1998;51:1063–9.

Incorrect







- Idiopathic Parkinson's disease associated with tremor at rest, rigidity, postural instability and bradykinesia. In patients suffering from drug induced complications or those refractory to medications, electrical stimulation of the deep brain structures ameliorates these symptoms.
- Kleiner-Fisman G, Fisman DN, Sime E et al. Long term follow-up of bilateral deep brain stimulation of the subthalamic nucleus stimulation in patients with advanced Parkinson's disease. J Neurosurg 2003; 99: 489-95





- In studies done by Lozano et al, treatment resistant major despression responded favorably to subcallosal cingulate gyrus deep brain stimulation
- Lozano AM, Mayberg HS, Giacobbe P et al. Subcallosal stimulation for treatment-resistant depression. Biol Psychiatry 2008; 64(6):461-7







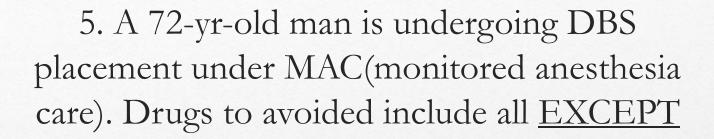
# D. Migraine headaches

- Current indications for DBS include essential tremor, idiopathic Parkinson's disease, dystonia. DBS is an emerging treatment in obsessive-compulsive disorder, refractory epilepsy, Tourette's syndrome, chronic pain, major depression and tremors( post stroke, post traumatic ) etc.
- Migraine headaches is not an indication for DBS placement.

Back to the Question

**Next Question** 





- A. Metoclopramide
- B. Meperidine
- C. Chlorpromazine
- D. Glycopyrrolate

Back to Q1







• Metoclopramide blocks dopamine receptors, may cause drug induced Parkinson's disease and must be avoided in this patient.

Ref: Ganzini L, Casey D, Hoffman W, McCali A. The prevalence of metoclopramide—induced tardive dyskinesia and acute extrapyramidal movement disorders. Arch Intern Med 1993; 153 (12) 1469-1475.

Try again

Incorrect

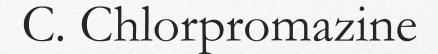




• Meperidine must be avoided in patients on MAOI inhibitors. Selegiline is used to treat Parkinson's disease is a MAOI-B type. Reports of agitation, muscle rigidity and hyperthermia have been described in patients on selegiline receiving meperidine.







• Chlorpromazine may exacerbate PD symptoms. PD patients have dopamine deficiency and cholinergic excitation. Chlorpromazine promotes cholinergic activity and worsens PD symptoms.





# D Glycopyrrolate

• Glycopyrrolate is the preferred anticholinergic drug of choice since it does not cross the blood brain barrier. Hence does not exacerbate PD symtoms.







