Seizures, Intractable

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Risk

- Incidence in USA: 600,000 people with epilepsy have uncontrolled seizures.
- Racial predominance: None.

Perioperative Risks

- Sudden death
- Status epilepticus
- Seizure-mediated cardiac dysrhythmias

Worry About

- Liver toxicity from anticonvulsants (on the decline with the new drug generation)
- Periop trauma from convulsions
- Sudden death
- Status epilepticus postop
- Altered pharmacologic responses due to chronic drug therapy

Overview

- Neurologic disease associated with birth, congenital malformation, trauma, CNS pathology, idiopathic.
- Periop risks for acquired seizure disorder are increased, but some epilepsy and/or congenital malformations carry their own anesthetic risks.
- Check type of seizures, clinical manifestations, duration, and frequency.
- Anticonvulsant therapy and side effects (liver function, level of consciousness).

Etiology

- Congenital (e.g., tuberous sclerosis and/or infantile seizure)
- Idiopathic
- CNS pathology: Trauma, tumor, hemorrhage

Usual Treatment

- Anticonvulsant and diet.
- Surgery for ablation of foci.
- GA is regarded as a last resort for seizures unresponsive to sedative-hypnotics and resulting in decrease in consciousness or significant (<7.28) metabolic acidosis.

Assessment Points

System	Effect	Assessment by Hx	PE	Test
HEENT	Tongue biting/swallowing		Airway assessment	
CV	Cardiac dysrhythmias	Syncope Tachycardia		ECG ECHO Holter monitor
RESP	Hyperventilation due to metabolic acidosis			ABG
GI	Altered liver function Anticonvulsant toxicity Tuberous sclerosis		Jaundice	LFTs Anticonvulsant levels
ENDO	Associated multiple endocrine adenomatosis			Glucose Ca^{2+}, thyroid function tests
RENAL	Renal dysfunction Tuberous sclerosis			Cr
CNS	Psychiatric problems CNS pathology			
MS	Occult trauma from seizures		Check joints, bones Examine tongue	

Key Reference: Kofke WA, Tempelhoff R, Dasheiff RM: Anesthesia for epileptic patients and epileptic surgery. In *Anesthesia and neurosurgery*, ed 3, St. Louis, MO, 1994, Mosby, pp 495–520.

Perioperative Implications

Preoperative Preparation

- Usual anticonvulsant regimen

Monitoring

- Routine monitors.
- $ETCO_2$: Increase in CO_2 production could be an indirect sign of seizure.
- Consider EEG monitoring.

Induction

- Have propofol and/or benzodiazepines available to treat possible seizures.
- Significantly higher requirement for nondepolarizing muscle relaxants and narcotics.

Maintenance

- Avoid proconvulsants (ketamine, etomidate, enflurane, and probably sevoflurane).
- Continue scheduled anticonvulsants.
- GA is sometimes used as treatment for status epilepticus.

Extubation

- To be delayed in case of doubt or situation such as:
  - High $ETCO_2$ despite adequate ventilation (can be a sign of active seizure).
  - Pt nonresponsive.
  - Obvious convulsions.
- Consider adding anticonvulsant (benzodiazepines) and ordering EEG.

Adjuvants

- See specific anticonvulsant used.

Postoperative Period

- Watch $ETCO_2$ as patient awakens since high production may indicate seizure activity.
- Resume anticonvulsants.
- Treat seizures ad libitum.

Anticipated Problems/Concerns

- Seizures on induction and awakening are treated with first-line benzodiazepine Rx (e.g., lorazepam load) rather than long-acting anticonvulsants. The latter (e.g., phenytoin, keppra ± levetiracetam) to be used after the seizure has been controlled.
- Evolution to status epilepticus: GA.
- Sudden death (ventricular arrhythmias).

Seizures, Tonic-Clonic (Grand Mal)

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Risk

- Incidence in USA: 500,000–1,000,000 with recurrent tonic-clonic seizures.
- 10–20 million at risk to have one tonic-clonic seizure secondary to alcohol withdrawal, febrile convulsions (in children), CNS pathology, and/or metabolic disturbances.
- Prevalence of epilepsy is 0.5–1% of the population.

Perioperative Risks

- Seizures:
  - Periop seizures: Incidence is 3.1:10,000 pts; incidence related to LA toxicity is 120:10,000; in pts with known seizures undergoing RA, frequency is 5.8%.
  - SE
- Seizure-induced sequelae:
  - Physical injuries
  - Tachycardia, hypertension, hypoxia, metabolic acidosis
  - Pulmonary aspiration
  - Elevated ICP, cerebral edema, postictal paralysis (Todd paralysis)

Worry About

- Seizure induction with periop drugs: Local anesthetics, sevoflurane, etomidate, ketamine.