Clinical Algorithms

Management of epilepsy

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The patient with epilepsy usually presents with a history of one or more attacks. If epilepsy is diagnosed the type of disorder should be established from the clinical features and electroencephalographic changes. A complex internationally agreed classification of epileptic seizures has been produced; a simplified version is shown in the table, together with suitable anticonvulsant treatment.

The order of decisions about management is shown in the algorithm.

(1) *Is it an epileptic attack?* This is a clinical diagnosis and is helped by an informed eye witness account of the episode as well as the presence of characteristics such as an aura, tonic-clonic movements, incontinence, tongue biting, and the nature of recovery after the episode.

(2) *Does an examination of the central nervous system yield normal results?* Any abnormality requires full investigation. Additional investigations to those shown are occasionally indicated. These include lumbar puncture, cerebral angiograms, and an encephalogram.

(3) *How old is the patient?* Idiopathic epilepsy rarely presents after the age of 25. More complete investigation should be considered in patients over this age.

(4) *Are the investigation results helpful?* The underlying causative lesion may be removed in some patients—for example, by excision of a meningioma. All patients with an underlying cause should also be treated with an anticonvulsant.

(5) *How many fits have occurred?* An isolated fit does not require treatment. The occurrence of two or more fits requires anticonvulsant therapy, though the risks of treatment must be balanced against those of the disease. Consideration of the legal requirements for possessing a driving licence—for example, freedom from fits while awake for at least two years—may favour treatment in patients with very infrequent seizures.

(6) *Which anticonvulsant?* The choice of drug depends on the pattern and type of seizure (see table). Individual factors may alter the order of choice. For example, young women may prefer carbamazepine or sodium valproate to avoid the cosmetic effects of phenytoin, though the risk of neural tube defects in patients planning pregnancy should also be considered.

Unless the fits are frequent and severe, the patient may be managed as an outpatient. The initial dose of the selected drug is given—for example, phenytoin 200-300 mg/day. The serum concentration of the drug is measured after it has reached steady state (4 × drug half life)—usually one to two weeks. The relation of serum drug concentration to control of seizures is well established for phenytoin but less so for other drugs. Total drug (bound and free) concentrations are measured in most laboratories, whereas the free drug is considered to be active. The relative proportion of free drug may be increased in the presence of other drugs owing to displacement from plasma proteins—for example, sodium valproate displaces phenytoin—or if there is hypoalbuminaemia. In such circumstances a total drug concentration below the therapeutic range may be enough to produce an effective free drug concentration.

Doses should be altered in the light of control of fits and toxicity. The serum drug concentration is a secondary consideration if the patient is well. If fits are not controlled the dose of the drug of first choice should be increased to achieve a serum concentration at the upper limit of the therapeutic range before another drug is added. A second drug may then be added if there has been some reduction in the frequency of fits. If there has been no improvement a second drug should be added while the first is withdrawn over several days. A third drug is rarely needed. A second drug should also be substituted if the first has produced side effects not related to dose; then the first drug may have to be stopped abruptly and a loading dose of the substitute drug given over 24 hours to avoid withdrawal fits.

There are particular problems with phenytoin treatment because increasing the dose produces a disproportionate rise in the serum phenytoin concentration owing to the limited capacity of the enzymes concerned in its metabolism.

The patient's failure to take drugs must always be considered if serum concentrations are low in relation to the dose given.

The occurrence of side effects may necessitate a reduction in dosage or a change of drug.

Once fits are controlled the patient requires only infrequent monitoring—once a year or less.

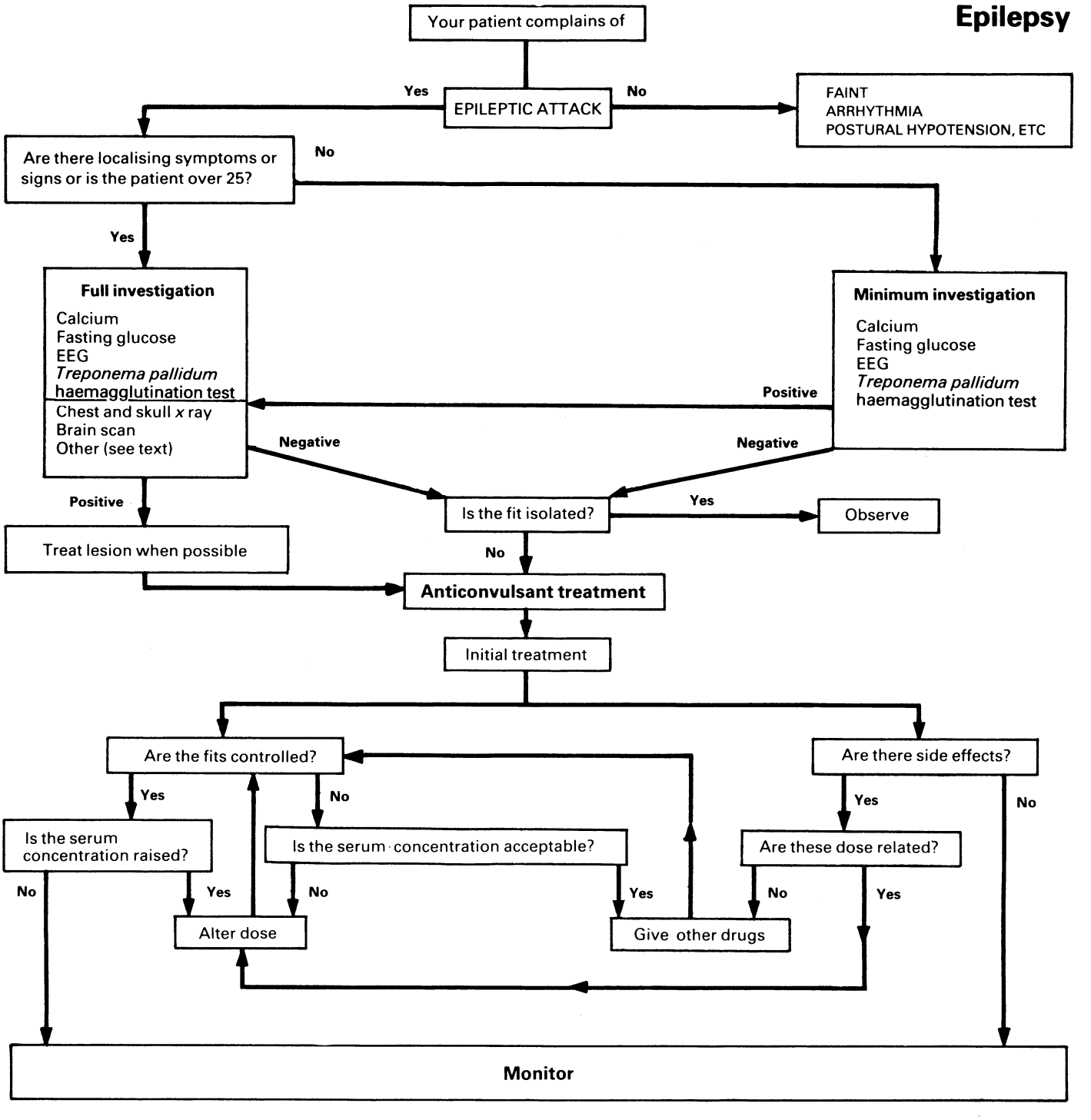
Points to note

First, the electroencephalogram is not always diagnostic of epilepsy. It may be normal between attacks. Secondly, when

Simplified classification of epileptic seizures with anticonvulsant of choice

Seizure type	*1st Choice*	*2nd Choice*
Generalised seizures		
Absence seizures:		
typical (petit mal)	Sodium valproate	Ethosuximide
atypical	Sodium valproate	Clonazepam
Myoclonic seizures	Sodium valproate	Clonazepam
Tonic-clonic seizures (grand mal)	Phenytoin	Carbamazepine, sodium valproate
Partial seizures		
Simple/complex (temporal lobe, Jacksonian, psychomotor seizures)	Carbamazepine	Phenytoin
Partial becoming generalised	Carbamazepine	Phenytoin

Epilepsy



phenytoin is used the dose must be increased in small increments (25 or 50 mg) above a dose of 300 mg daily, or a nomogram may be used. Thirdly, single drug therapy will control fits in most patients, provided adequate serum concentrations are achieved. For example, phenytoin alone will bring about control in at least 80% of patients with grand mal attacks.

Finally, the patient or parents should be warned about important side effects. For example, dizziness, ataxia, visual disturbance, or excessive tiredness may suggest excessive dosage of phenytoin or carbamazepine; rash may occur with most drugs; sore throat may point to neutropenia (rare); hair loss may ocur with valproate. The need for good dental hygiene to reduce gingival hyperplasia should be explained for patients treated with phenytoin. On the return visit these side effects should be considered and the patient examined. Liver function tests should be performed every two months for six months after starting valproate. Enzyme inducing drugs (phenytoin, carbamazepine, phenobarbitone) may raise serum γ-glutamyltranspeptidase and alkaline phosphatase activities. This does not imply liver disease (the serum bilirubin concentration is lowered). Long term treatment with enzyme inducing drugs may cause low red blood cell folate and serum calcium concentrations and occasionally megalobastic anaemia and osteomalacia.

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