

PublisherInfo		
PublisherName	:	BioMed Central
PublisherLocation	:	London
PublisherImprintName	:	BioMed Central

Atropine test is a useful adjunct to the diagnosis of brain stem death

ArticleInfo		
ArticleID	:	4201
ArticleDOI	:	10.1186/ccf-2000-5339
ArticleCitationID	:	5339
ArticleSequenceNumber	:	60
ArticleCategory	:	Paper Report
ArticleFirstPage	:	1
ArticleLastPage	:	4
ArticleHistory	:	RegistrationDate : 2000-3-6 OnlineDate : 2000-3-6
ArticleCopyright	:	Current Science Ltd2000
ArticleGrants	:	
ArticleContext	:	1305422

Keywords

Atropine test, brain stem death

Comments

The authors in this paper propose that a simple pharmacological test based on the absence of cranial parasympathetic nervous influence on the heart in brain dead patients may be a useful adjunct to testing brain stem function. They investigated the effect of an amount (2-3 mg) of atropine known to cause total parasympatholysis on patients suspected to be brain dead. A tachycardic response would demonstrate an intact cranial parasympathetic outflow. The authors also attempted to corroborate their findings with the simultaneous use of transcranial Doppler (TCD) to examine the cerebral circulatory flow, which shows characteristic patterns in the presence of intracranial hypertension, ultimately leading to no flow in the state of circulatory arrest.

Comparison of results of the atropine test with TCD showed a sensitivity of 100 % and specificity of 98.6%. However, the authors admit that a prior knowledge of the type of cerebral lesion is vital, as an infratentorial or a brain stem lesion damaging the dorsal horn, may result in a negative atropine test in the absence of brain stem tests. There are other patients who need to be excluded from an atropine test, eg patients with known autonomic neuropathy or cardiac transplant. It should also be remembered that pupillary reactions to light must be performed before atropine is administered, and an appropriate length of time allowed after its administration before the pupils are examined again.

The atropine test is by no means meant to replace any of the criteria that exist for the diagnosis of brain death; however, the test is a simple, clinically relevant and interesting adjunct to more formal brain stem death testing

Introduction

It is widely accepted that the absence of cranial nerve reflexes and apnea is synonymous with death, although there may be a cardiac output. Strict criteria for brain stem death tests are in place in most countries, and involve the initial exclusion of any confounding factors such as residual sedation, metabolic derangements and hypothermia. However, laboratory investigations may not form part of the

test protocol in many countries. The 'atropine test' was first proposed in 1975 as an adjunct to brain stem tests, and relies on the fact that there is only a contribution from the sympathetic nervous system to the heart rate in brain dead patients. The test is considered positive if the administration of 2-3 mg of atropine fails to increase the heart rate by 3%. This was considered to be helpful in deciding the appropriate timing for further tests, thus avoiding unnecessary investigations when these were demanded by the test protocol.

Methods

- . Prospective, observational study.
- . 45 patients with intracranial hypertension due to primary supratentorial lesions in whom brain death was clinically suspected.
- . TCD studies of the cerebral circulation carried out simultaneously to correlate the findings of the 'atropine test'.
- . Atropine was injected in a graded manner up to a maximum dose of 3 mg, with the test aborted (positive test) if a tachycardic response from baseline was observed.
- . Other treatment modalities and support remained unchanged during this period.

Results

Negative result on first atropine test: 32/45 patients

Positive result on first atropine test: 13/45 patients

TCD in the positive test group: (n = 13)Supratentorial circulatory arrest: 8/13 patients

Flow present but evidence of massive rise in ICP:5/13 patients

Atropine test became negative over 4-12 h in the latter group of patients. Comparison of results of the atropine test with TCD showed a sensitivity of 100% and specificity of 98.6%.

Additional information

Testing the functional integrity of the brain stem is a widely accepted method of diagnosing death. In most parts of the world, testing is carried out separately by two senior doctors with an interim period between the two tests. The physicians must ensure that there is no residual effect of sedative and muscle relaxant drugs that might have been administered during the course of the patient's stay in hospital.

Metabolic derangements and hypothermia must be absent. Many countries require confirmatory investigations such as EEG and transcranial Doppler in addition to clinical tests.

References

1. Huttemann E, Schelenz C, Sakka SG, Reinhart K: Atropine test and circulatory arrest in the fossa posterior assessed by transcranial Doppler. *Intensive Care Med.* 2000, 26: 422-425.