Notes and Announcements

The Canadian Neurological Society
Francis McNaughton Award

The Francis McNaughton Award is for the best submitted paper based on work done during Neurology residency or post-residency training.

Junior members of the Canadian Neurological Society and active members within two years of obtaining their specialty certification are eligible for this award. The award consists of an inscribed scroll and an honorarium of $1000. The winning paper will be presented to the Canadian Congress of Neurological Sciences.

Full papers prepared in the standard format of the Canadian Journal of Neurological Sciences should be submitted in triplicate to the President of the Canadian Neurological Society:

Dr. T. Peter Seland,
Calgary General Hospital,
841 Centre Street East,
Calgary, Alberta T2E 0A1

Deadline for submissions is January 1st, 1987.

The Canadian Neurosurgical Society
K.G. McKenzie Awards

AWARD 1 is awarded for the best paper presented to the annual meeting of the Canadian Neurosurgical Society, by a neurosurgical resident in which he is the principal author. The recipient will win a citation and prize of $1000 and will have his expenses to the meeting paid for as part of the Award.

A completed manuscript should be sent to the Chairman, listed below. Deadline for submissions is January 1st, 1987.

AWARD 2. A grant-in-aid will be awarded to support a specific educational project which may include travel. However, travel to regularly scheduled neurosurgical meetings is excluded. The applicant must be a resident in training in a Canadian Neurosurgical Training Program, or if formal training is completed, within two years of having received certification in neurosurgery.

The application should contain relevant personal information, a clear description of the educational project which is contemplated and its purpose, and any supporting letters the applicant may wish to submit. It should be sent to:

Dr. B.K.A. Weir, Chairman,
K.G. McKenzie Memorial Awards Committee,
Department of Surgery,
Walter C. MacKenzie Health Sciences Centre,
University of Alberta,
Edmonton, Alberta T6G 2B7

Deadline for submissions is January 15, 1987.

The Canadian Society of Clinical Neurophysiologists
The Herbert Jasper Prize

The Herbert Jasper Prize is awarded for the best submitted paper based on clinical neurophysiology done by a resident or post-graduate Fellow.

Those eligible include individuals in training or who are within three years of their doctorate or fellowship. The prize consists of travel expenses to the Canadian Congress of Neurological Sciences meeting and an honorarium of $100. The winning paper will be presented as a platform presentation at the Canadian Congress of Neurological Sciences meeting.

Full papers prepared in the standard format of the Canadian Journal of Neurological Sciences should be submitted in triplicate and consist of a copy of the abstract for the Congress plus a longer report of the research project findings and relevant related materials. Applications should be sent to:

Dr. R.D.G. Blair,
25 Leonard Avenue,
Suite 309,
Toronto, Ontario M5T 2R2

Deadline for submissions is February 1, 1987.

Recommended Guidelines for Practice in Clinical Neurophysiology

The following guidelines were discussed and accepted at the annual business meeting of the Canadian Society of Clinical Neurophysiologists in June 1986.

1. Clinical neurophysiological tests should be interpreted by a person with an M.D. degree or equivalent medical training, who has either a fellowship (or equivalent training) in a medical or surgical specialty related to the type of testing performed or a Ph.D. (or equivalent training) in a basic science related to the type of testing performed.

2. The field of clinical neurophysiology comprises many different procedures that record the spontaneous and evoked activity of the human brain, spinal cord, peripheral nerves and muscles. Within this field two major areas of competence are recognized: electroencephalography and electromyography. Within each of these areas, a minimum of six months of full-time training in a laboratory associated with an accredited residency-training program is necessary to attain competence. The six-month training periods in electroencephalography and electromyography should not run concurrently.

3. Qualifications in electroencephalography and electromyography can be judged by subcommittees of the Canadian Society of Clinicial Neurophysiologists on the basis of credentials and letters of reference.

Determination of Brain Death

The issue of determination of cerebral death has been of great concern to Canadian neurologists, neurosurgeons and neurophysiologists for many years. The late Dr. Michael Saunders of Winnipeg was a member of the American Electroencephalographic Society ad hoc committee on EEG determination of cerebral death which published its report in 1969, shortly after the report of the Ad Hoc Committee of Harvard Medical School to Examine the Definition of Brain Death. Subsequently, guidelines have been drawn up in Great Britain and Australia as well as the United States. In 1968, the Canadian Medical Association also issued their statement on death which was subsequently revised in 1974 and 1975.

In the latter part of the 1970's and early 1980's, Canadian neurologists and neurosurgeons were being called with increasing frequency to make vital bedside decisions as to whether patients had reached a state of irreversible global brain dysfunction. It was important that clear criteria should be used but different physicians were using different criteria. Neurologists became concerned whether they should use American Criteria or British Criteria or whether we should establish our own distinctly Canadian criteria taking the best from other guidelines. There was also concern that during the decade since the Canadian Medical Association guidelines had been published significant advances had occurred in our understanding of brain function and new techniques had been developed which made the existing criteria inadequate.

Because of these concerns an ad hoc committee of the Canadian Neurological Society was established in January 1983, to review the available American, British and the Canadian Medical criteria for brain death and to establish appropriate up to date criteria for this country. Dr. Andrew Kertesz chaired the committee which initially included Drs. John Girvin, Warren Blume and George Hinton. Drs. Garth Bray, Bill McCormick and Brian Young became involved later and Drs. Monique D'Amour and Alain Godon provided French translation. The original draft recommendations were presented to the memberships of the component societies of the Canadian Congress of Neurological Sciences and after repeated revisions were finally accepted in July 1985.

It was recognized that although the actual application of the guidelines would be used most often by neurologists and neurosurgeons, that it would be important for all Canadian physicians to be aware of them and that they receive the broadest possible dissemination. It would also be unfortunate if one group of doctors were to use the new guidelines while another group were adhering to the old ones. Consequently, the guidelines were presented to the Canadian Medical Association with the hope that organization would accept them as a revision of their own. After initial presentation to the CMA Council on Health Care the criteria were finally approved by the General Council in August 1986.

It should be realized that this document is a set of guidelines and is not a legal document. It should also be realized that this is not a final document. We do believe that it is a most useful document for the practical determination of brain death in 1986. Clearly new advances in our knowledge of neurophysiology and neuropathology and new technical developments as well as changes in society will necessitate further changes in this document and a review of the criteria should be undertaken on a regular basis.

Robert F. Nelson
Ottawa

Guidelines for the Diagnosis of Brain Death

Preamble The development of techniques for the ventilatory and circulatory support of critically ill patients has created a need for new definitions of death. Although irreversible cessation of circulatory and respiratory functions acceptably defines death, irreversible cessation of brain function is also equivalent to death of the individual even though the heart continues to beat while the person is on a respirator.[1] In 1968, following the publication of the "Harvard Criteria"[2] for the diagnosis of brain death, the Canadian Medical Association provided guidelines[3] that were subsequently revised.[4,5] In 1976, guidelines were published for the U.K.[5] and in 1981 revised guidelines were published in the Journal of the American Medical Association.[6] The following set of guidelines was prepared by a subcommittee of the Canadian Congress of Neurological Sciences and has been approved by the memberships of the Canadian Neurological Society, the Canadian Neurosurgical Society, the Canadian Association for Child Neurology and the Canadian Society of Clinical Neurophysiologists.

The determination of brain death is a clinical decision that must be made by an experienced physician in accordance with accepted medical standards.[7] Thus, the guidelines described below are based on current medical information and experience.

Recommandations au sujet des Critères de Mort Cérébrale

Préambule Avec le dévelopement de techniques d'assistance respiratoire et circulatoire pour les malades gravement atteints, la définition de mort a dû être revisée. Même si l'arrêt des fonctions circulatoires et respiratoires définissent la mort, l'arrêt de la fonction cérébrale peut être équivalent à la mort d'un individu, même si le coeur continue à battre lorsque le malade est ventilé par un respirateur.[1] En 1968, après la publication des Critères d'Harvard,[2] l'Association Médicale Canadienne a proposé des critères afin de déterminer la mort cérébrale,[3] ceux-ci furent réévalués par la suite.[4,5] En 1976, des critères ont été publiés pour la Grande-Bretagne.[6] En 1981, de nouveaux critères furent publiés dans le journal de l'American Medical Association.[7] L'ensemble des critères suivants a été préparé par un sous-comité du Congres Canadien des Sciences Neurologiques et fut accepté par les membres de la Société Canadienne de Neurologie, la Société Canadienne de Neurochirurgie, l'Association Canadienne de Neurologie Pédiatrique et la Société Canadienne des Neurophysiolgistes Cliniques.

La déclaration de mort cérébrale est une décision clinique qui doit être prise par un médecin expérimenté, tout en suivant les standards médicaux acceptés.[7] Les critères décrits plus bas sont basés sur les données actuelles des connaissances et de

As knowledge advances, it can be anticipated that further revisions will become necessary. Because of the major consequences of the diagnosis of brain death, consultation with other physicians experienced in the relevant clinical examinations and diagnostic procedures is usually advisable.

Guidelines The clinical diagnosis of brain death can be made when all of the following criteria have been satisfied:

1. An etiology has been established that is capable of causing brain death and potentially reversible conditions have been excluded (see Comment 2, below).
2. The patient is in deep coma and shows no response within the cranial nerve distribution to stimulation of any part of the body. No movements such as cerebral seizures, dyskinetic movements, decorticate or decerebrate posturing arising from the brain are present (see 1a, below).
3. Brainstem reflexes are absent (see 1b, below).
4. The patient is apneic when taken off the respirator for an appropriate period of time (see 1c, below).
5. The conditions listed above persist when the patient is reassessed after a suitable interval (see 2, below).

Comments Although the purpose of this document is to state general principles and recommend guidelines rather than outline a set of rules, certain features of the guidelines merit more detailed explanations.

1. ***Cessation of Brain Function.*** The clinical absence of brain function is defined as: profound coma, apnea, and the absence of brain-stem reflexes.

a. ***Coma.*** The patient should be observed for spontaneous behaviour and response to noxious stimuli. In particular, there should be no motor response within the cranial nerve distribution to stimuli applied to any body regions. There should be no spontaneous or elicited movements (dyskinesias, decorticate or decerebrate posturing, epileptic seizures) arising from the brain. However, various spinal reflexes may persist in the state of brain death.[8]

b. ***Brainstem Reflexes.*** The pupillary light, corneal, vestibulo-ocular and pharyngeal reflexes must be absent. The pupils should be mid-size or larger and must be unreactive to light. Care should be taken that atropine or related drugs that could block the pupillary response to light have not been given to the patient. The vestibulo-ocular reflexes should be tested by doing caloric tests while the head is 30 degrees above the horizontal. In adults a minimum of 120 ml of ice water should be used.[9] Grimacing or any other motor response to pharyngeal or tracheal suctioning is incompatible with a diagnosis of brain death.

c. ***Apnea*** was originally defined as lack of respirations when the patient was disconnected from the respirator for three minutes. This failed to take into consideration whether an adequate $PaCO_2$ level was present to trigger respirations. The threshold for respiratory stimulation in comatose patients may be elevated to $PaCO_2$ levels as high as 50-55 mm Hg and many patients on respirators have low $PaCO_2$ levels which rise slowly (e.g.: 2-3 mm Hg per minute) when the respiratory is stopped.[10] In patients who fulfill the other clinical criteria of brain death, the technique of apneic oxygenation, described below, is a safe way of testing respiratory activity.[11]

If blood gas determinations are available, the $PaCO_2$ should be 40 ± 5 mm Hg before testing for apnea begins. The patient should be pre-oxygenated (but not hyperventilated) with 100% O_2 for 10 minutes before testing. The respirator is then disconnected for 10 minutes while, to prevent hypoxemia, 100% O_2 is

l'expérience médicale. A mesure que nos connaissances vont progresser, ou pourra entrevoir d'autres revisions. A cause de l'implication du diagnostic de mort cérébrale, on suggère qu'une consultation soit faite également à un autre médecin possédant l'expérience nécessaire dans l'examen clinique et les techniques diagnostiques appropriées.

Critères Proposés Le diagnostic clinique de mort cérébrale peut être posé quand les critères suivants ont été remplis:

1. D'une part, une étiologie capable de causer la mort cérébrale a pu être établie, d'autre part, toutes les conditions potentiellement réversibles ont été exclues (voir commentaire numéro 2 plus bas).
2. Le malade est en état de coma profond et ne démontre aucune réponse, tant au niveau des nerfs crâniens, qu'à la stimulation d'autres régions corporelles. Il ne présente pas de crises convulsives, on ne note pas de mouvements dyskinétiques, et on en note pas non plus de posture de décortication ou de décérébration (voir 1a, plus bas).
3. Les réflexes du tronc cérébral sont absents (voir 1b, plus bas).
4. Le malade est en apnée lorsqu'il est retiré du respirateur pour une période appropriée (voir 1c, plus bas).
5. Ces conditions persistent lors d'un examen subséquent, après un intervalle acceptable (voir 2, plus pas).

Commentaires Bien que le but de ce document est d'émettre certains principes généraux et de recommander une certaine ligne de conduite plutôt que d'imposer des règles strictes, il serait important de définir plus en détail certaines des recommandations.

1. ***Arrêt de la fonction cérébrale*** L'absence clinique de la fonction cérébrale est définie comme suit: coma profond, apnée, absence de réflexes du tronc cérébral.

a. ***Coma*** L'on doit examiner chez le malade les mouvements spontanés et les réponses aux stimulis nociceptifs. Spécifiquement, il ne doit pas exister de réponse motrice, au niveau des nerfs crâniens, à des stimulis appliqués au niveau des autres régions du corps. Il ne doit pas y avoir de réponses spontanées ou provoquées telles que dyskinésies, mouvements de décérébration ou de décortication, crises convulsives. Cependant certains réflexes spinaux peuvent persister même en présence de mort cérébrale.[8]

b. ***Les réflexes du tronc cérébral*** Les réflexes pupillaires à la lumière, les réflexes cornéens, oculovestibulaires et pharyngés doivent être absents. Les pupilles doivent être de dimensions moyennes ou larges et il ne doit pas exister de réflexe photo-lumineux. On doit s'assurer de plus que le malade n'a pas reçu d'Atropine ou d'autres médicaments qui puissent bloquer la réponse photo-lumineuse. Les réflexes oculo-vestibulaires sont observés en irriguant le conduit auditif externe avec un minimum de 120 cc d'eau glacée pour adultes et la tête du malade est positionnée à un angle de 30 degrés au-dessus de l'horizontale.[9]

L'apparition d'une grimace ou de toute autre réponse motrice, lors de l'aspiration pharyngée ou trachéale, est incompatible avec le diagnostic de mort cérébrale.

c. ***L'apnée*** a été définie originalement par l'absence de respiration lorsque le malade était retiré du respirateur pendant 3 minutes. Cette technique ne tenait pas compte d'un niveau satisfaisant de $PaCO_2$ our stimuler la respiration. Le seuil nécessaire pour stimuler la respiration chez les malades comateux peut être aussi élevé que 50-55 mmHg et plusieurs malades

https://doi.org/10.1017/S0317167100036866 Published online by Cambridge University Press

delivered at 6 litres/minute through an endotracheal cannula. This should ensure an adequate rise in $PaCO_2$ to serve as a respiratory stimulant. If blood gas determinations are not available, an adequate test of brainstem responsiveness to hypercarbia can be provided by ventilating the patient for 10 minutes with a 95% O_2-5% CO_2 mixture before the 10 minute period of apneic oxygenation.[7] In patients with severe respiratory disease, it is advisable to obtain the opinion of a respiratory physician to determine the safety and validity of this test for apnea.

Testing for apnea without passive oxygenation is not recommended. In addition to its potential deleterious effects on brain, the resultant hypoxemia can occasionally cause complex movements of the limbs and trunk, presumably due to spinal cord ischemia, that could be confused with reflex movements of cerebral origin.[12]

2. ***Irreversibility*** Cessation of brain function is determined to be irreversible when potentially reversible causes have been excluded and the changes are judged to be permanent. Drug intoxication (particularly barbiturates, sedatives and hypnotics), treatable metabolic disorders, hypothermia (core temperature less than 32.2 degrees C.), shock and peripheral nerve or muscle dysfunction due to disease or neuromuscular blocking drugs must be excluded.

Re-evaluation is essential to ensure that the non-functioning state of the brain is persistent[13] and to reduce the possibility of observer error.[6] Depending on the etiology, the interval between such examinations may be as short as 2 hours or as long as 24 hours; observation for at least 24 hours is usually recommended to confirm brain death due to anoxia-ischemia (e.g. post-cardiac arrest).[7] In situations where brain death is declared for purposes of organ transplantation, local regulations may stipulate specific intervals for reassessment.

Special Circumstances

1. ***Infants and Children.*** Brain death has not been sufficiently well studied in neonates, infants and young children to determine if the clinical criteria listed above apply to the pediatric age groups. In one study, the presence of these criteria for three days was associated with brain death in all children studied.[14] When clinical criteria alone are used to make the diagnosis of brain death in children, a longer period of observation than in adults may be required. Where facilities exist for the demonstration of absent cerebral blood flow by radionuclide scintigraphy or cerebral angiography these methods may allow a diagnosis of brain death to be made in the pediatric population in a shorter period of time.

2. ***Inability to Apply the Clinical Criteria.*** Some clinical situations such as uncertainty regarding etiology, inability to examine one or both eyes due to trauma, middle ear injuries, cranial neuropathies or severe pulmonary disease may preclude the valid application of the listed clinical criteria. In these circumstances, the only reliable means of confirming brain death is the absence of cerebral perfusion, determined by cerebral angiography or radionuclide scintigraphy.

Laboratory Tests

Although brain death can be established reliably by clinical criteria alone,[1,2,6,7,13] special tests can be used to support and, in some instances, to supplement the clinical diagnosis. The electroencephalogram (EEG) assesses cerebral cortical

ventilés par un respirateur ont une $PaCO_2$ qui augmente lentement (par exemple 2 à 3 mm Hg/minute) après l'arrêt du respirateur.[10] Chez les patients qui présentent les autres critères de mort cérébrale, la technique d'oxygénation en apnée décrite plus bas vérifie de façon sécuritaire l'activité respiratoire chez ces malades.[11]

S'il est possible de mesurer les gaz artériels, il faudra s'assurer d'une $PaCO_2$ de 40 + 5 mmHg avant de commencer le test pour l'apnée. Le patient doit être oxygéné (mais non hyperventilé) à l'aide d'O_2 à 100% pendant dix minutes avant de subir l'examen. Le respirateur est alors débranché pendant une période de 10 minutes. Durant cette période, afin de prévenir une hypoxémie, de l'oxygène à 100% est alors administré, par la canule endotrachéale, à un débit de 6 litres/minute. Cette méthode devrait assurer une élévation satisfaisante de la $PaCO_2$ pour stimuler la respiration. S'il est impossible de mesurer les gaz artériels, et afin de vérifier la réponse du tronc cérébral à l'hypercarbie, il s'agira alors de ventiler le malade pendant 10 minutes avec un mélange de 95% d'oxygène et 5% de CO_2, avant la période de 10 minutes d'oxygénation en apnée.[7]

Chez les malades souffrants de maladie respiratoire sévère, il est suggéré de consulter un pneumologue, afin de déterminer la validité et la sécurité d'un tel test pour l'apnée.

Il n'est pas recommandé de vérifier la présence d'apnée sans oxygèation passive, d'une part en raison du risque potentiel d'aggraver/produire des lesions cérébrales et d'autre part vu que l'hypoxemie peut entraîner des mouvements complexes des membres et du tronc, possiblement dus a une ischemie spinale secondaire, qui pourrait être interprétes comme étant d'origine cérébrale.[12]

2. ***L'irréversibilité*** L'arrêt de toute fonction cérébrale chez un individu, est déclaré définitif et irréversible lorsque l'on a réussi à éliminer toutes les autres causes potentiellement réversibles qui pourraient expliquer son état clinique et que l'on considère les changements notés comme étant permanents. On doit exclure les intoxications médicamenteuses (barbituriques, sédatifs, hypnotiques), les pathologies métaboliques traitables, l'hypothermie (température centrale de moins de 32.2°C, le choc, les pathologies du système nerveux périphérique, les maladies musculaires et l'action des agents bloqueurs neuro-musculaires.

Il est essentiel de réévaluer le malade, afin de s'assurer de la persistance de cet état de mort cérébrale,[13] et aussi afin de minimiser la possibilité d'erreurs de la part de l'observateur.[6] Selon l'étiologie, l'intervalle entre les réévaluations cliniques du malade pourra s'échelonner entre 2 heures et 24 heures; on recommande une observation d'au moins 24 heures afin de confirmer une mort cérébrale causée par une anoxie-ischémie (par exemple après un arrêt cardiaque).[7]

Quand il s'agit d'une déclaration de mort cérébrale chez un donneur d'organes dans les cas de transplantation, on peut s'attendre à ce que le règlementation locale vienne préciser la fréquence des réévaluations de l'état clinique.

Circonstances Spéciales

1. ***Age pédiatrique*** La mort cérébrale n'a pas été suffisamment bien étudiée chez les nouveaux-nés et les enfants pour nous permettre de dire si les critères cliniques utilisés chez les adultes peuvent être mis en application chez les enfants. Dans une étude à ce sujet, on recommande d'attendre pendant un minimum de 3 jours avant de se prononcer sur la mort cérébrale chez les enfants.[14] L'on recommande de la prudence chez les

function. Electrocerebral inactivity is confirmatory evidence of brain death only if the full clinical criteria apply and established techniques[15] are followed to ensure proper sampling of cortical activity. Visual, auditory, and somatosensory evoked responses, or other tests may eventually prove to be useful but, at present, there are no standard guidelines for their use in assessing patients with suspected brain death.

The absence of intracranial perfusion, demonstrable by cerebral angiography or radionuclide scintigraphy, is reliable evidence of brain death.[16] The mean arterial pressure should be greater than 80 mm Hg when cerebral perfusion is assessed. If cerebral angiography or radionuclide scintigraphy is used to determine the absence of cerebral perfusion, the procedure should be performed by an appropriately qualified specialist.

enfants en ce qui a trait à la déclaration de mort cérébrale surtout dans les circonstacnes où certaines techniques tel l'étude du flot cérébral isotopique ne sont pas accessibles.

2. ***Autres*** Dans certaines circonstances cliniques (par exemple, une cause incertaine, impossibilité d'examiner un oeil ou les deux à cause d'un traumatisme, les traumatismes de l'oreille moyenne, les neuropathies crâniennes ou les maladies pulmonaires sévères), il peut être difficile de mettre en application les critères cliniques mentionnés. Dans ces circonstances, la seule façon de confirmer la mort cérébrale serait par l'absence de perfusion cérébrale soit par étude isotopique ou par angiographie cérébrale.

Tests de Laboratoire

Même si la mort cérébrale peut être confirmée de façon assez certaine sur la base des seuls critères cliniques,[1,2,6,7,13] certains tests spéciaux peuvent aider à confirmer ou même dans certains cas à compléter le diagnostic clinique. L'électroencéphalogramme (EEG) sert à évaluer la fonction cérébrale corticale. L'absence d'activité électrique cérébrale viendra confirmer la mort cérébrale, mais seulement si tous les critères cliniques de mort sont présents et seulement aussi après l'utilisation des techniques suggérées qui nous permettent de documenter adéquatement les différents aspects de l'activité corticale.[15] A date, l'utilité des potentiels évoqués visuels, auditifs et somatosensitifs, ou autres tests reste à être démontrée dans les cas de mort cérébrale.

L'absence de perfusion intra-crânienne démontrée soit par l'artériographie cérébrale, soit par le flot cérébral isotopique, est une preuve de mort cérébrale.[16] La pression artérielle moyenne doit se chiffrer cependant au-dessus de 80 mmHg lorsque l'étude de la perfusion est faite. Dans ces cas, l'on utilisera l'angiographie cérébrale ou l'étude isotopique du flot sanguin cérébral, obligatoirement pratiquée et interprétée par un spécialiste expérimenté en la matière.

References/Références

1. Law Reform Commission of Canada. Protection of Life: Criteria for the Determination of Death. Working paper Number 23, 1979.
2. Report of the Ad Hoc Committee of Harvard Medical School to examine the definition of brain death. Definition of irreversible coma. JAMA 1968; 205: 337-340.
3. The Canadian Medical Association Statement on Death. CMAJ 1968; 99: 1266-1267.
4. Transactions of General Council, Canadian Medical Association, 1974, Resolution 36.
5. Ibid. 1975, Resolution 27.
6. Diagnosis of brain death. Statement issued by the honorary secretary of the Conference of Medical Royal Colleges and their Faculties in the United Kingdom. Lancet 1976; 2: 1069-1070.
7. Guidelines for the Determination of Death. Report of the medical consultants on the diagnosis of death to the President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research. JAMA 1981; 246: 2184-2186.
8. Ivan LP. Spinal reflexes in cerebral death. Neurology (Minneap.) 1973; 23: 650-652.
9. Plum F, Posner J. The diagnosis of stupor and coma. 3rd edition revised. FA Davis Co, Philadelphia, 1982, pp 54-56.
10. Schafer JA, Caronna JJ. Duration of apnea needed to confirm brain death. Neurology (Minneap.) 1978; 28: 661-666.
11. Plum F, Posner J. The diagnosis of stupor and coma. 3rd edition revised FA Davis Co, Philadelphia, 1982, p 317.
12. Ropper AH, Unusual spontaneous movements in brain-dead patients. Neurology (Minneap.) 1984; 34: 1089-1092.
13. Pallis C. ABC of Brain Stem Death. British Medical Journal. London. 1982; 285: 1641-1644, 1720-1722.
14. Rowland TW, Donelly JH, Jackson AH, Jamroz SB. Brain death in the pediatric intensive care unit. Am J Dis Child 1983; 137: 547-550.
15. Chatrian GE. Standards of Clinical Practice of EEG in cases of suspected "cerebral death", in The International Federation of Societies for Electroencephalography and Clinical Neurophysiology Recommendations for the Practice of Clinical Neurophysiology. Elsevier, New York, 1983, pp 66-68.
16. Korein J, Braunstem P, George A et al. Brain death: I. Angiographic correlation with the radioisotope bolus technique for evaluation of critical deficit of cerebral blood flow. Ann Neurol 1977; 2: 195-205.