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Neuro Critical Care

1094
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Neuro Critical Care
The effect of intravenous immunglobulin treatment on erythrocyte sedimentation rate

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Background: High-dose intravenous immunoglobulin (IVIg) is an important treatment for many autoimmune neurologic diseases. Results obtained from different clinical trials about IVIg revealed many concerns such as cost and side effects. Increased serum viscosity, hemolysis, aseptic meningitis, headaches, and skin reactions are mentioned as side effects of IVIg. In the patient treated with IVIG we have detected unexplained elevation of sedimentation and we assessed that it might be related to treatment. We looked sedimentation and CRP levels before and after IVIG that given for other diseases. In this study we investigated the effect of IVIg treatment on ESR (Erythrocyte Sedimentation Rate).
Methods: IVIg treatment applied to 9 women, a total of 21 patients with autoimmune neurological disease, 12 men were studied retrospectively. 5 of them were myasthenia gravis, 14 patients were Guillain Barre Syndrome, one of them had Chronic Inflammatory Demyelinating Polyneuropathy and one of the patients was Central Nervous System Demyelinating Disease. Prior to the 5-day 0.4 mg/kg/day IVIG treatment, and 1 day and 7 days after treatment, ESR, CRP and hCRP levels were viewed.
Results: ESR's median value of the patients were 12 on pre-treatment, 1 day after treatment those were 79 , after 7 days those were 80 ($P < 0.001$) (Table 1).
Conclusion: To date, very few studies indicating an increase of ESR after IVIG treatment were published. We found that IVIG can increase the ESR without underlying inflammation and inflammatory diseases and without upgrading other acute phase reactants. We determined that it started at the end of the therapy and continued a week later. Thus, we recommend that the clinicians should keep in mind that ESR can increase after treatment in patients receiving IVIG.

Table 1

n = 21	Before treatment median (min-max)	After treatment 1st day median (min-max)	After treatment 7th day median (min-max)	P*
ESR	12 (2-88)	79 (6-140)		<0,001
ESR	12 (2-88)		80 (17-140)	<0,001

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Neuroanatomical base of posttraumatic coma

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The present study tested a hypothesis: is structural brain damage always the only reason of decreased consciousness at all grades of traumatic axonal injury. And if it is so, which brain structures damage are more responsible for the deepest and the longest coma period and can be used as biomarkers for predicting the worst outcome. In this prospective study, 61 patients (mean age, … years; range, …) with severe diffuse axonal traumatic brain injury (TBI) (GCS < 8) were examined with 3T MRI at a median of … days (range, …) postinjury. Structural brain damage localization was verified using T1, T2, fluid-attenuated inversion recovery (FLAIR), diffusion-weighted imaging (DWI), T2*-weighted gradient echo (T2*GRE) or susceptibility weighted imaging (SWI) sequences. Coma depth was ranged with Glasgow Coma Scale (GCS). Outcome was evaluated in 6 month with Glasgow Outcome Scale (GOS). Prolonged (≥13 days) and deep (3–4 GCS) coma was associated with damage of dorsolateral part of pons (LCA, PPN and LDT areas), CTA, more often GP and Tha injury. Coma duration in patients with diffuse axonal injury I–II grades didn't depend on brainstem and subcortical structures damage. Coma duration in patients with diffuse axonal injury III–IV grades was accompanied by frequent injury of dorsolateral pons (LCA, PPN and LDT areas) or CTA. Therefore the evaluation of deep brain structures damage from the neurotransmitter point of view may provide a key to better understanding of unconsciousness pathophysiology, which leads to more accurate outcome prediction in severe TBI. But the most important idea is to use these neuroanatomical biomarkers together with molecular and clinical ones for choosing a specific personalized neurotransmitter-directed pharmacotherapy, which is a new developing treatment strategy for consciousness recovery after TBI.

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Characteristics of the posterior reversible encephalopathy syndome in a cohort of 1130 eclamptic patients

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Background: The Posterior Reversible Encephalopathy Syndrome (PRES) is a clinical and radiological entity frequently associated with eclampsia. However, the link between these pathologies is unclear.
Objective: To describe the clinical and radiological findings of PRES during eclampsia and determine the independently associated factors with PRES.
Patients and methods: A retrospective study was conducted in the obstetrical reanimation unit from January 2000 to December 2013. All women with eclampsia were included. PRES was defined by coexistence of clinical, radiological and evolutive criteria. The clinical and radiological data were described, then compared between the patients with and without PRES through a univariate and multivariate analysis.
Results: Among the 1130 eclamptic women included, 168 patients with PRES were identified (14.9%). There was no statistical difference between the 2 groups for epidemiological data. Fifty percent of PRES patients had up to 3 tonic-clonic seizures. Interestingly, there were no significant differences for blood pressure levels. The most common location of abnormalities was occipital, parietal, and frontal, but also in the basal ganglia and brainstem. The factors associated with PRES are showed in Table 1.
Conclusion: Our study suggest that PRES was not associated with severe levels of hypertension, and was associated with HELLP syndrome and renal failure, which may reflect the endothelial dysfunction process. Stronger evidence-based studies are necessary to attest these findings.

Table 1
Factors independently associated with patients with PRES during eclampsia.

	Adjusted odds ratio	Confidence interval 95%
Renal failure	2.35	1.41–3.89
HELLP syndrome	2.66	1.52–4.67
Death	2.85	1.07–7.59

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1097
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Neuro Critical Care
Brain death in Asia — accepted fact but still no uniform certifying criteria

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Introduction: Asia is the largest and most populous continent in the world with people from many diverse ethnic groups, religions and government systems. Although the concept of brain death has been accepted in many Asian countries, its implementation and practice have so far been quite varied.
Methods: A literature review was conducted through both a PUBMED and GOOGLE search to identify relevant articles and publications using the search words: brain death, transplantation, and Asia from 1970 to 2014. In addition, through contacts of the two authors of this paper, a survey with questions about brain death practices and guidelines, was sent to as many countries as we were able to contact.
Results: Fourteen countries accounting for 77 percent of Asia's population were included in this survey. While most countries have adopted the 'whole brain' concept of brain death, most countries with past colonial links to the United Kingdom follow the 'brainstem' concept of brain death. Despite this difference most countries require only neurological testing of irreversible coma and absent brainstem reflexes as criteria for certification of brain death. Differences exists in the $PaCO_2$ threshold required for apnea test, number of personnel required, qualification of certifying doctors, need for repeat examination, minimum time interval between examinations, and the requirement for and choice of confirmatory tests.
Conclusion: These differences reflect the lack of scientific evidence to support a standard criteria in the certification of brain death.

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1098
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Neurology and eclampsia. Clinical features in a developing country (México)

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Background: Eclampsia is one of the illnesses with high incidence and mortality in developing countries; the evaluation by neurology is unusual, despite the presence of seizures as a diagnostic criterion, so the neurological aspects often go unnoticed. Our hospital is a regional referral center.
Objective: To describe the clinical and epidemiological characteristics of a series of cases of eclampsia features.
Patients and methods/material and methods: Prospectively, patients were analyzed between 2011 and 2014, admitted to the ICU with biochemical and clinical diagnosis of eclampsia. Clinical and epidemiological characteristics were documented. Descriptive statistics were used.
Results: The total of receipts was of 1004 patients. 502 (50%) were preeclampsia–eclampsia and only 168 (16.7%) were eclampsia. The average age was of 25.9 years old (13–44). Socioeconomic status was low in 114 (68%) patients. All of them started with generalized seizures and with an average of two events (1–8). The seizures appeared in the antepartum (73.8%) and the postpartum (22.6%). All patients had vascular headache, and blurred vision by 84%. No visual field defects were found. Meningismus was found in 12 (7.1%) cases.
Conclusion: Eclampsia is usually studied by obstetricians, but clinical phenomenology deserves further study by Neurology. Our cases differ in part from other international reports, probably due to lack of experience in neurological patients. In subsequent publications we discuss the imaging findings in our series.

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1099
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Levetiracetam vs phenytoin for status epilepticus/cluster seizures: a prospective randomized study

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Background: Few effective and safe medications are available for treating Status Epilepticus (SE). Levetiracetam, a novel anticonvulsant, has a few studies supporting its efficacy in SE.

Objective: To compare the efficacy of IV levetiracetam (LEV) and phenytoin (PHT) in controlling SE and cluster seizures (CS), using an open-label, prospective, randomized study design.
Patients and methods: Adult patients (>18 yrs) with SE/CS, following an initial dose of IV benzodiazepine (lorazepam or diazepam for aborting ongoing seizures), were randomized to receive either Inj.LEV (20–30 mg/kg) or Inj.PHT (20 mg/kg) intravenously over 20–30 min, with close hemodynamic and neurologic monitoring. No prior consent was obtained (with permission of Ethics Committee). Outcome measures included prevention of seizures over 24 h; control of seizures with cross-over, adverse effects and resistant SE. Outcomes were examined using univariate and multivariate methods.
Results: Interim results of ongoing study (1 year) are presented. Of 71 patients (M:F::47:24; age = 41.5 + 11 yrs) recruited, 33 had SE while 38 had CS. Prior epilepsy 48 (67%) or acute metabolic disorders were the most common causes. No recurrence of seizures occurred over next 24 h in 22/34 (65%) receiving LEV and 27/37(73%) receiving PHT ($p = 0.06$). Adverse effects occurred in: PHT (hypotension) :2 and LEV (thrombocytopenia):1; all three recovered. Two patients died in each group due to underlying conditions.
Conclusions: IV Levetiracetam was effective in controlling SE/CS among two-thirds of patients. There was a trend towards better efficacy with IV Phenytoin. IV Levetiracetam may be safer. These interim results are encouraging to extend the study to larger number of patients.

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1100
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The use of 40 Hz-ASR can predict conscious outcome in patients with severe head injury in the early stage

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Early diagnosis is essential for providing appropriate treatment. The 40 Hz auditory steady-state response (40 Hz-ASR), which may reflect the activity of brainstem reticular formation, was examined in 27 patients with severe head injury. All of them were deeply comatose (Glasgow coma scale 3–8). In this prospective study, we evaluated the usefulness of the 40Hz-ASR as a predictor of consciousness outcome. We recorded the auditory brainstem response (ABR) simultaneously, and compared the results to clarify the characteristics and pathophysiological differences of these responses. The change in patients' consciousness level was noted successively and the condition at discharge was determined as the final outcome. The patients who lost waves III and V of the ABR had a poor outcome, and, in general, showed no 40 Hz-ASR. The patients who exhibited wave V had low mortality. However, if they showed no 40 Hz-ASR during their convalescent stage, the consciousness disturbance persisted and some of the patients became vegetative. The patients who showed good or fair 40 Hz-ASR in the acute or sub-acute stage recovered from the coma. In conclusion, as the ABR correlated with the vital outcome and the 40 Hz-ASR correlated with the consciousness recovery, they might be utilized as indices of the vital risk and consciousness recovery, respectively. Moreover, as the 40 Hz-ASR changed before the alteration of the level of consciousness in patients who were improving or worsening, it may serve as a useful tool for early prognostic evaluation of comatose patients. We have obtained Institutional Review Board approval prior to launching this study.

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Early quantitative somatosensory evoked potentials are associated with neurological outcomes after cardiac arrest and therapeutic hypothermia

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Background: Therapeutic hypothermia is one of the most effective interventions for cardiac arrest (CA) survivors. However, a satisfactory monitoring tool to track the effect of therapeutic hypothermia on post-CA neurological outcome is not yet available.
Objective: We developed a novel algorithm based on phase space area (PSA) to quantify and assess the recovery of somatosensory evoked potentials (SSEPs) after CA. We have shown that higher PSA is associated with better outcome.
Material and methods: 14 male Wistar rats subjected to 7-min asphyxial-CA were randomly assigned to either immediate post-resuscitation hypothermia (33 ± 1 °C) or normothermia (37 ± 0.5 °C) (N = 7). SSEPs were recorded during baseline and for 4 hrs post-resuscitation. Normalized quantitative SSEP (qSSEP)-PSA values were analyzed. Neurological recovery was evaluated by Neurologic Deficit Scale (NDS) score at 72 h post-resuscitation.
Results: A greater recovery of qSSEP-PSA was found in rats treated with hypothermia (mean ± S.E.M, 0.77 ± 0.15) compared with normothermia (0.12 ± 0.01) ($p < 0.001$), which was consistent with the 72h-NDS trend (median (25th, 75th): hypothermia (74 (74, 77)) versus normothermia (68 (49, 72)) ($p < 0.001$). The significant differences in PSA between the two groups occurred from 1.5 h post-resuscitation. Rats with good outcome (72 h-NDS ≥ 50) (0.80 ± 0.02) had significantly higher qSSEP-PSA values than those with bad outcome (72 h-NDS < 50) (0.50 ± 0.09) ($p < 0.001$). The PSA strongly correlated with 72 h-NDS as early as 2 h after resuscitation (Pearson correlation coefficient 0.580, $p < 0.05$).
Conclusion: The benefit of hypothermia was accurately tracked by our qSSEP marker in the early recovery post-CA. qSSEP-PSA indicated a robust prognostic ability to objectively and accurately predict neurologic outcome at 72 h.

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Validation of the A2DS2 score to assess the risk of stroke-associated pneumonia in a neurocritical care unit

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Background: Pneumonia is present in about 7–9% of ischemic stroke patients, often associated with poor outcome. In 2012, the Berlin Stroke Registry developed a clinical score for predicting this complication, consisting mainly in clinical findings and evaluations. It was later applied and validated in other centers and countries such as China, obtaining similar results.
Objective: To apply and validate the A2DS2 clinical score in patients admitted in our neurocritical care unit.
Patients and methods: The model was applied using prospective information obtained from patients admitted in our unit since 2014. Eligible patients were followed in order to perform proper evaluations (x-Rays, cultures and laboratory) when respiratory infections

were suspected. Since admission, patients were evaluated by a professional team of Speech therapists with the Toronto Scale and Swallowing Rating Scale in order to correctly assess dysphagia and the Clinical Pulmonary Infection Score to evaluate pneumonia.
Results: Forty-eight eligible patients were admitted and followed during the hospitalization in order to evaluate the rate of respiratory infections. Four patients presented them. Two patients had the CPIS score diagnosis for pneumonia.
Conclusions: Our current investigation aimed to show adequate validation of the A2DS2 in patients with acute ischemic stroke admitted in our unit. The numbers of patient with diagnosis of pneumonia seen in our study were lower than those described in the literature. This could be explained because of the use of standardized diagnostic criteria, rather than a clinical-radiologic evaluation performed in other studies.

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1103
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Delayed neurological recovery from eclampsia—etiological analysis

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Background: Eclampsia remains the most dreadful complication of pregnancy. Proper treatment leads to recovery within 24 to 48 h in majority. However vascular, metabolic, hematologic, septicemic or a multifactorial encephalopathy may delay the neurologic recovery.
Objectives: To analyze various etiologic factors for delayed neurologic recovery from eclampsia.
Patients and methods: All patients with eclampsia diagnosed and treated as per ACOG Guidelines with delayed neurologic recovery after 48 h of admission were studied in detail for demography, clinical features, hematologic, biochemical and neuroimaging. An attempt was made to establish etiological reasons for the delayed recovery.
Results: Of 280 patients with eclampsia treated during the study period, recovery was delayed in 32 **[** age 18 to 38 years, 20 primi gravida ,23 antepartum eclampsia, 9 post partum eclampsia, 27 vaginal delivery, rest caesarian**]**. Maternal mortality was in 6 and fetal mortality in 14. Antepartum onset of seizures was in 23. Seizure duration was >10 h in 24. Preceding visual aura was noted in 6 & orofacial grimacing in 3. Bilateral papilledema was present in 10 with focal neurological deficit in 5. Thrombocytopenia was noted in 18, raised liver enzymes in 22. CT abnormalities were observed in 14 patients, commonest being diffuse white matter hypodensities (9), arterial infarcts (4), venous infarcts (2) & intra cerebral hemorrhage (1).The commonest post eclamptic complication was HELLP syndrome (15 patients), followed by hypertensive encephalopathy(10),arterial infarct (4),venous infarct & septic encephalopathy (2 each), intra cerebral hemorrhage (1).
Conclusion: HELLP syndrome appears to be a prominent predisposing factor in delayed neurologic recovery from eclampsia.

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1104
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Neuro Critical Care
Usefulness of neck mra source images for rapid screening for spontaneous cervical epidural hematoma: a case report and literature review

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Background: Spontaneous Cervical Epidural Hematoma (SCEDH) rarely presents with hemiparesis.
Objective: We report a case of SCEDH initially recognized on neck MRA source images.
Results: A 64-year-old woman was admitted to a local hospital because of sudden neck pain and subsequent right hemiparesis. Although no abnormalities were detected on head CT, MRI, or head and neck MRA, oral aspirin administration was initiated under a presumptive diagnosis of ischemic stroke. Three days later, she was transferred to our hospital for additional investigations and treatment. Physical examination revealed 4/5 strength for the right upper and lower extremities, and cranial nerve examination showed normal findings. Babinski sign was positive on the right side, and a cervical lesion was suspected. Review of the neck MRA source images showed a predominantly right-sided posterolateral isointense lentiform collection with a hypointense rim compressing the cord. Subsequent cervical spine MRI showed an epidural lesion consistent with a C4-C6 hematoma. She was thus diagnosed with SCEDH. Orthopedic consultation was promptly obtained, and conservative therapy (aspirin discontinuance) was initiated. Two weeks later, the patient recovered completely. Hematoma resolution was confirmed on follow-up cervical spine MRI.
Conclusion: In emergencies, head MRI and head and neck MRA help rule out ischemic stroke for patients presenting with hemiparesis but no intracranial cerebral hemorrhage on head CT. Cervical lesions are suspected when these techniques yield normal findings, and neck MRA source images help quickly screen for cervical lesions, especially SCEDH, and should be re-examined before performing additional imaging examinations.

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