

Poster Corner 3: Kidney and Metabolism

033 - THE ROLE OF SERUM CYSTATIN C IN ESTIMATION OF RENAL FUNCTION IN CRITICALLY ILL SURVIVORS

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INTRODUCTION. In patients who survived from critical illness, estimation of renal function is still challenging. Using serum creatinine, the standard markers for glomerular filtration rate (GFR), might be interfered by malnutrition, severe muscle wasting and volume overload status. Recently, serum cystatin C, novel AKI biomarkers which is not influenced by muscle mass, and volume status, has been introduced. However, the role of cystatin C in the context of critically ill survivors is unknown. **OBJECTIVES.** We aimed to assess the validity of serum cystatin C and serum creatinine as a marker of renal function in critically ill survivors with the ^{99m}Tc diethylenetriaminepentacetate (DTPA), the gold standard in estimation of GFR.

METHODS. Thirty-seven adult Thai critically ill patients in intensive care units (ICU) with stable renal function and without hemodynamic instability were recruited. Their serum creatinine and cystatin C levels were measured. Three creatinine-based equations; [1) Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI), 2) Caucasian Modification of Diet in Renal Disease(MDRD), 3) Thai MDRD Cr], and two cystatin C-based equations, and one equation combining Cystatin C and serum creatinine (CKD-EPICr-CysC) were used to calculate estimated GFR. The ^{99m}Tc-DTPA plasma clearance was used as a reference for standard GFR. Spearman rank correlation and Bland-Altman plots were used to assess the correlation, bias, and accuracy between the estimated GFR from serum creatinine, serum cystatin C and the standard GFR.

RESULTS. A total of 37 patients with mean age 60±16.4 years were included. Mean standard GFR was 93.2±30.4 mL/min per 1.73 m². There were significant correlations between reference GFR and GFR by eGFR CKD-EPI SCysC (R=0.66, P< 0.001), eGFR CKD EPI SCr-SCysC (R=0.64, P< 0.001), eGFR MDRD Thai SCysC (R=0.61, P< 0.001), eGFR CKD EPI SCr (R=0.31, P< 0.001), eGFR MDRD Thai SCr (R=0.33, P< 0.001) and MDRD Caucasian SCr (R=0.28, P 0.001), respectively. CKD-EPI-cystatin C equation had the smallest absolute bias and the significantly highest accuracy.

CONCLUSION. In critically ill survivors with stable renal function, serum cystatin C significantly outperforms serum creatinine and we suggest to use estimated GFR by CKD-EPI cystatin equation to assess renal function.

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034 - LOW-DOSE HYDROXY-ETHYL-STARCH 6% (130/0.4) ADDED TO PRIMING SOLUTION OF CARDIOPULMONARY BYPASS PUMPS FOR CARDIAC SURGERY: EFFECTS ON RENAL FUNCTION, INTRAOPERATIVE FLUID BALANCE AND BLOOD TRANSFUSION REQUIREMENTS

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INTRODUCTION. Colloids are often used as priming fluids for cardiopulmonary bypass machines (CPB) aiming for improved fluid balance and consecutively improved pulmonary gas exchange. Hydroxy-ethyl-starches (HES) are the mostly commonly used colloids for this purpose. Compared to other colloids, HES causes significantly less allergic and immunological reactions, however, the potentially negative effects of HES on renal function and coagulation are widely discussed and there is some data indicating that this is particularly the case when higher doses of HES are used as a priming solution for CPB.

OBJECTIVES. The aim of this study was to investigate, whether a low dose of 5-10 ml/kg HES 6% (130/0.4) added to the priming solution in CPB pumps has an effect on the incidence of acute renal failure, perioperative blood loss, transfusion requirements and intraoperative fluid balance.

METHODS. In a pre-post design, data from 1120 patients undergoing open heart surgery with heart-lung-bypass was analyzed. In 560 patients priming solution consisted of 1250 ml balanced crystalloids, 250 ml mannitol 15%, tranexamic acid 2g and 500 I.E. heparin. For the other 560 patients, 500 ml of the crystalloids were replaced with HES 6% (130/0.4) while the other components of the priming solution were the same. Patients were matched 1:1 with propensity score method. Primary end-point was intraoperative fluid balance. Secondary end-points were perioperative blood loss, transfusion requirements as well as incidence of acute renal failure.

RESULTS. Data from 866 patients was analyzed. Significantly less total fluid volume was given intraoperatively in the HES group as compared to the crystalloid group ($p < 0.001$). There was no difference in intraoperative blood loss ($p=0.426$). Similarly, there was no difference in terms of blood transfusion requirements ($p=0.442$) as well as for other blood products. Incidence of renal failure was not significantly different between the two groups.

CONCLUSION. Adding a low-dose of 5-10 ml/kg HES 6% (130/0.4) to the priming solution of CPB pumps decreased intraoperative fluid accumulation without increasing perioperative blood loss and transfusion requirements. There was no significant effect on the incidence of acute perioperative renal failure. Priming CPB pumps with a low-dose of HES 6% (130/0.4) is therefore an important component when aiming for a restrictive volume strategy in cardiac surgery and can safely be used for patients with existing pre-operative limited renal function.

035 - THE EFFECTIVENESS, SAFETY OF BOLUS VS. CONTINUES INFUSION OF LOOP DIURETICS AMONG ICU PATIENTS WHO NEED INCREASE DOSAGE OF DIURETICS: RESULTS FROM MIMIC DATABASE

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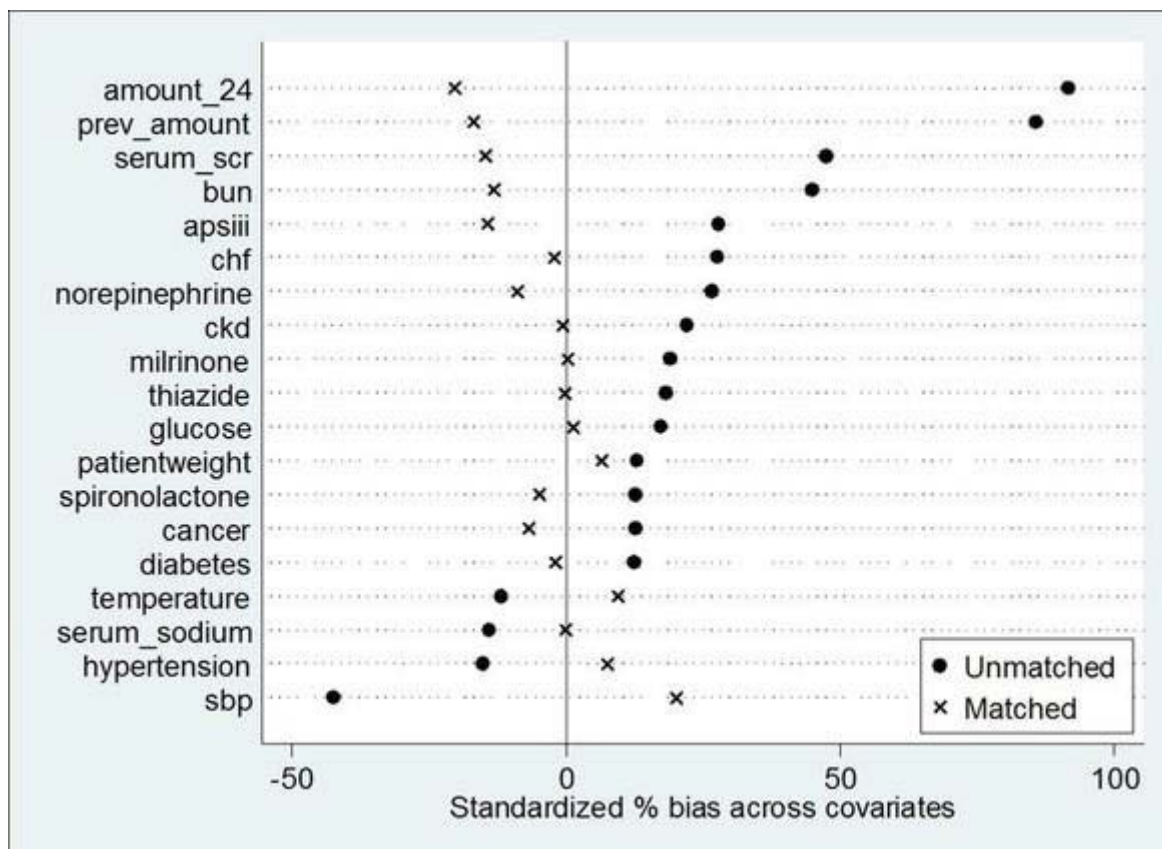
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INTRODUCTION. Although loop diuretics are among the most commonly used drugs in ICU, little is known about their effects and safety, especially when facing the scenario of having to increase the dosage, choice between different administration modality of continuous infusion vs. bolus lacks evidence.

OBJECTIVES. All the data was acquired through MIMIC (Medical Information Mart for Intensive Care) database. We used the following methods to define the patients cohort who need increase dosage of diuretics: Firstly, we chose the adult patients with diuretics use during their first ICU stay; Secondly, we divided the time of diuretics use into different 12-hour-units for each patient and calculated total amount in each unit; Thirdly, we compare each unit with the following one to identify increase of dosage and define the time point of increase as the index time; Finally we excluded those with an $eGFR < 15\text{ml}/\text{min}/1.73\text{m}^2$, receiving renal replacement therapy, baseline systolic blood pressure less than 80mmHg or the amount of diuretics less than 40mg furosemide or as equal. All patients were divided into two groups: receiving continuous intravenous drip of diuretics as drip group and others as bolus group.

METHODS. Propensity matching was used to balance the unmatched baseline characters between two groups. Variables including age, gender, ICU type, type of diuretics injection, weight, APS III score, systolic blood pressure, diastolic blood pressure, temperature, glucose, creatinine, blood urea nitrogen, serum sodium, potassium, 24-hour urine output after index time, amount of diuretics in previous 24 hours before index time, milrinone use, norepinephrine use, thiazide use, hypertension history, chronic kidney disease history, heart failure history, diabetes history and cancer history were generated from the database. After propensity matching, systolic blood pressure and previous 24-hour amount of diuretics were still unmatched. Multiple linear regression was used to compare the urine output and Chi-square test was used to explore the incidence of acute kidney injury based on the definition of acute kidney injury network.

RESULTS. A total of 1,582 patients including 559 as drip group were in the final dataset. The 24-hour urine output after the index time in drip group (935.69ml [95%CI: 722.64-1148.71, $p < 0.01$]) is more than the bolus group after adjusting systolic blood pressure and amount of diuretics in previous 24 hours. The 24-hour urine output per 40mg furosemide (174.08ml [95%CI: 91.33-256.82, $p < 0.01$]) is also more than the bolus group. There is no significant difference of AKI between two groups (26.61% in bolus group vs. 28.57% in drip group, $p=0.17$).



[Propensity matching]

CONCLUSIONS. When facing increasing dosage, continuous intravenous drip of diuretics is more efficient in ICU patients than bolus injection without causing a higher incidence of acute kidney injury.

037 - DOES INFUSION TIME AFFECT THE RETENTION OF PARENTERAL MICRONUTRIENTS?

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INTRODUCTION. Parenteral nutrition does not contain vitamins and minerals and these have to be added or given separately. When given separately, a fast infusion may be preferred for efficiency and accountability as it is less likely to be interrupted or curtailed, however it has been claimed that fast infusions could saturate transport mechanisms and result in increased losses in the urine.

OBJECTIVES. This study aimed to compare urinary losses after fast infusion versus slow infusion of parenteral micronutrients.

METHODS. The study enrolled consecutive well-nourished adult ICU patients with normal renal function who were starting parenteral nutrition post-operatively. Patients received a one-day dose of a complete micronutrient additive providing amounts recommended by the Australasian Society for Parenteral and Enteral Nutrition. This was infused over one hour and over ten hours, in random order, with a washout day after each infusion day. A 24-hour urine collection was used to measure losses of copper, zinc, selenium, manganese, chromium and iron. The total urinary losses on the infusion day and the subsequent day were recorded for each infusion time.

RESULTS. Complete urinary collections were obtained from 12 patients. There was no significant difference between the two-day urinary losses after the two different infusion times ($p > 0.05$ for all tests). For copper the two-day urinary loss was 1.76(SD 1.19)umol after the one-hour infusion versus 1.46(1.26)umol after the ten-hour infusion, compared to the daily dose of 8umol. For zinc the losses were 38.92(16.91) versus 31.71(17.98)umol compared to daily dose 100umol; for selenium 1.33(0.49) versus 1.29(0.41)umol compared to daily dose 1umol; for manganese 12.64(16.10) versus 18.25(33.48)nmol compared to daily dose 1000nmol; for chromium 218.71(50.25) versus

220(105.99)nmol compared to daily dose 200nmol; for iron 0.76(1.12) versus 1.15(1.75) compared to daily dose 20umol.

CONCLUSIONS. Parenteral trace element infusions can be given over one hour without causing excessive urinary loss.

038 - INDIRECT CALORIMETRY - GUIDED NUTRITION IN CRITICALLY ILL POLYTRAUMA PATIENTS

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INTRODUCTION. The critically ill polytrauma patient with sepsis presents with variable energetic necessities characterized by a pro-inflammatory, pro-oxidative and hypermetabolic status. One of the challenges the ICU doctor faces is adapting the nutritional therapy based on the individual needs of each patient.

OBJECTIVES. Through this paper we wish to highlight the trend of energy needs in the case of critically ill polytrauma patients with sepsis by using noninvasive monitoring of respiratory gases based on indirect calorimetry (GE Healthcare, Helsinki, Finland).

METHODS. This is a prospective observational study carried out in the Anesthesia and Intensive Care Unit "Casa Austria", Emergency County Hospital "Pius Brinzeu", Timisoara, Romania. We monitored VO₂, VCO₂, energy demand (ED), and specific clinical and paraclinical data. We measured energy demand values monitored by direct calorimetry with values calculated based on standard formulas.

RESULTS. 21 values have been recorded in the study. The mean VO₂ was 3.3 ± 0.4 ml/min/kg, the mean VCO₂ was 2.3 ± 0.3 ml/min/kg. In regard with energy demand, the mean ED obtained through direct calorimetry was 2393.2 ± 912.9 kcal/day, and those obtained by using mathematic formulas were 1988.6 ± 1100 kcal/day (p < 0.05). Moreover, statistically significant differences have been observed regarding the mean difference between energy demand determined using indirect calorimetry and that determined mathematically, respectively between the enteral and parenteral administered ED.

CONCLUSION. Continuous monitoring of the energy demand in critically ill patients with sepsis can bring important benefits in regard with the clinical prognosis of these patients through the individualization and adaption of intensive therapy for each patient.

040 - ASSESSMENT OF NUTRITIONAL STATUS AND ASSOCIATED FACTORS IN PATIENTS WHO UNDERWENT CARDIOPULMONARY BYPASS SURGERY IN A TERTIARY CARE SETTING

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BACKGROUND. Malnutrition is highly prevalent among hospitalized patients, which affects their clinical outcomes and length of hospital stay. Cardiac patients are known to be at risk of malnutrition. Healthcare workers often under recognize and underestimate malnutrition in patients.

AIMS. To assess nutritional status and associated factors in patients who underwent cardiopulmonary bypass surgery in Cardiothoracic Unit (CTU) of Teaching Hospital, Karapitiya (THK).

Methods. A retrospective analysis of clinical records of 423 patients who underwent cardiopulmonary bypass surgery for past two years in CTU, THK was carried out. Data on relevant demographic, anthropometric, biochemical and clinical parameters were collected using a data extraction sheet. Body Mass Index (BMI) was calculated using cut-off values recommended for Asian population. Data were analyzed using SPSS software.

RESULTS. Mean(±SD) age of the sample was 59.4(±7.7) years, the majority being Sinhalese (92.2%) and males (76.1%) from rural areas (71.3%). Diabetes, Hypertension and Dislipidaemia were found in 48.0%, 65.1% and 93.0% of the patients respectively. Mean(±SD) BMI and haemoglobin concentration were 24.3(±4.2) and 12.5(±1.6) g/dl respectively. Proportions with underweight (BMI < 18.5), normal BMI (BMI = 18.5-22.9) and overweight/obese (BMI ≥ 23) were 6.9%, 31.7% and 61.4% respectively. Approximately 48% were anaemic. Mean(±SD) duration of post-operative hospital stay was 12.5(±4.9) days. Post-operative complications were observed in 22.5% while in ICU and 37.4% while in the ward.

Nutritional status was associated with age of the patients ($p < 0.01$), but not with other basic socio-demographic characteristics and co-morbid conditions. Outcome of the surgery and duration of hospital stay did not show any association with nutritional status ($p > 0.05$).

CONCLUSION. Majority of the patients undergoing cardiopulmonary bypass surgery were overnourished, though a considerable proportion was anaemic. Basic socio-demographic characteristics except age, co-morbid conditions and outcomes did not show any association with nutritional status in this sample.

041 - WHAT ARE THE OUTCOMES OF ICU PATIENTS WITH ACUTE KIDNEY INJURY REQUIRING RENAL REPLACEMENT THERAPY? (WATER)? RETROSPECTIVE SINGLE CENTRE STUDY

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OBJECTIVE. To determine long-term outcomes of Intensive Care Unit (ICU) patients with AKI requiring CRRT. **Design, setting and participants:** Retrospective analysis of patient outcomes from a single centre, tertiary teaching hospital ICU. Adult patients admitted to the ICU with AKI requiring CRRT from 1st July 2013 to 30th June 2015 were included.

METHODS. ICU, hospital electronic record management systems and the renal unit database were interrogated for demographic data and outcome measures. Patients already on dialysis prior to their index ICU admission were excluded.

Outcome measures: Hospital and one-year mortality; dialysis dependence in survivors

RESULTS. 190 patients were analyzed. The median length of hospital and ICU stay for these patients were 16 days (IQR, 24 days) and 3 days (IQR, 6 days) respectively. Hospital mortality was 37.4% (71/190) which increased to 55.6% (99/178) at one-year. At one-year 6.3% (5/79) patients were still dependent on dialysis. On univariate analysis, heparin circuit anticoagulation OR 0.52 (CI 0.35 - 0.77, $p=0.001$) and creatinine level on ICU admission (OR 0.99, per micromol/l increase in creatinine, CI 0.997 to 0.999, $p=0.02$) were associated with reduced mortality. Creatinine level on ICU admission OR 1.65 per micromol/l increase in creatinine (CI 1.03-2.62, $p=0.04$), was associated with dialysis dependence at one year. On multivariate analysis only APACHE II score was a significant predictor of mortality at one year with an OR, 1.06, per one unit increase in score (CI 1.01, 1.09 $p=0.02$).

CONCLUSIONS. Although critically ill patients with AKI treated with CRRT have high one-year mortality at 55.6%, only a small proportion of survivors (6.3%) are still dependent on dialysis.

043 - HIGHER GLUCOSE VARIABILITY INDEXES FOR HIGHER ICU MORTALITY? ONE MORE EVIDENCE...

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INTRODUCTION. Guidelines have recommended a precise control of glycaemia in ICU patients at respect of morbidity and mortality. Recently, glucose variability index (GVI) was also mentioned to be more important.

OBJECTIVE. The objective of this study was to evaluate GVI effect on ICU patients' morbidity and mortality.

METHODS. The annual (2017) records of 343 ICU patients retrospectively reviewed. Insulin-treated patients' data (n:76) included into study and analyzed for nutrition route (NR), mean calorie/day (C/d) intake, mean insulin dose/day (ID/d), and GVI patterns that an effect on 28th-day survival and treatment complications through length of stay.

RESULTS. The patients' survival did not show any significant relation at respect of patients' previous own-medications, pre-diagnosis of DM, liver or renal failure, and also provided renal replacement therapy (Table 1). In case, NR and ID/d were not related, also. Those complications through ICU stay did not correlated to C/d, ID/d, NR and also GVI. Though, first day SOFA score predicted mortality, but daily SOFA changes did not. On the other hand, lower GVI levels and lower C/d significantly correlated to 28th-day survival (Table 2).

Primary diagnosis	<i>n</i>	Co-diagnoses	<i>n</i>	Previous-continued medications	<i>n</i>	Nutrition route	<i>n</i>
Malignity	29	Acute liver failure	11	Beta-blockers	17	EN	31
CNS	21	Chronic liver failure	2	Steroids	14	TPN	19
GIS	17	End-stage liver disease	2	Thyroid replacement	7	EN+TPN	4
Pulmonary	15	Acute renal failure	31	DM	30	Complications developed	<i>n</i>
Post-operative	13	Chronic renal failure	6			BSI	3
Renal	10	CVVHDFx	6			Pulmonary	4
Cardiovascular	8	HDx	3			Septic shock	4

[Table 1: General characteristics and data]

	survived	died	sig.
Patients (n:76) (female:47)	24	52	
ID/d u (19.6 ± 15.1) (mean±SD)	21 ± 18	19 ± 14	<i>ns</i>
SOFA score (1-19) (mean±SD)	5.5 ± 3.6	9.4 ± 4.2	<0.01
C/d Kcal (mean±SD)	1022 ± 659	1217 ± 393	<0.01
GVI (mean±SD)	190 ± 33	211 ± 58	<0.05

[Table 2: statistical analyses for mortality]

CONCLUSION. The results of this study indicated that a lower-calorie nutrition had somehow better prognosis as postulated by previously studies. Remarkably, GVI was an important parameter for ICU patients' morbidity, but not for mortality indeed. This study was retrospective, non-randomized and relatively small in size, therefore GVI should be opt to evaluated by future large RCTs.

044 - COMA, PROFOUND THROMBOCYTOPAENIA, DIALYSIS-DEPENDENT RENAL FAILURE AND SYMMETRICAL PERIPHERAL GANGRENE - SURVIVING A 20% PLASMODIUM FALCIPARUM CEREBRAL PARASITAEMIA

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INTRODUCTION. A rare case of cerebral malaria survivor with high parasite count and some rare complications.

CASE. 64 year old Zimbabwean male presented with high fevers, rigors. and headache, rapidly declined to Glasgow Coma Scale (GCS) of 11 with profound acidaemia. Blood tests of 20% parasitaemia confirmed *Plasmodium falciparum* with platelets $9 \times 10^9/L$. Intravenous (IV) artesunate was commenced. Day 1: 3 self-limiting tonic clonic seizures, pyrexial ($40.2^\circ C$), hypoxia, intubated for GCS of 7. Day 2: noradrenaline infusion of 0.17mcg/kg/min with improving acidosis. Day 3: parasite count undetectable but GCS remained 3. He had a mixed lower limb neuropathy with cold, mottled and pulseless feet. Day 5: developed renal failure on haemofiltration. CT scan on day 1 was normal. MRI scan on day 3 showed multiple cortical infarcts. CT scan on day 6 showed cerebral oedema. Trial of methylprednisolone was given with recovering of GCS. He underwent bilateral below knee amputations due to symmetrical peripheral gangrene (SPG). He was extubated on day 10 with dysarthria and right-sided weakness. He remained dialysis-dependant for 3 weeks. He is now in rehabilitation with good neurological function.

DISCUSSIONS. Cerebral malaria is a severe complication of *Plasmodium falciparum* malaria, with mortality of up to 25%.¹ Pathophysiology is the sequestration of parasitised red blood cells (PRBC) in the microvascular circulation of the brain, cerebral oedema is likely due to the resultant inflammation. A Cochrane database review of steroids in cerebral malaria identified two valid RCTs, neither showed benefit.² GCS improvement with steroids could be co-incidental but it is possible that steroids reduced residual inflammation and therefore oedema. Thrombocytopenia due to: hypersplenism as PRBCs are sequestered in the organ; and platelet aggregation due to increased endothelial activation. The acute kidney injury is secondary to blackwater fever exacerbated by IV artesunate. SPG is a rare complication of malaria with mortality of 35% and amputation rate of 70-90%. The adhesion of the PRBC to the vascular endothelium and clumping of erythrocyte cause intravascular thrombosis and peripheral gangrene.

CONCLUSION. This is a rare case of an adult cerebral malaria with 20% parasite count exhibiting complications including blackwater fever, profound thrombocytopenia and SPG all of which are poor prognostic indicators in the context of an on-going cerebral malaria infection. With early intensive care admission, aggressive anti-malarial treatment with IV artesunate, timely administration of high dose steroids, effective surgical management and rehabilitation we were able to successfully manage this patient's severe disease.

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044A - Comparative study on some novel biomarkers for enhanced detection in patients with hepatocellular carcinoma

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INTRODUCTION. Taurine has been demonstrated to function as direct and indirect antioxidant and found to display antineoplastic effect.

OBJECTIVES. To correlate serum taurine level with the serum levels of the specific liver cell tumor markers (α -fetoprotein (AFP) and α -L-fucosidase (AFU)) for early diagnosis of hepatocellular carcinoma (HCC)

METHODS. Three groups of 80 males and females patients aged between 20 and 70 years old were selected from the Tropical Medicine Department, Faculty of Medicine, Cairo University presented with signs of liver impairment. Full clinical examinations and imaging techniques were done for all patients beside serum level of AFU, AFP and taurine. Twenty healthy persons were also enrolled as control group. Liver biopsies were taken from selected patients. Patients were classified into three groups, 20 acute hepatitis, 20 cirrhotic and 40 HCC patients. Patients who accepted to be a candidate for living donor liver transplant (LDLT) were referred to Ain Shams University Specialized Hospital (ASUSH) liver transplant unit

RESULTS. For the hematological parameters, there is significant decrease in RBCs, platelets count, Hemoglobin concentration, prothrombin time especially in cirrhotic and HCC groups. Liver enzymes (AST, ALT) showed significant elevation in hepatitis group. Serum albumin showed marked decrease ($P < 0.001$) in all patients. Contrary, a highly significant increase ($P < 0.001$) in total bilirubin was found

in all cirrhotic and HCC patients. Serum levels of (AFP and AFU) were extremely elevated in all HCC patients and to a lesser extent in cirrhotic patients. Taurine level exhibited a value of less than 20 mmol/l in HCC patients and its level in chronic hepatitis exhibited a value less than that recorded in control by about 30% these decrement was continuous in cirrhotic patients. Twenty two patients accepted to be a candidate for LDLT were referred to ASUSH liver transplant unit.

CONCLUSIONS. It is suggested that assessment of taurine level beside (AFP and AFU) in sera of patients with high risk for HCC and may have a rule in identifying HCC and end stage liver disease (ESLD) patients candidate for LDLT, an area which needs further research.

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