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SAP101 | IS THE CONTRAST-ENHANCED MAGNETIC RESONANCE IMAGING OR MAGNETIC FIELD SAFE FOR THE PATIENTS WITH HIGH-RISK FOR ACUTE KIDNEY INJURY?

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Introduction and Aims: Gadolinium chelate (GC)s using in magnetic resonance imaging (MRI) have been traditionally considered as non-nephrotoxic contrast materials. But, in some recent articles it has been suggested that GCs may have a nephrotoxic potential. Nevertheless, most of these reports are retrospective, and evaluated contrast agents and their doses were not homogenous. To investigate the effect of gadopentetate dimeglumine (GD) and magnetic field on renal function in patients with high-risk for acute kidney injury (AKI).
Methods: We designed a prospective case control study, and age and sex-matched two groups of patients were included the study. Both of groups were consisted of the patients with high-risk for AKI (diabetes mellitus, hypotension, chronic renal failure, using nephrotoxic material, i.e.) (n=40, for each group). While contrast (gadopentetate dimeglumin)-enhanced non-vascular MRI was performed to group 1 patients, MRI without contrast agent was performed in goup 2 patients. Fixed dose of GD (0.2 mmol/kg) were administered to group 1 patients. All patients were followed up 72 hours. Before and at the 6, 24 and 72 hours after the MRI; biochemical markers, urinalysis, microalbumin/creatinine ratio in spot urine, serum creatinine, and glomerular filtration rate were measured.
Results: Baseline serum creatinine, microalbumin/creatinine ratio, and GFR was not different between group 1 and group 2 (p>0.05). We did not observe adverse effect related to procedures. There were no significant changes in renal functional tests (? serum creatinine, ?microalbumin/creatinine ratio, and ?GFR) in both groups after 6, 24 or 72 hours of the procedures (p>0,05).
Conclusions: Non-vascular contrast-enhanced (GD, 0.2 mmol/kg) MRI is a safe procedure for patients with high-risk for AKI. Key Words: MRI, Gadopentetate dimeglumine, contrast nephropathy, acute kidney injury.

SAP102 | NEURAL NETWORKS FOR THE DIAGNOSIS OF ACUTE KIDNEY INJURY

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Introduction and Aims: Treatment of acute kidney injury (AKI) is hampered by the lack of an accurate tool for early diagnosis. Prediction of AKI in septic patients is cumbersome because of the many influencing factors and the heterogeneity of the underlying disease process. Neural networks (NN) have a great capacity to recognise in a robust way patterns in apparently unstructured data, which theoretically would make them optimal for medical decision making, especially when the exact relation between input (clinical and biochemical data) and output (disease state) is unknown. We therefore hypothesized that NN would be suited for early prediction of AKI in septic patients.
Methods: in the first 100 consecutive patients admitted to a tertiary care ICU and with the diagnosis of sepsis, we collected biochemical data (urinary NGAL, KIM-1, IL18 and Screa) on arrival and clinical information (diuresis, fluid balance, CVP, volume status) during the first 6 hours. AKI was defined as RIFLE class I or F on any of the first five days after admission. Multilayer perceptron NN's (based on SPSS 19) were constructed with sigmoid decision functions for the hidden and output layer, an initial sigma and lambda of 0.00005. For each NN, 70% of data were used for training and 30% for testing. NN's were once fed with only clinical data (NN1), once with only biochemical data (NN2) and once with the combination (NN3). For each condition, 10 NN's were trained during max 1000 epochs each, for the early prediction of occurrence of AKI. Results are provided on the testing cases only.
Results: 54/100 patients developed AKI. Sensitivity for prediction of AKI in the next 5 days ranged between 61.5-80.0% (NN1), 58.3-80.0% (NN2) and 56.3-95% (NN3), and specificity between 64-81% (NN1), 71-76% (NN2) and 55-72% (NN3). For the clinical model NN1, the biochemical model NN2 and the mixed model NN3, positive predictive value (PPV) varied between 46 and 80%, 58 and 88%, and 54 and 86% respectively. The negative predictive value (NPV) varied between 50 and 80%, 50 and 64% , and 50 and 77% resp.
Conclusions: Despite their ability to adequately categorise data with unknown relation, neural networks perform at best moderately in predicting AKI in the 5 days following ICU admission. Most likely, accurate prediction of AKI will remain complicated, as underlying pathophysiology and clinical conditions differ substantially between each individual case, making generalisations nearly impossible. NNs performed equally well when trained with only clinical or only biochemical data. Combination did not add to the prognostic power. As NNs train in a process similar to how experience works in humans, it can be concluded that clinical data are probably as good in predicting AKI as biomarkers in experienced physicians.

SAP103 | ASSOCIATION OF ACE D ALLELE WITH ACUTE KIDNEY INJURY IN NON-CHINESE PATIENTS AFTER CARDIAC SURGERY IN A MULTI-ETHNIC SOUTH ASIAN POPULATION

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Introduction and Aims: Postoperative acute kidney injury (AKI) after cardiac surgery is a frequent, serious, multifactorial complication with interpatient variability predicted poorly by preoperative clinical and procedural markers1. In our preliminary study, we noted that 56% of patients presenting for cardiac surgery developed AKI and apart from common known risk factors, ethnicity was independently associated with the risk of AKI, with Indians and Malays having a higher risk of developing AKI after cardiac surgery. The ACE (Angiotensin converting enzyme) D allele has been implicated in kidney injury in African Americans and we postulate that the D allele is associated with the increased incidence of AKI in the non Chinese after cardiac surgery in a multi-ethnic South Asian population.
Methods: 991 consenting patients who underwent cardiac surgery were studied. Clinical covariates were recorded. The primary outcome was AKI, defined as a 25% or greater increase in preoperative to maximum postoperative serum creatinine level within 3 days after surgery. DNA was isolated from preoperative blood and PCR was used to detect the deletion (D) allele and insertion (I) allele of the ACE gene.
Results: 49.5% patients have a creatinine rise of 25% post cardiac surgery. Out of 491 patients who develop AKI, 60.9% carry the D allele. A race effect was seen with Indians and Malays having a higher risk of developing AKI compared to Chinese (p=0.002). In addition, non- Chinese with the D allele have a marginally higher risk compared to Chinese of developing AKI (OR 1.037, CI 0.949-1.134)
Conclusions: Indians and Malays who have the D allele have a higher risk of developing AKI compared to Chinese. The ACE D allele is linked to increased renal vasoconstriction and this susceptibility in the non Chinese may be unmasked during cardiac surgery which is associated with problems of atheroembolism and ischaemia-reperfusion injury2. This is the first local report linking the D allele in the non Chinese with development of AKI after cardiac surgery.

References1 Conlon PJ et al.Nephrol Dial transplant 14(1999), 1158-1162.2 Stafford-Smith M et al. Am J of Kidney Disease 45(2005), 519-530.

SAP104 | PREOPERATIVE SERUM URIC ACID IS THE MOST PREDICTIVE MARKER FOR THE INCIDENCE OF ACUTE KIDNEY INJURY FOLLOWING CARDIAC SURGERY

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Introduction and Aims: Acute kidney injury (AKI) following cardiac surgery is a frequent complication and several risk factors increasing its incidence have already been characterized. This study evaluates the influence of preoperative increased serum uric acid (SUA) levels in comparison with other known risk factors on the incidence of AKI following cardiac surgery.
Methods: 247 patients who underwent elective coronary artery bypass grafting, valve replacement/ repair or combined bypass and valve surgery between October 2010 and February 2011 were prospectively analyzed. Primary endpoint was the incidence of AKI as defined by the AKIN criteria comparing patients with preoperative serum