MO963 VITAMIN D STATUS AND SARS-COV-2 INFECTION IN A COHORT OF RENAL TRANSPLANTED PATIENTS

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BACKGROUND AND AIMS: Immunomodulatory and anti-inflammatory properties have been hypothesized for native vitamin D (nVD). Very little is reported about nVD and risk of Sars-CoV-2 infection (COV) in renal transplant (RTx). In a cohort of renal transplanted patients (RTxp) we retrospectively evaluated: (i) nVD status in patients with (COV+) and without (COV-) COV infection; (ii) the impact of nVD status on severity of COV.
METHOD: The study includes 61 COV + in whom nVD status was available in the year before the infection, and 122 COV- matched 1:2 for age (53[45–64]years), gender ($M = 60.7\%$), RTx vintage (7[2–15] years), presence of diabetes (18%), arterial hypertension (85%) and cardiac symptomatic disease (3%). Renal function, 24-h proteinuria and mineral metabolism (MM) parameters were evaluated at 1, 6 and 12 months before COV whereas nVD status was considered as the mean 25-OH-VD levels at the same timepoints. Severity of COV was based on the need for hospitalization (HOSP+: 27/61, 44.3%) and death (D+: 6/61, 9.8%).
RESULTS: (i) nVD levels were significantly lower in COV + than in COV- (19[12–26] ng/mL and 23[16–30] ng/mL, respectively, $P = 0.01$). No differences in the other biochemical parameters were found. The COV discriminative power of nVD status was evaluated by ROC curve (AUC 0.61, 95% CI: 0.54–0.68, $P = 0.01$), with a value of 25-OHVD 23.9 ng/mL showing the best discriminative power (sensibility 72%, specificity 47%). (ii) nVD levels showed a trend towards lower values in HOSP + COV + than HOSP-COV+ (17[8–25] ng/mL versus 20[14–26] ng/mL) and in D + COV + than D-COV+ (13[6–23] ng/mL versus 20[13–26] ng/mL), although these differences did not reach the statistical significance ($P = 0.1$ and $P = 0.2$, respectively).
CONCLUSION: With the limitations of the retrospective nature of the study and the small sample size, our data report that:

(i) COV + showed lower nVD levels in the year preceding the infection compared with controls with similar main demographic features and comorbid conditions
(ii) No differences were found in renal function, proteinuria and other MM parameters between the two groups.

No association was found between nVD levels in the year preceding the infection and COV severity.

MO964 HIGH URGENCY RENAL TRANSPLANTATION FOR PATIENTS WITH EXHAUSTION OF VASCULAR ACCESS FOR HAEMODIALYSIS: EXPERIENCE FROM A TERTIARY CENTER

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BACKGROUND AND AIMS: When faced with exhaustion of vascular access for haemodialysis (EVAH), allocation for High Urgency Renal Transplantation (HURT) is the appropriate solution. Patients with EVAH usually have multiple comorbidities and an increased risk of cardiovascular and thrombotic events. The aim of this study is to analyze the characteristics and outcomes of patients undergoing HURT due to EVAH.
METHOD: Data from the Renal Transplant Unit since January 2006 were retrospectively analyzed. Eleven patients undergoing HURT were identified.
RESULTS: In the population studied, 45.5% ($n = 5$) were male, 63.6% ($n = 7$) were Caucasian and the mean age at the time of transplantation was 41.6 ± 7.8 years. Ninety % ($n = 10$) were hypertensive, 27.3% ($n = 3$) were diabetic and 27.3% ($n = 3$) had previous cardiovascular disease. Patients were on renal replacement therapy for 5.8 ± 2.7 years prior to transplantation. The mean transplant time was 75.5 ± 53.7 months. The mean follow-up period was 90.6 ± 51.9 months. During this period, 63.6% ($n = 7$) of patients lost their renal graft and mortality was 63.6% ($n = 7$). Renal graft survival was 81.8% ($n = 9$) at the first year, 72.7% ($n = 8$) at the third year and 63.6% ($n = 7$) at the fifth year of follow-up. At discharge, mean creatinine was 1.8 ± 1.1 mg/dL. At the first year, mean creatinine was 1.9 ± 0.8 mg/dL, at the third year was 2.3 ± 1.9 mg/dL and was 1.6 ± 0.4 mg/dL at the fifth-year post-transplant. The mean time to graft loss was 54.1 ± 49.3 months. Overall survival was 90.9% ($n = 10$) at the first year, 90.9% ($n = 10$) at the third year and 81.5% ($n = 9$) at the fifth-year post-transplantation. Two patients died from a cardiovascular event, one from neoplasia and other from an infectious cause. Two patients died with a functioning kidney allograft.
CONCLUSION: Kidney graft survival in patients undergoing HURT was significantly lower. Portuguese Transplantation Society reporting an overall graft survival of 92.9% at the first year and 85.0% at the fifth year. The mortality of these patients is quite high; however, the fact that they are patients with EVAH, whose life expectancy would be greatly reduced if they were not transplanted, makes HURT continue to be an indicated option in this population of more vulnerable patients.

MO965 THE IMPLEMENTATION OF A NOVEL ALGORITHM FOR OPTIMAL PREDICTOR SELECTION, EXPLOITING MIQUBO ON D-WAVE QUANTUM ANNEALER, FOR PREDICTING KIDNEY GRAFT LOSS AFTER URINARY SEPSIS IN KIDNEY TRANSPLANT RECIPIENTS

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BACKGROUND AND AIMS: Kidney transplant recipients (KTRs) hospitalized for urinary sepsis are at increased risk of graft loss (GL). Thus, there is a distinct need to develop models to accurately predict significant graft complications. MIQUBO (Mutual Information Quadratic Unconstrained Binary Optimization) is a concept, which in great approximation relies on optimization (maximization) of Mutual Information (the amount of information that is carried by a single variable) based on QUBO (Quadratic Unconstrained Binary Optimization) problem [1,2]. This method is found to be especially fit to solve complex statistical problems due to its ability to reduce models dimensionality, especially when deployed on a *D*-wave quantum computer [3]. In this study, we have investigated the feasibility of MIQUBO as a novel feature selection method to consciously extend machine learning prediction models, using a previously published dataset [4], to predict GL after urosepsis in KTRs.
METHOD: The analyzed dataset included 101 KTRs hospitalized for urosepsis, 100 KTRs hospitalized for UTI and 100 healthy KTRs without any history of UTI or sepsis. To predict GL at 12 months post-discharge after an episode of urosepsis, four features have been used to predict graft loss in a previous (unpublished) study by our group. These four features are further referred to as restricted variable set (RVS*). Subsequently, from the total of 150 variables included in the dataset, we have selected 12 additional features using MIQUBO deployed on a *D*-Wave quantum annealer. The extended variable set (EVS) was created based upon Conditional Mutual Information (CMI) of each variable. Then, 13 different machine learning (ML) models were build using each set of variables. Each developed model was explored for its performance according to the amount of included additional features (random versus MI-ranked).
RESULTS: The overall frequency of graft loss after 12 months of observation equaled 10.3% in the whole study cohort. However, the frequency of GL after urosepsis has reached 18% after 12 months from discharge, as compared with 3% in the healthy controls. The variables included in both sets of features (RVS and EVS) and their values were presented in Table 1. The best performance among developed models (using the EVS) has been achieved using Gaussian Process and QDA models, yielding area-under-the-receiver-operator-curve (AUROC) of approximately 0.91. From 13 developed pairs of models (for both sets of variables), 8 have proven to be statistically superior (AUROC comparison) in favor of MIQUBO-extended models. The mean difference of AUROCC between EVS- and RVS-models equaled 0.092 ± 0.11. Furthermore, a trend has been observed towards better performance of models (in regard of achieved AUC and recall) when ML-models were extended utilizing features based upon MIQUBO MI-ranking as compared with features randomly chosen from EVS. Representative plots were presented on Figure 1. The point '0' on these plots refers to the parameters of models built on sole RVS.
CONCLUSION: Our preliminary experiment suggests that MIQUBO deployed on a quantum annealer is an efficient method for extending machine learning models with variables derived from extensive and imbalanced datasets, without losing on models' reproducibility or accuracy.

REFERENCES

1. Venkateswara H, Lade P, Lin B *et. al.* "Efficient approximate solutions to mutual information based global feature selection," *2015 IEEE International Conference on Data Mining* 2015; 1009–1014
2. Nguyen X, Chan J, Romano S *et. al.* Effective global approaches for mutual information based feature selection. In Proceedings of the 20th ACM SIGKDD international conference on Knowledge discovery and data mining (KDD '14). New York, NY: USA; 2014: Association for Computing Machinery, 512–521.
3. https://www.dwavesys.com
4. Krolicki T, Bardowska K, Krolicka A *et al.* Study on urinary sepsis in kidney transplant recipients—a single-center, retrospective, cross-sectional study', Mendeley Data, V1; 2021