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Machine learning: An effective way to predict acute renal failure and spinal cord injury after thoraco-abdominal aorta replacement

ardiologists have to discover an approach to predict the occurrence of acute renal \checkmark failure (ARF) and spinal cord injury (SCI) in early stage to relief the organic injury. 193 perioperative data of thoraco-abdominal aneurysm cases have been retrospectively collected from Anzhen Aortic-Disease Center and Delta Health Hospital. The thoracoabdominal aneurysm was repaired by four-branched tetra furcate graft without cardiopulmonary bypass in normal thermal. The mean age of patients was 38±10 years and 108 (70.6%) were male. There were 87 (53.8%) patients experienced previous aortic surgeries and 33 (22%) with Marfan syndrome. Based on the data categorized by the occurrence of ARF and SCI, the logistic regression model prompts that male, senility, prolonged right renal artery blocking, upraised lactate dehydrogenase (LDH) during operation, transfused excessive RBC, may increase the occurrence of ARF, however, the upraised BMI is the protective factor; prolonged operation, combined with Marfan syndrome, transfused excessive platelet may increase the occurrence of SCI, whereas cerebrospinal fluid drain is the protective factor. Furthermore, four frequently used machine learning models have been tested to predict the result, random forest and linear support vector machine are separately the most precise model to predict ARF and SCI, the mean AUC of each is 0.94 and 0.79 (models and code has uploaded to GitHub1 for free access). As a conclusion, the machine learning models could precisely predict the ARF and SCI at the early stage after surgery, it's possible for Cardiologists to handle the complications earlier to relief the organic injury.

Biography

Chenyang Zhou is a MD. at the age of 23 years from Dalian Medical University and become PhD candidate at the age of 28 years from Capital Medical University. Published 'Combined Transfer of vegf165 and bfgf Genes in Endothelial Response in Ischemic Skeletal Muscle' on The Houston Aortic Symposium 2014.

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