Establishment and clinical application of immune risk stratification criteria for kidney transplant recipients

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Introduction: To establish risk stratifying criteria for acute rejection (AR) after kidney transplantation (KT) through analyzing the preoperative risk factors of KT recipients from deceased donor (DD).

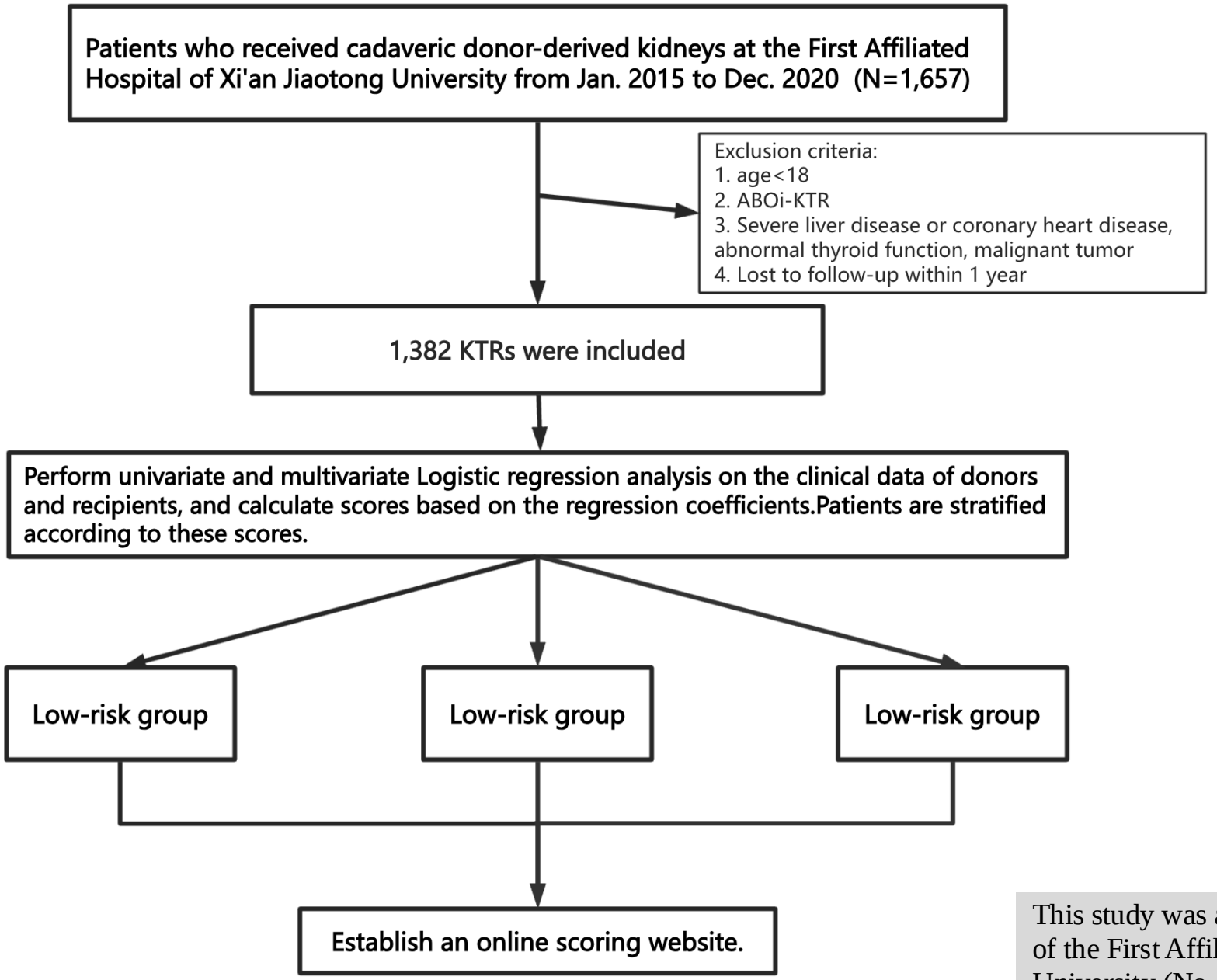
Method: The data of kidney transplant recipients who received deceased donor-derived kidneys in the renal transplantation department of the First Affiliated Hospital of Xi'an Jiaotong University between January 2015 and December 2020 were retrospectively analyzed with a follow-up period of >1 year, and a total of 1,382 recipients were included and divided into an acute rejection group (AR group, 115 cases) and a non-acute rejection group (non-AR group, 1,267 cases). A statistical algorithm was applied to determine the risk factors for AR and their regression coefficients by univariate and multifactorial analysis of the clinical data of the two groups, then establish the scoring criteria based on the result. The recipients were divided into low, risk and high risk groups according to their scores, and the occurrence of AR in the different scoring groups was analyzed and compared.

Result: Acute rejection occurred in 115 of 1 382 recipients within 1 year after surgery, with an overall AR incidence of 8.32% (115/1,382). After univariate analysis, variables that were statistically different ($P<0.05$) were included in further multivariate logistic regression analysis calculations, and those that were statistically significant were finally identified. Scores were calculated based on their regression coefficients, and a recipient scoring system with a total score of 36 was established. The recipients were divided into low, intermediate, and high-risk groups according to the tertile of the score, and the incidence of AR in the three groups was 4.3%, 14.7%, and 40.0%, respectively, with a significantly higher incidence of AR in the intermediate and high-risk groups than in the low-risk group (all $P<0.001$).

Conclusion: The immune risk assessment criteria for kidney transplant recipients from DD sources can effectively differentiate the risk of postoperative AR in kidney transplant recipients; For recipients with middle/high immune risk, intensity and dose of immunosuppressants should be appropriately boosted during preoperative induction and maintenance period. And the occurrences of AR and infection should be dynamically monitored.

Keywords: Deceased donors; Kidney transplantation; Acute rejection; Risk assessment

Flow diagram of developing prediction model



This study was approved by the Ethics Committee of the First Affiliated Hospital of Xi'an Jiaotong University (No. XJTU1AF2021LSK-258).

Results

Table 1. Immunological Risk Scoring Table for AR in Recipient

Variables	Multivariate Logistic Analysis			Scores
	β	95% CI	*P*	
Age difference between donor and recipient (years)				
<25	—	—		0
≥25	0.61	0.18，1.0	0.006	6
ECD				
No	—	—		0
Yes	0.82	0.38, 1.3	<0.001	8
HLA-mismatch				
<3	—	—		0
≥3	0.81	0.40, 1.2	<0.001	8
PRA+DSA				
Negative	—	—		0
Positive	0.74	0.17, 1.30	0.008	7
Cold ischemia time (hours)				
<12	—	—		
≥12	0.74	0.28, 1.20	<0.001	7

https://tudou123.shinyapps.io/tian_lab/

肾移植受者免疫风险分层

Fig 1. Online rating website QR code

Conclusions

The immune risk assessment criteria for kidney transplant recipients from DD sources can effectively differentiate the risk of postoperative AR in kidney transplant recipients. For low-risk recipients in immune risk stratification, low-intensity immunosuppressive regimens can be appropriately administered to reduce adverse drug reactions, postoperative infections and economic burden; for kidney transplant recipients in intermediate and high-risk immune risk stratification, the preoperative immune induction and maintenance periods should be appropriately increased. The intensity and dose of immunosuppression should be increased and the occurrence of rejection and DGF and infection should be dynamically detected in order to improve the long-term survival rate of human/transplanted kidney in kidney transplant recipients.

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