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Guidelines for Assessing and Presenting Multivariable Logistic Regression in Transplantation Research Publications

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Introduction

In our complex world, characterized by multifactorial events, multivariable logistic regression emerges as a vital tool for dissecting the contributions of various factors to specific outcomes. Widely utilized across medical disciplines, including surgery and transplantation literature, this statistical method enables the exploration of factors that either explain changes in specific outcomes or predict those outcomes [1]. Whether analyzing continuous variables (e.g., tacrolimus levels) or dichotomous variables (e.g., gender), the outcome variable must be dichotomous for logistic regression analyses. However, landmark studies in prominent medical journals like NEJM, JAMA, ANNALS, and BMJ have consistently highlighted significant issues in the reporting of multivariable regression analyses, raising concerns about the accuracy of results and their implications for transplant patient care [2].

Kidney transplantation (KT) has seen remarkable advancements since the 1970s, particularly in the 1990s with the introduction of new immunosuppressive agents with reduced nephrotoxicity. This has led to improved graft survival rates and decreased rejection rates. The most common causes of chronic renal failure (CRF) leading to KT include insulin-dependent diabetes mellitus, glomerulonephritis, and hypertensive nephrosclerosis. Additionally, atherosclerosis, often exacerbated by hemodialysis or CRF-related arterial inflammation, can lead to aortoiliac occlusive disease, contributing to the increasing number of vascular patients seeking KT [3,4].

In this paper, we present a case study of a kidney transplant recipient who previously underwent endovascular bifurcated aortic bi-iliac stent placement for an infra-renal abdominal aortic aneurysm. We discuss the considerations surrounding the presence of the endovascular stent, pre-transplant patient evaluation, and post-operative course [5].

Discussion

Our research reveals a concerning lack of thorough reporting in transplantation studies, both in general journals and specialized ones. Most journals only include basic estimates and measures to prevent model overfitting, with the selection of independent variables being the most commonly reported criterion. While the traditional guideline of having at least 10 outcome events per variable helps prevent overfitting, recent evidence suggests that a minimum of eight events per variable may yield similarly well-fitted models. However, rigid adherence to these guidelines may exclude relevant variables [6,7].

Kidney transplantation has become the preferred treatment for end-stage renal failure, with an expanding pool of potential donors. This trend is closely linked to the association between chronic renal failure (CRF), hemodialysis, and conditions like hypertension and dyslipidemia, which accelerate atherosclerosis. Additionally, improved outcomes have broadened the eligibility criteria for renal transplantation to include individuals of varying ages and those with diabetes. Consequently, there is a growing population suffering from both end-stage renal disease and aortoiliac atherosclerotic or aneurysmal diseases, posing challenges in surgical planning for aortoiliac reconstruction and kidney transplantation [8].

Some experts advocate for routine aortoiliac angiography before kidney transplantation, particularly in older donors above 40 years of age, as it can provide valuable insights for the transplant surgeon. However, this recommendation faces resistance due to the invasive nature and potential radiation exposure associated with angiography [9]. Given the systemic nature of vascular disease, attention must also be paid to conditions like coronary atherosclerosis, which could impact transplant eligibility if left unaddressed. Studies, such as one conducted in Norway by Brekke, emphasize the importance of evaluating coronary artery disease in aortoiliac disease cases being considered for kidney transplantation. Failure to address ischemic heart disease could jeopardize the suitability of kidney transplantation for these patients [10].

Conclusion

In conclusion, our analysis underscores significant shortcomings in the reporting of multivariable logistic regression analyses in transplantation research literature. While some journals adequately report key estimates and precautions against model overfitting, there remains a notable lack of detail in other critical areas, such as the selection of independent variables. The traditional guideline of 10 outcome events per variable for model fitting may need reconsideration, as newer evidence suggests that fewer events per variable could yield similarly well-fitted models.

Kidney transplantation has emerged as the preferred treatment for end-stage renal failure, with a growing pool of potential donors. However, this trend has also led to the challenge of managing patients with concurrent aortoiliac atherosclerotic or aneurysmal diseases, complicating surgical planning for both aortoiliac reconstruction and kidney transplantation. While some experts advocate for routine aortoiliac angiography before transplantation, others raise concerns about its invasiveness and radiation exposure.

Moving forward, it is essential for researchers and clinicians to collaborate closely to address these challenges and improve the reporting standards in transplantation literature. By adopting more rigorous reporting practices and considering evolving evidence-

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based guidelines, we can enhance the validity and applicability of multivariable logistic regression analyses in guiding clinical decision-making and optimizing patient outcomes in transplantation.

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None

Conflicts of interest

None

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