Impact of Steroid Withdrawal at Various Time Points on Diabetes Mellitus After Liver Transplantation: A Population-Based Cohort Study in Korea

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INTRODUCTION

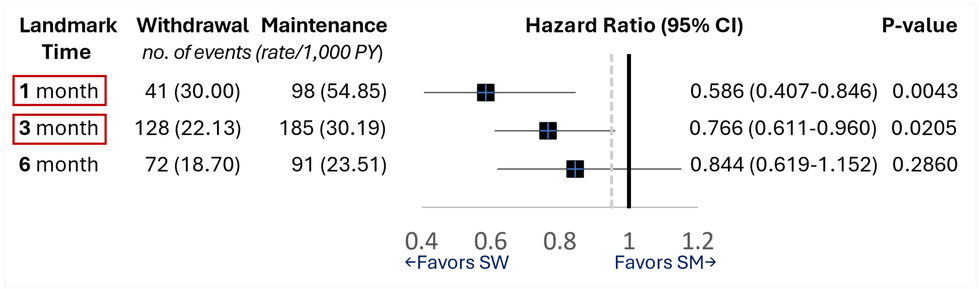
- Immunosuppressive treatments used in liver transplantation(LT) often include corticosteroids. In LT recipients, diabetes mellitus(DM) commonly occurs as a metabolic complication, and the use of steroids post-LT has been identified as a primary risk factor for the development of DM[1].
- Minimization, avoidance, or discontinuation of steroids is considered a priority in the prevention and management of DM[2].
- This study aims to investigate how the timing of steroid withdrawal after LT affects the development of DM using Landmark approach[3].

RESULTS

Table 1. Baseline characteristics

Characteristics	LT recipients N=6,295	P-value
Age at LT, y(mean±SD)	53.0±15.2	-
Male, n(%)	4,451 (70.7)	< 0.0001
Insurance type, n(%)		< 0.0001
National Health Insurance	5,945 (94.4)	
Medical Aid	350 (5.6)	
Types of transplantation, n(%)		< 0.0001
Living donor LT	4,812 (76.4)	
Deceased donor LT	1,483 (23.6)	
Immunosuppression, n(%)		< 0.0001
Tacrolimus-based regimen	5,975 (94.9)	
Cyclosporin-based regimen	115 (1.8)	
Other regimen	205 (3.3)	
CCI score (mean±SD)	4.3±2.2	-
Comorbidities, n(%)		< 0.0001
Hypertension	841 (13.4)	
Dyslipidemia	102 (1.6)	
Osteoporosis	152 (2.4)	
Congestive heart failure	304 (4.8)	
Peripheral vascular disease	241 (3.8)	
Chronic pulmonary disease	1,379 (21.9)	
Rheumatologic disease	122 (1.9)	
Renal disease	157 (2.5)	

Figure 2. Hazard ratio and 95% CI to assess the association between steroid withdrawal and DM among LT recipients

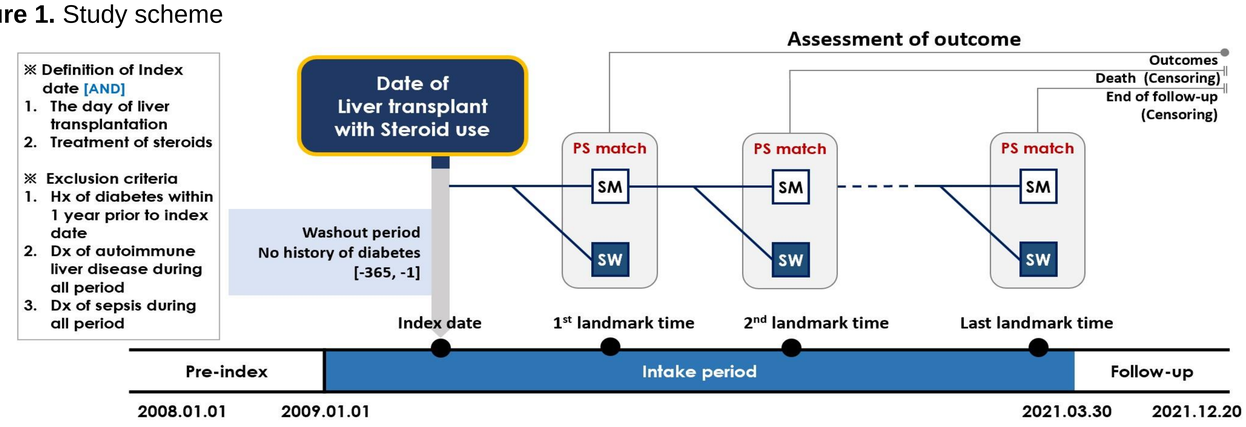


Steroid withdrawal within 3 months after LT significantly reduced the risk of DM compared to steroid maintenance.

METHODS

- This research is a retrospective study utilizing a nationwide health insurance claims database covering LT recipients from January 2009 to March 2021 in South Korea.
- Adult patients(≥18) without a DM diagnosis within one year before LT were included.
- The exposure of interest was steroid withdrawal, a dichotomous time-dependent variable. Withdrawal was defined as the absence of a prescription renewal for 30 days following the last medication supply date.
- ***We classified patients based on their steroid treatment status at 1, 3, and 6 months post-transplantation (landmark time) and followed them up.*** *(*SW, steroid withdrawal; SM, steroid maintenance)
- ***At each landmark time, we created cohorts using propensity score matching and conducted Cox proportional hazards model analysis*** to estimate the incidence rate and hazard ratio of DM.
- All analyses were performed with SAS software.

Figure 1. Study scheme



DISCUSSION

- The study showed that early steroid withdrawal within 3 months reduced the risk of diabetes by 20-40%. However, balancing steroid withdrawal with the risk of acute rejection is important.
- Some factors such as clinical lab tests, individual lifestyle habits, and physician preferences were not considered due to data limitations.
- While the cumulative dosage of steroids is a significant cause for development of DM[4], this study focused on the duration of steroid treatment.
- This study reflected the overwhelming prevalence of living donor LT in the national context.

CONCLUSION

- **The findings emphasize the importance of timing steroid withdrawal after LT, providing crucial insights for setting optimal treatment durations.**
- **Steroids are essential for a successful outcome after LT, but long-term use increases the risk of diabetes and requires a cautious approach.**

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