Subcutaneously administered low molecular weight heparin for anticoagulation in patients undergoing lung transplantation with periprocedural ECMO support - a retrospective, observational cohort study

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Background

In selected patients with end-stage lung disease lung transplantation represents the only curative therapeutic option. Extracorporeal membrane oxygenation (ECMO) can be used perioperatively as bridge-to-transplant as well as bridge-to-recovery. Although low molecular weight heparin (LMWH) has replaced unfractionated heparin (UFH) in a number of indications in critically ill patients, UFH remains the most commonly used anticoagulant for ECMO.^{1,2} The aim of this study was to compare subcutaneously administered LMWH with intravenous UFH for anticoagulation during ECMO.

Material and methods

All patients that underwent lung transplantation with periprocedural ECMO support at the Medical University of Vienna between 2006 and 2017 were screened for inclusion and grouped in two cohorts depending on the anticoagulant. Primary outcome parameter was the occurrence of at least one severe bleeding event (bleeding that led to surgical intervention, intracranial hemorrhage or exsanguination). Secondary outcome parameter was the occurrence of at least one thromboembolic event (arterial thromboembolic event, deep vein thrombosis, pulmonary embolism or extracorporeal circuit thrombosis).

Results

102 patients (80 LMWH, 22 UFH) were included. In total 452 ECMO-days (256 LMWH, 200 UFH) were observed and analyzed. Significant differences between the groups occurred in regard to ECMO duration (LMWH median 4 (IQR 3) vs. UFH 7 (12) days; $P < 0.01$), ICU length of stay (LMWH 24 (19) vs. UFH 36 (30) days; $P < 0.01$), as well as the proportion of venoarterial ECMO (LMWH 80% vs. UFH 32%; $P < 0.01$). Outcome parameters are shown in table 1.

Conclusion

In this study anticoagulation with LMWH for ECMO therapy in lung transplant patients does not seem to be inferior compared to UFH. The observed lower rate of thromboembolic events and composite events in the LMWH group remains to be evaluated in prospective, randomized, controlled trials.

	UFH (n=22)	LMWH (n=80)	P
Severe bleeding event	5 (22,7 %)	10 (12,5 %)	0,30
Thromboembolic event	11 (50,0 %)	16 (20,0 %)	0,01*
Events overall	13 (59,1 %)	25 (31,3 %)	0,03*

Table 1 - Outcome parameters. Fisher's exact test. (Abbreviations: LMWH - low molecular weight heparin; UFH - unfractionated heparin)

References

- 1) Fowler RA, et al. Cost-Effectiveness of Dalteparin vs Unfractionated Heparin for the Prevention of Venous Thromboembolism in Critically Ill Patients. JAMA. 2014;312(20):2135-45
- 2) ELSO Anticoagulation Guidelines. Extracorporeal Life Support Organization, 2014. Ann Arbor, MI, USA. (Accessed 26.11.2017, at www.elsonet.org)