DEUTSCHES HERZZENTRUM BERLIN

STIFTUNG DES BÜRGERLICHEN RECHTS

Mechanical circulatory support and its relevance for development of vasculopathy of the cardiac allograft

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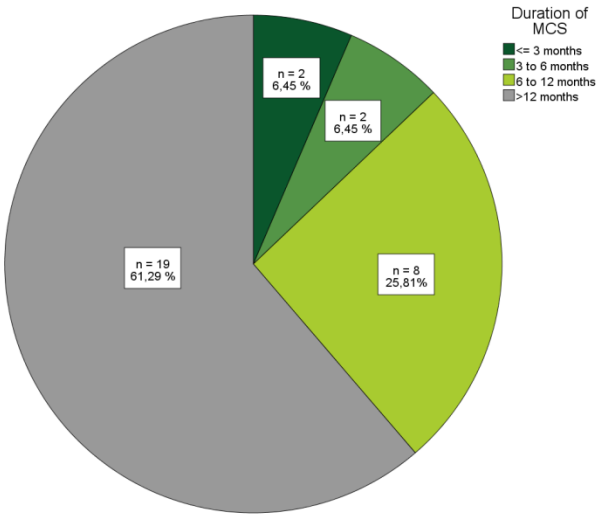
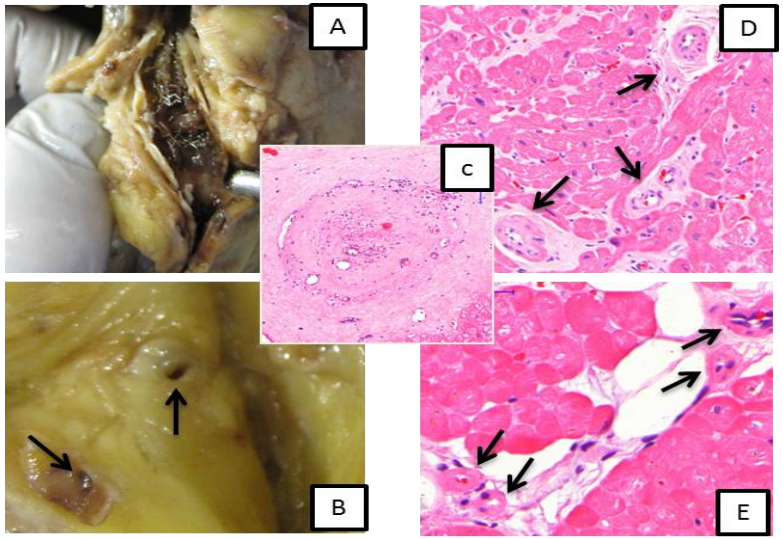
Purpose

Due to the increasing demand for donor organs growing numbers of heart failure patients are bridged to heart transplantation (HTx) with mechanical circulatory support (MCS).



Pie chart: Duration of pre-HTx mechanical unloading of the left ventricle in our patient cohort.

This study investigated the effect of MCS therapy of any kind on development of transplant vasculopathy, both of the epicardial arteries (macro-TVP) and the terminal vascular network (micro-TVP) of cardiac allografts.



Figures A&B: Accelerated atherosclerosis of epicardial coronary arteries (arrowheads) 25 years after HTx, with in -stent thrombosis. Figure C: Recanalized thrombus of one coronary artery from the same patient. Figures D&E: Hyalinosis of intramural arteries (arrowhead), within fibrous septae.

Material and Methods

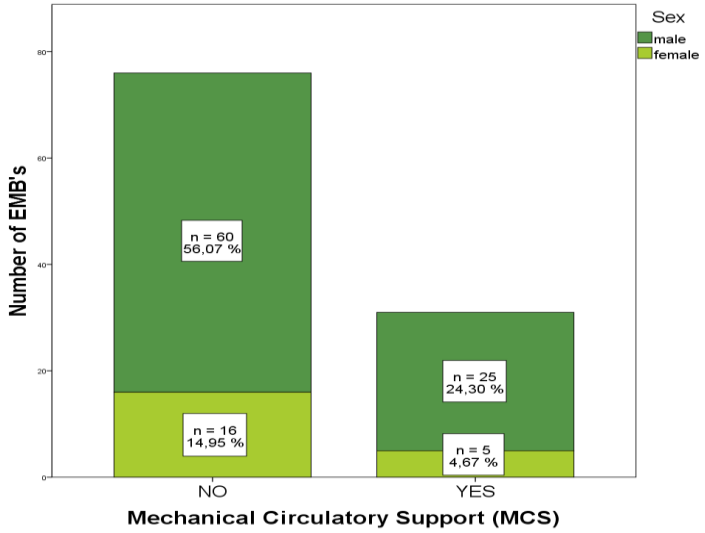
Retrospectively, we studied all consecutive right ventricular endomyocardial biopsies (EMBs) received between 01/2011 and 12/2011 from HTx patients at our center (106 pts, 85 male, age range 18-64 years). Thirty of these heart failure patients had mechanically unloading using fully implantable devices.

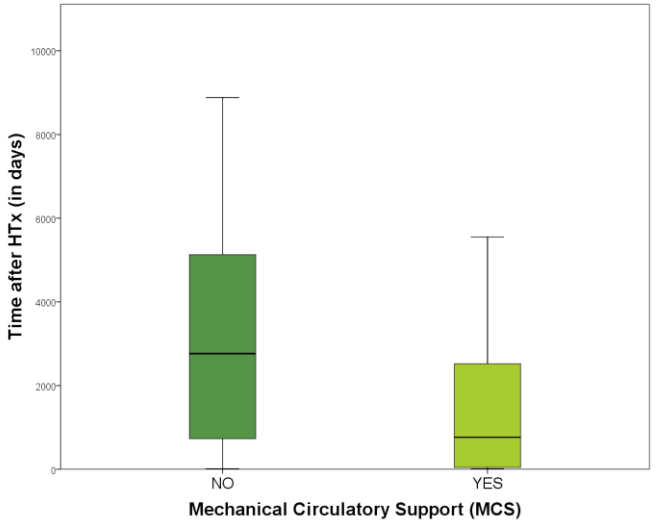
Serial 3µm thick sections of formalin-fixed paraffin-embedded EMBs were evaluated for signs of micro-TVP using conventional histology (HE - hematoxylin eosin). Immunohistochemistry (alpha actin and CD31) was used to highlight the pathological changes of the intramural vessels, which were defined as luminal narrowing, with vascular wall thickness exceeding its diameter.

Heart catheter protocols from the surveillance biopsy procedure were searched for presence of macro-TVP and for values of pulmonary pressure.

The latter was correlated with values from heart catheter procedures pre-HTx.

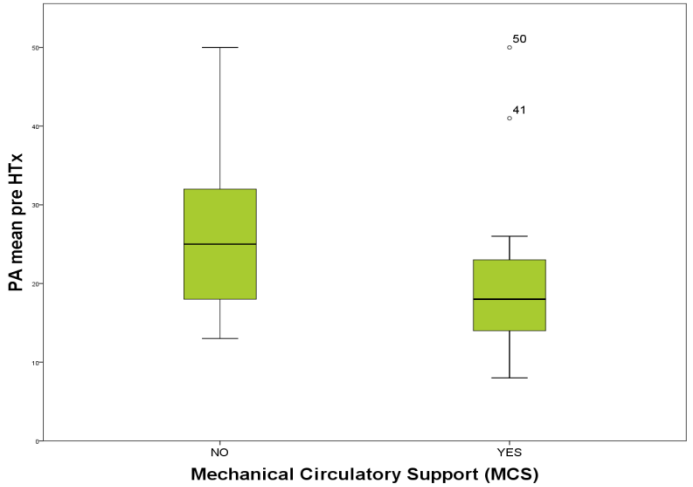
The results were subjected to statistical analysis (chi-square and multivariate analysis).



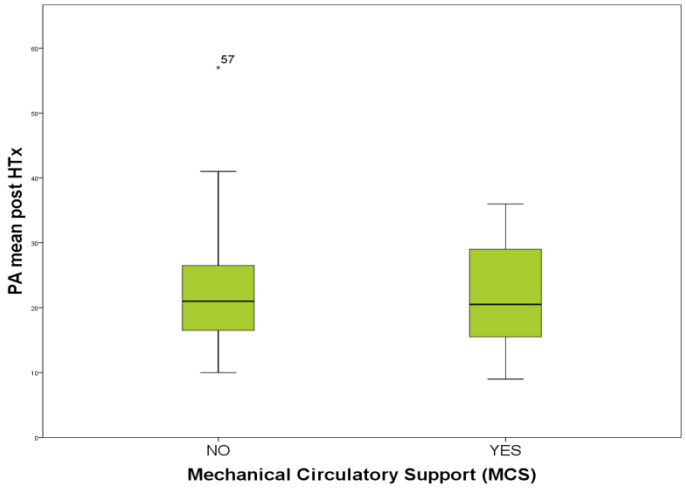


Results of clinical findings

Pre- HTx there are on average significantly lower mean pulmonary artery pressure (PA) values of 19.91 (± 9.70) mmHg in the MCS group (n=23), regardless of the type of device, duration of therapy or time after HTx, in comparison to 26.00 (± 8.93) mmHg in non MCS-patients (n=28) (p=0.026).

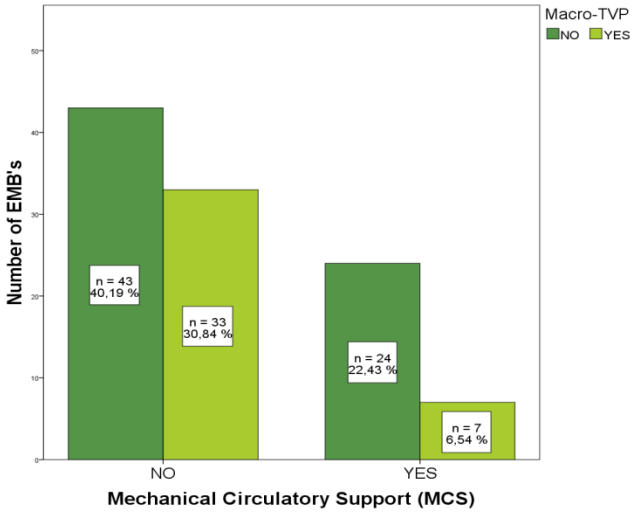


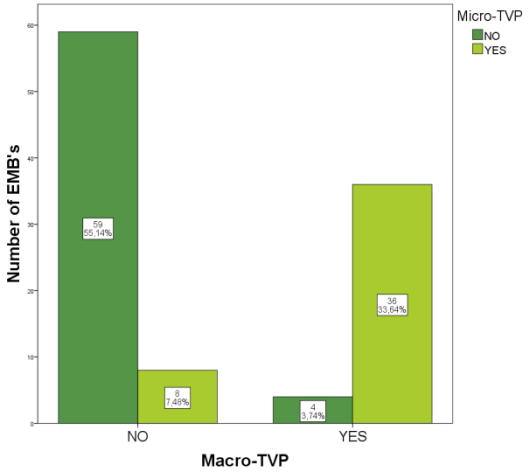
Post-HTx there are no significant differences in mean PA values between the MCS group (values available from 16 patients) and the non-MCS group (values from 43 patients). Whereas there were slightly lower mean PA values in comparison to those pre-HTx (23.28 ± 8.79 mmHg) in the non-MCS group, the MCS group had insignificantly higher values (21.81 ± 8.25 mmHg).

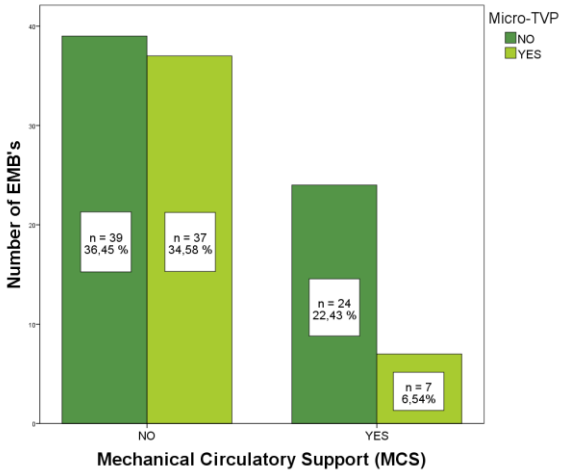


Histological results

A lower incidence of micro-TVP and accelerated atherosclerosis of epicardial arteries was noted in MCS patients (p=0.017 vs. p=0.043) regardless of the type of device, duration of therapy or time after HTx.







Conclusion

Our findings suggest that the reduction of mean PA pressure by MCS prevents development of transplant vasculopathy of the terminal vascular network and the epicardial coronary arteries of cardiac allografts. This might be explained by reduction of wall-stress during mechanical unloading of the failing ventricle.

Nonetheless, further studies with larger, homogeneous patient cohorts are required to confirm our findings.

Disclosure: I have no financial relationships to disclose concerning the content of this presentation.

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