Pathological correlation between apical core biopsies at the time of left ventricular assist device implantation and excised heart at time of transplant or autopsy

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Purpose: The diagnostic yield of endomyocardial biopsy is low, one possible explanation is the small sample size. At the time of LVAD implantation, core tissue biopsies may prove to be more useful but previous reports suggest that pathological findings are non-specific. In this study, we aimed to compare core biopsy findings at the time of LVAD implantation with those of the explanted heart at the time of heart transplantation or autopsy.

Methods: This is a retrospective comparative analysis between LVAD core biopsy and explant pathology at the time of transplant or autopsy in a large Canadian center. Comparisons were conducted using the Bowker's test of symmetry for paired data.

Results: From 2000 to 2016, a total of 101 consecutive adult patients underwent a LVAD implantation at our institution. The mean age at VAD implantation was 45.6 /13.2 years. 79 (78.2%) were male. Fifty-three patients (52.5%) were supported with a Heartmate II device while 20 patients (19.8%) were supported with a HeartWare. A total of 77 patients (76%) were transplanted and 24 patients (23.7%) died on support. When comparing the pre-LVAD clinical diagnosis with core biopsy pathology at implantation the diagnoses at the two time points differ significantly ($p<0.001$) (table 1). Pre vs. post comparison of core biopsy at implantation with pathology at explant or autopsy indicated that the classification at these two time points do not significantly differ. While pathology at explantation report were congruous ($p=1.00$) (table2), The findings of hypertrophic cardiomyopathy (HCM) presented the highest rates of misclassification at the time of core biopsy assessment.

Conclusion: The LVAD core biopsies correlate well with the explant pathology. The finding of hypertrophic cardiomyopathy on apical core biopsy however should be interpreted with caution.

Table 1 – Cross-tabulation of clinical diagnosis with core biopsy diagnosis at LVAD implantation.

Pre-LVAD clinical diagnosis	**Pathological diagnosis of core biopsy at LVAD implantation** Ischemic cardiomyopathy	Dilated cardiomyopathy	Chemotherapy-induced cardiomyopathy	Myocarditis	Hypertrophic cardiomyopathy	Amyloid	GCM	Other	Total
Ischemic cardiomyopathy	22 (21.8%)	3 (3%)	0	0	0	0	0	0	25 (24.8%)
Dilated cardiomyopathy	0	30 (29.7%)	1 (1%)	3 (3%)	11 (10.9%)	0	1 (1%)	2 (2%)	48 (47.5%)
Chemotherapy-induced cardiomyopathy	0	2 (2%)	4 (4%)	1 (1%)	0	0	0	0	7 (6.9%)
Myocarditis	1 (1%)	2 (2%)	0	1 (1%)	4 (4%)	0	1 (1%)	0	9 (8.9%)
Hypertrophic cardiomyopathy	0	1 (1%)	0	0	3 (3%)	0	0	0	4 (4%)
Amyloid	0	0	0	0	0	1 (1%)	0	0	1 (1%)
Other	0	4 (4%)	0	1 (1%)	0	0	0	2 (2%)	7 (6.9%)
Total	23 (22.8%)	42 (41.6%)	5 (5%)	6 (5.9%)	18 (17.8%)	1 (1%)	2 (2%)	4 (4%)	101 (100%)

Table 2 - Pre and post comparisons of pathological diagnosis at LVAD implantation with pathological diagnosis at explantation or autopsy. Bold numbers indicate patients who remain in the same category at explantation or autopsy as they were at LVAD implantation.

Pathological diagnosis at explantation or autopsy	**Pathological diagnosis of core biopsy at LVAD implantation** Ischemic cardiomyopathy	Dilated cardiomyopathy	Chemotherapy-induced cardiomyopathy	Myocarditis	Hypertrophic cardiomyopathy	Amyloid	GCM	Other	Total
Ischemic cardiomyopathy	**20**	3	0	0	0	0	0	0	23
Dilated cardiomyopathy	3	**29**	0	5	8	0	0	2	47
Chemotherapy-induced cardiomyopathy	0	1	**5**	0	0	0	0	0	6
Myocarditis	0	3	0	**1**	0	0	0	0	4
Hypertrophic cardiomyopathy	0	2	0	0	**7**	0	0	0	9
Amyloid	0	0	0	0	0	**1**	0	0	1
GCM	0	0	0	0	0	0	**2**	0	2
Other	0	4	0	0	3	0	0	**2**	9
Total	23	42	5	6	18	1	2	4	101