Factors related to the severity of early post-operative infections after heart transplantation in patients surviving prolonged mechanical support periods experience from a single university center (07AP04-1)

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Background

The bridging of end stage heart failure patients with continuous flow ventricular assist devices (CF-VADs) has improved the survival of these patients and has enabled longer waiting periods prior to heart transplantation (HTx). According to the United Network of Organ Sharing database, 10% (n=267) of HTx recipients with CF-VADs between 2011- 2014 required more than 2 years of mechanical support.(ref 1) However, many patients suffer VAD-related infections related to drive line infections. Support periods lasting over 2 years has been suggested to affect early post transplant morbidity.(ref 2) Currently, the average waiting donor waiting period in our country exceeds 2 years with 90% of patients requiring CF-VAD support. We examined the impact of prolonged support with CF-VADs and other related factors on the severity of infections within 30 days of HTx .

Methods

We conducted a retrospective analysis of all 52 adult HTx recipients at our hospital from 2010 to 2016. Our primary outcome was the severity of 30-day acute post-operative infections. We categorized the severity of infections into 4 groups according to the following grading shown in table 1. A logistic-regression model for ordinal responses was used in our multivariable analysis. Age, sex, BMI, length of CF-VAD support, active VAD-specific infections and moderate to severe primary graft dysfunction (PGD) were included as possible risk factors. A p-value of < 0.05 was considered statistically significant.

Table 2. Baseline demographics and severity of 30-day post-operative infection.

Baseline clinical features and Perioperative demographics	Severity of 30-day post-operative infection			
	None (n = 32)	Minor (n = 8)	Major (n = 8)	Severe (n = 4)
Age, median (IQR)	39.2 (29.7 - 51.2)	34.4 (25.7 - 49.4)	40.8 (33.8 - 47.3)	33.9 (22.9 – 39.2)
Female, n (%)	12 (37.5)	1 (12.5)	3 (37.5)	2(50.0)
BMI (kg/m²), median (IQR)	20.0 (18.6 - 22.9)	19.4 (16.2 - 23.1)	21.2 (18.4 - 22.0)	20.9(16.9 – 28.1)
VAD, n (%)	28 (87.5)	8 (100)	8 (100)	4 (100)
VAD support in days, median (IQR)	889 (524 - 1056)	1188 (1046 - 1322)	1062 (704 - 1172)	1001 (433 - 1138)
Active VAD-specific infections, n (%)	4 (12.5)	6 (75.0)	7 (87.5)	3 (75)
Length of surgery (min), median (IQR)	485 (442-516)	560 (446-584)	581 (460-620)	645 (442 - 672)
Moderate PGD, n (%)	5 (15.6)	2 (25.0)	2 (25.0)	1 (25.0)
Severe PGD, n (%)			1 (12.5)	2 (50)
ICU stay (days), median (IQR)	4 (3 - 6)	3 (2.25 - 6.5)	8.5 (6.25 - 12.75)	18 (13 - 108)
30 day mortality, n (%)				1 (25)

PGD: primary graft failure, Moderate PGD: IABP support, Severe PGD: IABP + ECMO support

Table 3. Independent predictors for increased severity of 30-day infections in HTx recipients.

Risk Factor	Odds Ratio (95% CI)	P Value
Age (per year)	0.96(0.90 - 1.01)	0.15
Female	0.68 (0.30 - 1.43)	0.30
BMI (kg/m²)	1.12 (0.89 - 1.43)	0.30
Duration of VAD support (per year)	1.00 (0.99 - 1.00)	0.92
Active VAD-specific infections	5.37 (2.55 - 12.99)	< 0.001
Moderate or Severe PGD	2.53 (1.20 - 5.60)	0.01

Results

Fifty-two patients were included in our study. The median support period for recipients with CF-VADs was 964 d (interquartile range: IQR 571 - 1135). Infections occurred in 20 (38.5%) with the following severity: None 32 (61.5%), Minor 8 (15.4%), Major 8 (15.4 %), and Severe 4 (7.7%). Active VAD specific-infections and moderate to severe PGD was present in 38.5% and 25% of the recipients, respectively. The length of ICU stay was significantly longer for patients with severe infections (median 18 d, IQR 10-13) when compared to all other groups (median18d IQR [13 - 108]) p < 0.01). In our multivariable analysis, active VAD-specific infections (odds ratio: OR 5.3, 95% confidence interval: CI 2.6 - 13.0, p < 0.01) and moderate to severe PGD (OR 2.5, 95%CI 1.2 - 5.6, p = 0.02) were independent risk factors for the increased severity of 30-day acute post-operative infections. The length of VAD support was not significant (p =0.92). (Table 3)

Table 1. Classification of the Severity of 30d post-operative infection

None	No infection suspected
Minor	No systemic infection suspected, Abx < 14days
Major	Systemic infection(BSI positive), Abx >14 days
Severe	Septic shock

Abx: antibiotics, BSI: bloodstream infections

Conclusion

Active VAD-specific infection and poor graft function likely contribute to the severity of early postoperative infections after HTx. Our findings are useful for planning response strategies when systemic and invasive infections are suspected in patients receiving CF-VAD support in the ICU. Although longer periods of mechanical support with CF-VADs may increase the possibility for VAD-specific infections, the duration of VAD support was not a significant factor in the development of severe postoperative infections. This result highlights the importance of providing day to day adequate care prior to transplantation for long-term LVAD recipients to successfully undergo HTx.

References
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THE AUTHORS HAVE NO CONFLICT OF INTERESTS TO DECLAIR