



A CASE REPORT: REGRESSION OF LEFT VENTRICULAR HYPERTROPHY AFTER HEART TRANSPLANTATION

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ABSTRACT

- A 46-year-old male patient with Stage D heart failure due to non-ischemic dilated cardiomyopathy subsequently underwent a successful heart transplant.
- The donated heart exhibited severe left ventricular hypertrophy (LVH).
- One year post-transplant, echocardiography revealed regression of the left ventricular hypertrophy.
- This case illustrates favorable outcomes following heart transplantation from a donor with LVH.





INTRODUCTION

More patients are now surviving with stage D heart failure.

Heart transplantation is the last resort for these patients.

To narrow the discrepancy between the number of waiting recipients and the number of available organs, the donor pool must be expanded.

The use of donor hearts with LVH has yielded mixed results in terms of recipient outcomes.

According to consensus guidelines of The International Society for Heart and Lung Transplantation (ISHLT), use of donor organs with left ventricular septal or posterior wall thickness >13 mm should be used with caution.

Tong CK, Khush KK. New approaches to donor selection and preparation in heart transplantation. *Current Treatment Options in Cardiovascular Medicine*. 2021;23:1-14.

Marelli D, Laks H, Fazio D, Moore S, Moriguchi J, Kobashigawa J. The use of donor hearts with left ventricular hypertrophy. *The Journal of Heart and Lung Transplantation*. 2000;19(5):496-503.

Velleca A, Shullo MA, Dhital K, et al. The International Society for Heart and Lung Transplantation (ISHLT) guidelines for the care of heart transplant recipients. *The Journal of Heart and Lung Transplantation*. 2023;42(5):e1-e141.

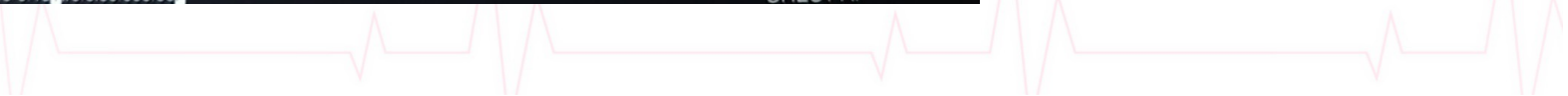
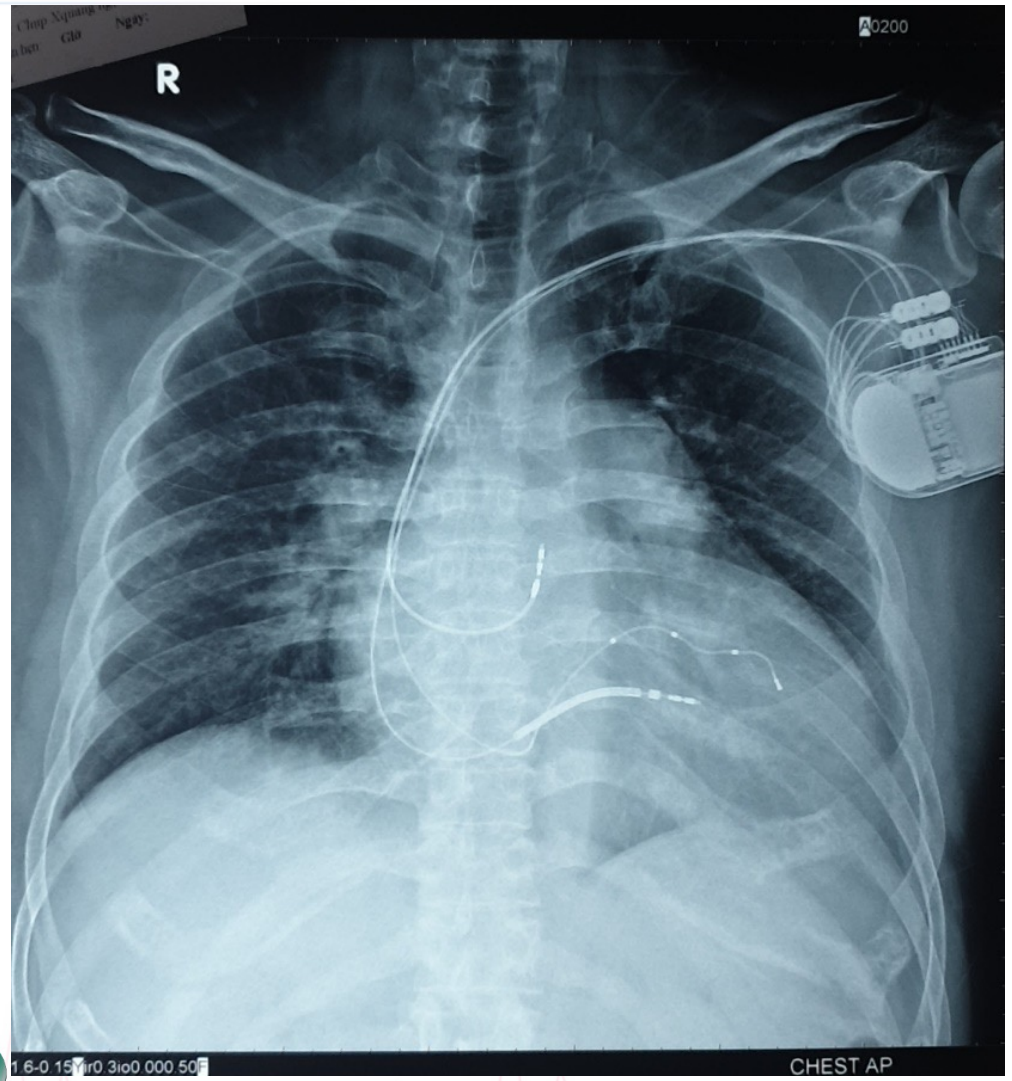


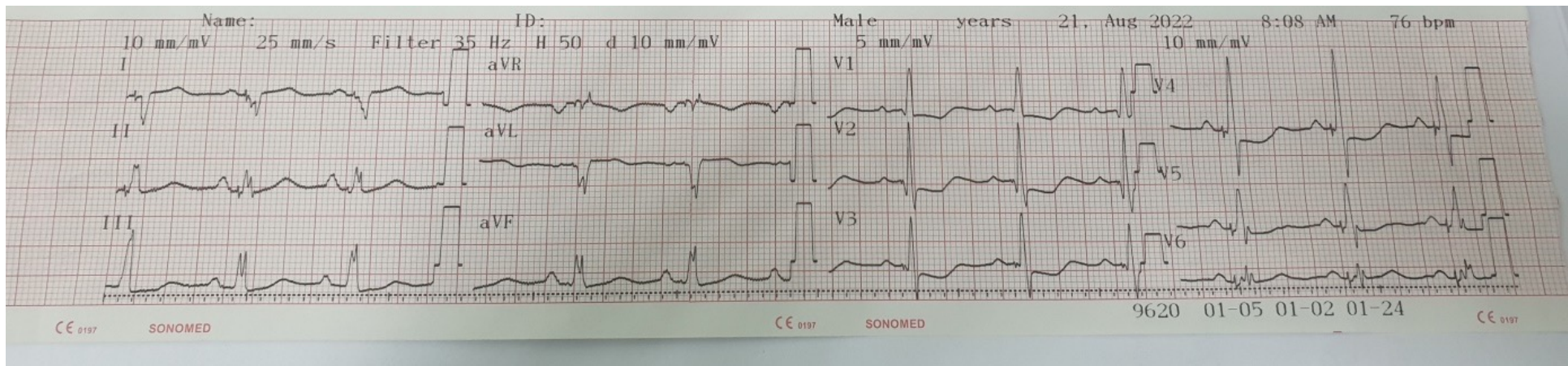


CASE PRESENTATION

- A 46-year-old male patient with history of dilated non-ischaemic cardiomyopathy was admitted to our hospital because of advanced heart failure.
- Although he has been continuously treated with optimal heart failure medications for the past 7 years and received a CRT-D implant 2 years ago due to severe left ventricular systolic dysfunction and complete left bundle branch block, he still experiences significant symptoms even at rest.










Transthoracic echocardiography revealed a dilated left ventricle with an ejection fraction of approximately 21%.

NT-pro BNP 14853 pg/mL



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- The patient subsequently underwent uncomplicated heart transplantation.
 - He received the heart of a 25 years old man of 65 kg who had died of a haemorrhage stroke.
 - The donor had had no medical history.
 - Transthoracic echocardiography of the donor was noted of severe concentric left ventricular hypertrophy with IVSd is 18 mm, LVPWd is 16 mm, LVEDD is 44 mm and LVM is 325 g.
 - Without evidence of aortic stenosis, the cause of LVH was assumed due to previous hypertension.



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- Following uncomplicated heart transplantation, the recipient received an immunosuppression regimen of mycophenolate mofetil, prednisone, and tacrolimus.
 - Subsequent progress of the recipient has been uneventful and he remains stable 1 year after transplantation.
 - Over several months the LVH resolved with the echocardiography being normal at 1 year.
 - His most recent echocardiography showed that both of the IVSd and the LVPWd are 7 mm, LVEDD is 43 mm and the left ventricular mass is 89 g.





DISCUSSION





- We report a case of successful heart transplantation using a donor heart with LVH.
- This is also the first case we used a donated heart with LVH for transplantation.
- Previous investigations that explored the effect of donor LVH on post-transplant survival provided conflicting results.
- Therefore, it remains controversial whether donor cardiac allografts that demonstrate evidence of LVH on echocardiography can be used safely for transplantation.

Tong CK, Khush KK. New approaches to donor selection and preparation in heart transplantation. *Current Treatment Options in Cardiovascular Medicine*. 2021;23:1-14.

Pinzon OW, Stoddard G, Drakos S, et al. Impact of donor left ventricular hypertrophy on survival after heart transplant. *American Journal of Transplantation*. 2011;11(12):2755-2761.




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- Historically, donor LVH has been associated with primary graft failure and increased mortality in the first 30 days after transplant:
 - Aziz et al 1997 (n=110, 8% LVH): increased incidence of early allograft dysfunction compared with patients receiving allografts without LVH (33% vs. 3%).
 - Marelli et al 2000 (n=258, 14% LVH): decreased early and mid-term survival in recipients of allografts with LVH.

Marelli D, Laks H, Fazio D, Moore S, Moriguchi J, Kobashigawa J. The use of donor hearts with left ventricular hypertrophy. *The Journal of Heart and Lung Transplantation*. 2000;19(5):496-503.

Aziz S, Soine L, Lewis S, et al. Donor left ventricular hypertrophy increases risk for early graft failure. *Transplant international*. 1997;10:446-450.

Stehlik J, Edwards LB, Kucheryavaya AY, et al. The Registry of the International Society for Heart and Lung Transplantation: twenty-seventh official adult heart transplant report—2010. *The Journal of Heart and Lung Transplantation*. 2010;29(10):1089-1103.




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- Goland et al 2008 (n=427, 62 LVH) did not find differences in both short- and long-term survival between patients with or without donor LVH; at 1- and 5-year follow-up, wall thickness was similar in both groups.
 - UNOS registry analysis 2011 (n=2626, 44% LVH): LVH did not predict mortality at 30 days or 1-year post-transplant; subgroup analyses suggested that recipients of donors with LVH combined with older age (>55 years) or longer ischemic time (≥ 4 hours) had an increased risk of death.

DeFilippis EM, Khush KK, Farr MA, Fiedler A, Kilic A, Givertz MM. Evolving Characteristics of Heart Transplantation Donors and Recipients. *Journal of the American College of Cardiology*. 2022;79(11):1108-1123. doi:doi:10.1016/j.jacc.2021.11.064

Goland S, Czer LS, Kass RM, et al. Use of cardiac allografts with mild and moderate left ventricular hypertrophy can be safely used in heart transplantation to expand the donor pool. *Journal of the American College of Cardiology*. 2008;51(12):1214-1220.

Pinzon OW, Stoddard G, Drakos S, et al. Impact of donor left ventricular hypertrophy on survival after heart transplant. *American Journal of Transplantation*. 2011;11(12):2755-2761.






Goland et al. speculated the favorable outcomes of recipients of donor hearts with LVH in their study can be explained by a number of factors:

- 1) The average age of heart donors with LVH remains relatively young; therefore, there is a low likelihood of prolonged hypertension.
- 2) No patients had ischemic times longer than 240 minutes.
- 3) During follow-up, the rate of patients with LVH after surgery is relatively low.
- 4) Aggressive blood pressure management and the widespread use of certain medications have been shown to have beneficial effects on left ventricular remodeling.

Goland S, Czer LS, Kass RM, et al. Use of cardiac allografts with mild and moderate left ventricular hypertrophy can be safely used in heart transplantation to expand the donor pool. *Journal of the American College of Cardiology*. 2008;51(12):1214-1220.





In our case, the donated heart exhibited severe concentric left ventricular hypertrophy in a young male with no medical history, which suggests that his hypertrophy was likely of recent onset.

The regression of LVH may be related to the gradual adaptation of the donor heart to its new loading conditions.

In addition to applying advancements in surgery techniques and preservation, careful donor selection and meticulous donor-recipient matching also contribute to improved survival and regression of LVH in this patient.





CONCLUSION

This case presents a compelling example of the successful regression of LVH following heart transplantation.

Despite the initial concerns and varying reports on the use of donor hearts with LVH, our patient's post-transplant course demonstrates a favorable outcome.

Further research and a larger sample size are needed to definitively establish the safety and efficacy of using donor hearts with LVH.





**THANK YOU FOR YOUR
ATTENTION!**

