



EMORY
LIBRARIES &
INFORMATION
TECHNOLOGY

OpenEmory

Post-surgical hemodynamics in aortic valve bypass (AVB) patients evaluated with phase contrast magnetic resonance (PCMR)

Adrian Lam, *Georgia Institute of Technology*
Stephanie Clement-Guinaudeau, *Emory University*
[Muralidhar Padala](#), *Emory University*
Vinod Thourani, *Emory University*
[John Oshinski](#), *Emory University*

Conference Name: 15th Annual SCMR Scientific Sessions: 2012

Publication Date: 2012-02-02

Type of Work: Poster

Publisher DOI: 10.1186/1532-429X-14-S1-P95

Permanent URL: <https://pid.emory.edu/ark:/25593/s5pf0>

Final published version: <https://doi.org/10.1186/1532-429X-14-S1-P95>

Copyright information:

©2012 Lam et al; licensee BioMed Central Ltd.

This is an Open Access work distributed under the terms of the Creative Commons Attribution 2.0 Generic License

(<http://creativecommons.org/licenses/by/2.0/>).



Accessed January 20, 2022 2:23 AM EST

POSTER PRESENTATION

Open Access

Post-surgical hemodynamics in aortic valve bypass (AVB) patients evaluated with phase contrast magnetic resonance (PCMR)

Adrian Lam^{1*}, Stephanie Clement-Guinaudeau², Muralidhar Padala², Vinod Thourani², John N Oshinski^{1,2}

From 15th Annual SCMR Scientific Sessions
Orlando, FL, USA. 2-5 February 2012

Background

Many high-risk patients with severe aortic stenosis cannot undergo valve replacement surgery due to calcification of the ascending aorta. Aortic valve bypass (AVB) surgery uses a conduit and prosthetic valve placed transapically into the left ventricle to divert flow from the apex of the heart through the conduit and prosthetic valve to the descending thoracic aorta to improve cardiac output, Fig 1. The hemodynamics resulting from AVB are not well understood. Specifically, there appears to be significant patient-to-patient variability in the amount of retrograde blood flow in the descending thoracic aorta (location 3, flow from conduit to arch vessels). The objective of this study is to use phase contrast magnetic resonance (PCMR) to examine the hemodynamics in AVB patients and determine the relationship between pre-surgery native aortic valve pressure gradient and post-surgery retrograde blood flow in the thoracic aorta.

Methods

20 patients were included in this study. Mean pressure gradient across the aortic valve pre-surgery (ΔP) was determined with Doppler ultrasound using the modified Bernoulli equation. Patients underwent an MRI post-surgery, and PCMR images were acquired along the aorta and in the graft conduit at 5 locations, Fig 1.

Results

Flow curves generated from PCMR showed large patient-to-patient variations in the flow patterns at the descending thoracic aorta (location 3). Patients were categorized into three groups: 1) patients with mono-

phasic *retrograde* flow over the cardiac cycle in the descending thoracic aorta (10/20), 2) patients with mono-phasic *antegrade* flow over the cardiac cycle in the descending thoracic aorta (5/20) and 3) patients with multi-phasic (mixed antegrade and retrograde) flow (5/20). The amount of retrograde flow in the descending thoracic aorta (location 3) was inversely correlated to blood flow from the native aorta (location 1), Fig 2a. This indicates that despite variations in the direction or source of the flow, the volume of blood flow to the arch vessels remains relatively constant among patients. Additionally, patients were divided into two groups: those with pre-surgery $\Delta P < 40$ mmHg or those with $\Delta P > 40$ mmHg, Fig 2b. Patients with $\Delta P < 40$ had significantly less retrograde flow than those with $\Delta P > 40$ mmHg ($p < 0.05$) and flow in those patients was not significantly different from zero ($p < 0.05$).

Conclusions

While much patient-to-patient variability exists in the flow patterns post AVB surgery, retrograde blood flow in the descending thoracic aorta is related to pre-surgery aortic valve gradient. This relationship may help with future patient selection, as patients with pre-surgery native aortic valve pressure gradient > 40 mmHg will most likely have retrograde flow supplying the arch vessels.

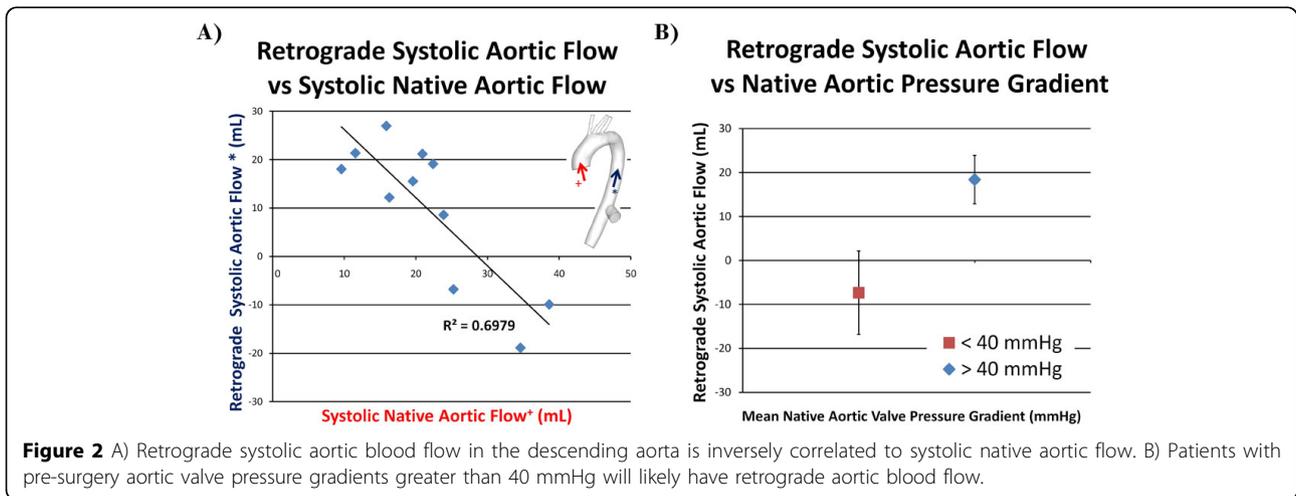
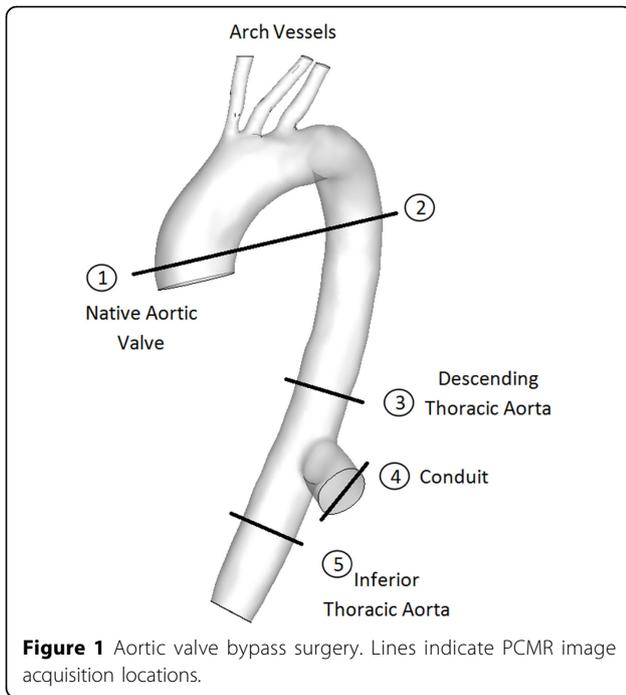
Funding

This project was funded by the NIH T32 Training Grant.

Author details

¹Georgia Institute of Technology, Atlanta, GA, USA. ²Emory University, Atlanta, GA, USA.

¹Georgia Institute of Technology, Atlanta, GA, USA
Full list of author information is available at the end of the article



Published: 1 February 2012

doi:10.1186/1532-429X-14-S1-P95

Cite this article as: Lam et al.: Post-surgical hemodynamics in aortic valve bypass (AVB) patients evaluated with phase contrast magnetic resonance (PCMR). *Journal of Cardiovascular Magnetic Resonance* 2012 **14** (Suppl 1):P95.

Submit your next manuscript to BioMed Central and take full advantage of:

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at
www.biomedcentral.com/submit

