



CLINICAL INSIGHTS

MASTERS SERIES MITRAL MECHANICAL HEART VALVES

Key Mitral MHV selection considerations: durability, size range, hemodynamics, and implantability¹

Masters Series Mitral Valves Demonstrate Excellent 30-Year Clinical Outcomes

- **DURABILITY:** Masters Series mechanical heart valves demonstrate long-term durability based on experience of more than 3 million implants² over several decades
- **SIZE RANGE & HEMODYNAMICS:** Wide range of sizes (15 to 33 mm) allows for individualizing valve implantation for enhanced hemodynamic performance
- **IMPLANTABILITY:** Lower profile reduces protrusion into the left ventricle

TITLE

Thirty-year experience with a bileaflet mechanical valve prosthesis¹

AUTHORS

Scott Johnson, Martha Stroud, John Kratz, Scott Bradley, Fred Crawford, Jr., and John Ikonomidis

BACKGROUND

Masters Series are bileaflet valves made of pyrolytic carbon and are available for use in both mitral and aortic positions. In addition to their low profile, Masters valves deliver low transvalvular gradients, low rates of thrombotic events, and few mechanical failures.¹

OBJECTIVE

The objective of this study was to evaluate the long-term outcomes of mitral valve replacement with a Masters Series mechanical valve prosthesis.

METHODS

From January 1979 to December 2014, all patients undergoing mechanical mitral valve replacement (N=439) were prospectively entered into a computer database. Patient questionnaires, telephone calls, and in-person interviews were used to collect adverse event and mortality data. Follow-up was 95% complete with 4735 total patient years for the MVR cohort.

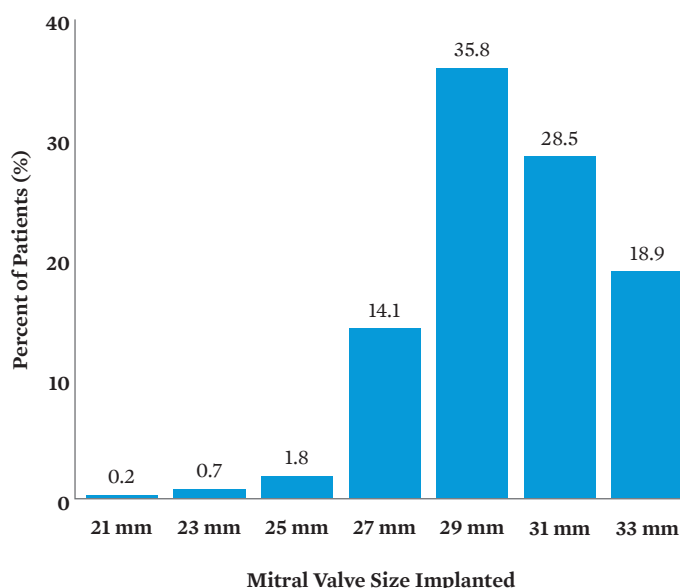
RESULTS

Between 1979 and 2014, 439 patients underwent mitral valve replacement with a Masters Series valve. In patients undergoing MVR, late actuarial survival was 64%, 28%, and 14% at 10, 20, and 30 years, respectively. Analysis quantified thirty-year freedom from reoperation (85%), thromboembolism (55%), valve thrombosis (99%), bleeding (57%), and endocarditis (95%). Incidence of bleeding was 2.0% per patient-year and incidence of thromboembolism was 2.9% per patient-year.

CONCLUSION

Masters Series valves continue to demonstrate high reliability after decades of study.¹ Structural failures and reoperation due to device malfunction are rare. These factors combine to make the Masters Series an excellent valve choice for a wide variety of patients.

Figure 4. Over 90% of patients in the 30-year study cohort had a size 27 or larger valve implanted during mitral valve replacement.



SIZE RANGE - THE IMPORTANCE OF ORIFICE AREA

Individualizing Care for Patients Undergoing MVR

Masters Series valves offer a choice of sizes with relational internal diameters and lower risk of protrusion. Other commercially available valves may offer smaller orifice areas, especially in larger sizes, that may have an impact on hemodynamics. For example, the On-X⁺ valve for the mitral position is only manufactured with two carbon sizes,

23 mm and 25 mm, with only the later available in the U.S. Patients with larger mitral tissue annuli receive the same sized carbon with bigger versions of a supra-annular flange style cuff or a tapered intra annular cuff. The result is a smaller effective orifice area than is possible given the size of the patient's natural anatomy.^{3,4}

Masters HP (HP) and Masters Valve (MV)

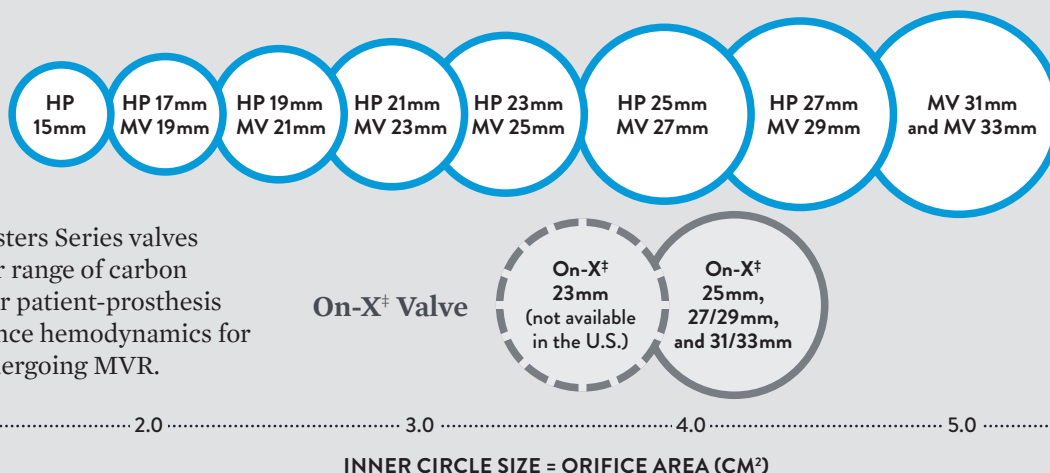


Figure 2. Masters Series valves offer a wider range of carbon sizes to tailor patient-prosthesis fit and enhance hemodynamics for patients undergoing MVR.

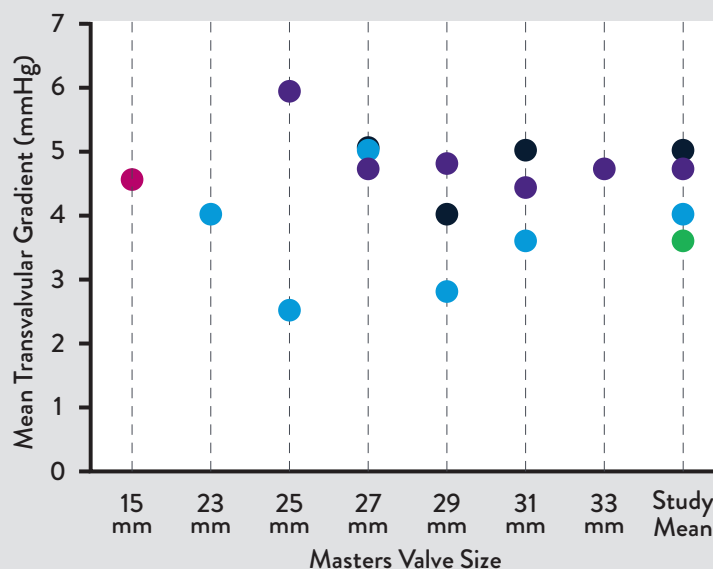
HEMODYNAMICS - MASTERS VALVE: CONSISTENTLY LOW GRADIENTS ACROSS A WIDE RANGE OF SIZES

Masters Series valves have been studied in the mitral position for decades and consistently delivers low gradients across sizes to optimize care based on the patient anatomy (see Figure 3).

Additional *in vitro* testing of Masters Series and On-X⁺ valves by Evin et al. in 2017, demonstrated lower gradients and larger EOAs with Masters valves than comparably sized On-X⁺ devices.¹⁰ For example, in the 29 mm label size, a Masters valve delivered a mean transvalvular pressure gradient of 0.9 ± 0.1 mmHg with an EOA of 3.22 ± 0.32 cm², compared to On-X⁺ size 27-29/31-33 mm with 1.3 ± 0.1 mmHg and 2.53 ± 0.34 cm².

*NOTE: Data not from head-to-head studies. Data differences depicted between these trials may not be directly comparable, statistically significant, or clinically meaningful due to differences in trial protocols, endpoints, and/or patient populations. Data provided for informational purposes only.

Figure 3. Mean Valve Gradient for MVR with Masters Series by Size*



Clinical Study

- Panidis, et al. 1986 (N=74)⁵
- Bitar, et al. 1995 (N=40)⁶
- Reisner, et al. 1998 (N=21)⁷
- Blauwet, et al. 2013 (N=368)⁸
- Ijsselhof, et al. 2020 (N=17)⁹

IMPLANTABILITY - THE POTENTIAL IMPACT OF HEIGHT ON PROTRUSION

Maximize Hemodynamics While Reducing the Risk of Obstruction

In the mitral position sub-annular valve protrusion can increase the risk of leaflet interference from the sub-valvular anatomy and increase risk of LVOT obstruction. The Masters Series mitral valve's outflow profile is between 2.9 mm and 8.2 mm (depending on size), with the occluding leaflets effectively pulled up-stream by the pivot guards. This upstream pivot location reduces sub annular mitral leaflet protrusion.

In contrast, the On-X⁺ valve has a tall, flared, tube-like orifice structure, with the occluding leaflets located in the mid-line. Depending on the cuff and patient's mitral annular size, the On-X⁺ sub-annular protrusion or outflow profile, can be as large as 7 mm to 11 mm, resulting in significantly more apparatus in the ventricle.

Additionally, since On-X⁺ valves for sizes 25 mm and larger share the same profile height,⁴ there may be significantly more protrusion relative to the native anatomy in smaller patients. This may complicate implantation and impact the performance of the valve depending on its alignment.

In the commonly used 29 mm mitral size Masters valve can have 20% less sub-annular protrusion.

Figure 4. The design and placement of the Masters Series mitral valve results in shorter overall height, can yield less protrusion, and may reduce the risk of entanglement.

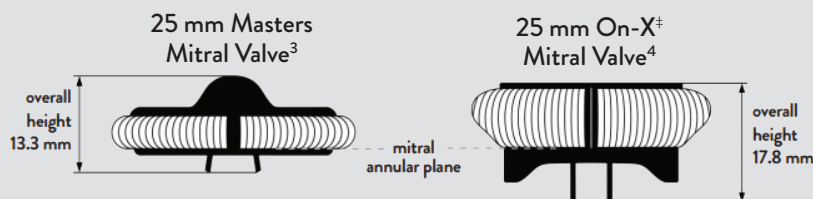
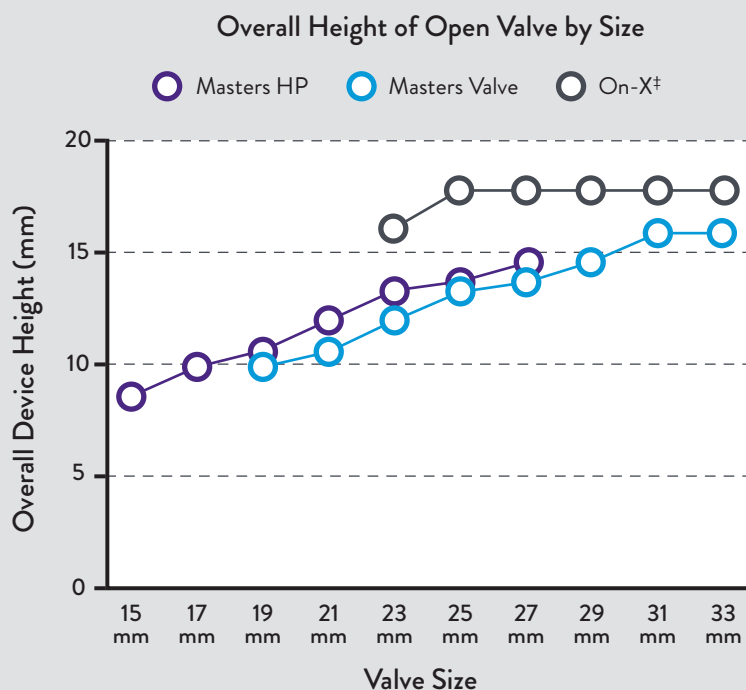


Figure 5. While the Masters Series valve height varies by size and is short, the On-X⁺ device requires significant clearances regardless of the patient's annulus dimensions.



**TO LEARN MORE CONTACT YOUR REPRESENTATIVE OR VISIT
WWW.STRUCTURALHEART.ABBOTT**

REFERENCES

- Johnson S, Stroud MR, Kratz JM, et al. Thirty-year experience with a bileaflet mechanical valve prosthesis. *J Thorac Cardiovasc Surg.* 2019;157(1):213-222. doi:10.1016/j.jtcvs.2018.09.002
- Data on file.
- Masters IFU
- On-X IFU
- Panidis I, Ross J, Mintz G. Normal and abnormal prosthetic valve function as assessed by doppler echocardiography. *J Am Coll Cardiol.* 1986;8(2):317-326. doi:10.1016/S0735-1097(86)80046-8
- Bitar JN, Lechin ME, Salazar G, Zoghbi WA. Doppler echocardiographic assessment with the continuity equation of St. Jude medical mechanical prostheses in the mitral valve position. *Am J Cardiol.* 1995;76(4):287-293. doi:10.1016/S0002-9149(99)80083-6
- Reisner SA, Harpaz D, Skulski R, Borenstein D, Milo S, Meltzer RS. Hemodynamic performance of four mechanical bileaflet prosthetic valves in the mitral position: an echocardiographic study. *Eur J Ultrasound.* 1998;8(3):193-200. doi:10.1016/S0929-8266(98)00076-7
- Blauwet LA, Malouf JF, Connolly HM, et al. Comprehensive Hemodynamic Assessment of 368 Normal St. Jude Medical Mechanical Mitral Valve Prostheses Based on Early Postimplantation Echocardiographic Studies. *J Am Soc Echocardiogr.* 2013;26(4):381-389. doi:10.1016/j.echo.2013.01.015
- IJsselhof RJ, Sliker MG, Hazekamp MG, et al. Mitral Valve Replacement With the 15-mm Mechanical Valve: A 20-Year Multicenter Experience. *Ann Thorac Surg.* 2020;110(3):956-961. doi:10.1016/j.athoracsur.2019.11.050
- Evin M, Magne J, Grieve SM, Rieu R, Pibarot P. Characterization of Effective Orifice Areas of Mitral Prosthetic Heart Valves: An In-Vitro Study. *J Heart Valve Dis.* 2017;26(6):677-687.

SJM™ MASTERS SERIES MECHANICAL HEART VALVE

IMPORTANT SAFETY INFORMATION



INDICATIONS FOR USE

The SJM™ Masters Series Mechanical Heart Valve is intended for use as a replacement valve in patients with a diseased, damaged, or malfunctioning aortic or mitral heart valve. This device may also be used to replace a previously implanted mitral or aortic prosthetic valve.

CONTRAINDICATIONS

The SJM™ Masters Series Mechanical Heart Valve is contraindicated for individuals unable to tolerate anticoagulation therapy.

POTENTIAL ADVERSE EVENTS

Complications associated with replacement mechanical heart valves include, but are not limited to, hemolysis, infections, thrombus, or thromboembolism, valve dehiscence, unacceptable hemodynamic performance, hemorrhagic complications secondary to anticoagulation therapy, prosthetic failure, heart failure or death. Any of these complications may require reoperation or explantation of the device.

CAUTION: This product is intended for use by or under the direction of a physician. Prior to use, reference the Instructions for Use, inside the product carton (when available) or at eifu.abbottvascular.com or at medical.abbott/manuals for more detailed information on Indications, Contraindications, Warnings, Precautions and Adverse Events.

Illustrations are artist's representations only and should not be considered as engineering drawings or photographs.

Abbott

3200 Lakeside Dr., Santa Clara, CA 95054 USA, Tel: 1.800.227.9902

™ Indicates a trademark of the Abbott group of companies.

‡ Indicates a third-party trademark, which is property of its respective owner.

www.structuralheart.abbott

© 2023 Abbott. All Rights Reserved. MAT-2101282 v2.0 | Item approved for US use only.

