

**SUPPLEMENTAL APPENDIX**

**Table S1. Tukey's HSD - Coronary blood flow (mL/s)**

	Control	ACP	SMOD	Straight	Uni-Graft	Valsalva
Control	-	1.00 (-29.3, 31.3) 1.00	5.00 (-25.3, 35.3) 0.99	-9.00 (-39.3, 21.3) 0.93	-6.00 (-36.3, 24.3) 0.99	-1.00 (-31.3, 29.3) 1.00
ACP	-1.00 (-31.3, 29.3) 1.00	-	4.00 (-26.3, 34.3) 1.00	-10.00 (-40.3, 20.3) 0.90	-7.00 (-37.3, 23.3) 0.98	-2.00 (-32.3, 28.3) 1.00
SMOD	-5.00 (-35.3, 25.3) 0.99	-4.00 (-34.3, 26.3) 1.00	-	-14.00 (-44.3, 16.3) 0.70	-11.00 (-41.3, 19.3) 0.86	-6.00 (-36.3, 24.3) 0.99
Straight	9.00 (-21.3, 39.3) 0.93	10.00 (-20.3, 40.3) 0.90	14.00 (-16.3, 44.3) 0.70	-	3.00 (-27.3, 33.3) 1.00	8.00 (-22.3, 38.3) 0.96
Uni-Graft	6.00 (-24.3, 36.3) 0.99	7.00 (-23.3, 37.3) 0.98	11.00 (-19.3, 41.3) 0.86	-3.00 (-33.3, 27.3) 1.00	-	5.00 (-25.3, 35.3) 0.99
Valsalva	1.00 (-29.3, 31.3) 1.00	2.00 (-28.3, 32.3) 1.00	6.00 (-24.3, 36.3) 0.99	-8.00 (-38.3, 22.3) 0.96	-5.00 (-35.3, 25.3) 0.99	-

Data reported as mean difference (95% confidence interval) followed by the adjusted *p*-value for the comparison.

Estimated Mean	256.7	255.7	251.7	265.7	262.7	257.7
(CI)	(236.6, 276.8)	(237.3, 274.0)	(231.6, 271.8)	(245.6, 285.8)	(242.6, 282.8)	(237.6, 277.8)

**Table S2. Tukey's HSD - Mean transaortic pressure (mmHg)**

	Control	ACP	SMOD	Straight	Uni-Graft	Valsalva
Control	-	-4.37 (-10.2, 1.4) 0.21	-4.86 (-10.6, 0.9) 0.13	-6.71 (-12.5, -0.9) <b>0.02</b>	-11.58 (-17.4, -5.8) <b>0.00</b>	-5.12 (-10.9, 0.7) 0.10
ACP	4.37 (-1.4, 10.2) 0.21	-	-0.49 (-6.3, 5.3) 1.00	-2.34 (-8.1, 3.4) 0.80	-7.21 (-13.0, -1.4) <b>0.01</b>	-0.75 (-6.5, 5.0) 1.00
SMOD	4.86 (-0.9, 10.6) 0.13	0.49 (-5.3, 6.3) 1.00	-	-1.85 (-7.6, 3.9) 0.91	-6.72 (-12.5, -0.9) <b>0.02</b>	-0.26 (-6.0, 5.5) 1.00
Straight	6.71 (0.9, 12.5) <b>0.02</b>	2.34 (-3.4, 8.1) 0.80	1.85 (-3.9, 7.6) 0.91	-	-4.87 (-10.6, 0.9) 0.13	1.59 (-4.2, 7.4) 0.95
Uni-Graft	11.58 (5.8, 17.4) <b>0.00</b>	7.21 (1.4, 13.0) <b>0.01</b>	6.72 (0.9, 12.5) <b>0.02</b>	4.87 (-0.9, 10.6) 0.13	-	6.46 (0.7, 12.2) <b>0.02</b>
Valsalva	5.12 (-0.7, 10.9) 0.10	0.75 (-5.0, 6.5) 1.00	0.26 (-5.5, 6.0) 1.00	-1.59 (-7.4, 4.2) 0.95	-6.46 (-12.2, -0.7) <b>0.02</b>	-

Data reported as mean difference (95% confidence interval) followed by the adjusted *p*-value for the comparison.

Estimated Mean	8.9	13.3	13.8	15.6	20.5	14.0
(CI)	(5.1, 12.8)	(9.8, 16.8)	(10.0, 17.6)	(11.8, 19.5)	(16.7, 24.3)	(10.2, 17.9)

**Table S3. Tukey's HSD - Effective orifice area (cm<sup>2</sup>)**

	Control	ACP	SMOD	Straight	Uni-Graft	Valsalva
Control	-	0.66 (0.2, 1.1) <b>0.00</b>	0.72 (0.3, 1.1) <b>0.00</b>	0.94 (0.5, 1.4) <b>0.00</b>	1.21 (0.8, 1.6) <b>0.00</b>	0.81 (0.4, 1.2) <b>0.00</b>
ACP	-0.66 (-1.1, -0.2) <b>0.00</b>	-	0.06 (-0.4, 0.5) 1.00	0.28 (-0.1, 0.7) 0.32	0.54 (0.1, 1.0) <b>0.01</b>	0.15 (-0.3, 0.6) 0.86
SMOD	-0.72 (-1.1, -0.3) <b>0.00</b>	-0.06 (-0.5, 0.4) 1.00	-	0.22 (-0.2, 0.6) 0.57	0.48 (0.1, 0.9) <b>0.02</b>	0.09 (-0.3, 0.5) 0.98
Straight	-0.94 (-1.4, -0.5) <b>0.00</b>	-0.28 (-0.7, 0.1) 0.32	-0.22 (-0.6, 0.2) 0.57	-	0.26 (-0.2, 0.7) 0.40	-0.13 (-0.5, 0.3) 0.92
Uni-Graft	-1.21 (-1.6, -0.8) <b>0.00</b>	-0.54 (-1.0, -0.1) <b>0.01</b>	-0.48 (-0.9, -0.1) <b>0.02</b>	-0.26 (-0.7, 0.2) 0.40	-	-0.39 (-0.8, 0.0) 0.08
Valsalva	-0.81 (-1.2, -0.4) <b>0.00</b>	-0.15 (-0.6, 0.3) 0.86	-0.09 (-0.5, 0.3) 0.98	0.13 (-0.3, 0.5) 0.92	0.39 (0.0, 0.8) 0.08	-

Data reported as mean difference (95% confidence interval) followed by the adjusted *p*-value for the comparison.

Estimated Mean	2.5	1.9	1.8	1.6	1.3	1.7
(CI)	(2.2, 2.8)	(1.6, 2.1)	(1.5, 2.1)	(1.3, 1.9)	(1.0, 1.6)	(1.4, 2.0)

**Table S4. Tukey's HSD - Regurgitant fraction (%)**

	Control	ACP	SMOD	Straight	Uni-Graft	Valsalva
Control	-	-4.74 (-9.3, -0.2) <b>0.04</b>	-1.58 (-6.1, 2.9) 0.88	3.71 (-0.8, 8.2) 0.15	2.72 (-1.8, 7.2) 0.44	-0.56 (-5.1, 4.0) 1.00
ACP	4.74 (0.2, 9.3) <b>0.04</b>	-	3.16 (-1.4, 7.7) 0.28	8.45 (3.9, 13.0) <b>0.00</b>	7.46 (2.9, 12.0) <b>0.00</b>	4.18 (-0.4, 8.7) 0.08
SMOD	1.58 (-2.9, 6.1) 0.88	-3.16 (-7.7, 1.4) 0.28	-	5.29 (0.8, 9.8) <b>0.02</b>	4.30 (-0.2, 8.8) 0.07	1.02 (-3.5, 5.5) 0.98
Straight	-3.71 (-8.2, 0.8) 0.15	-8.45 (-13.0, -3.9) <b>0.00</b>	-5.29 (-9.8, -0.8) <b>0.02</b>	-	-0.99 (-5.5, 3.5) 0.98	-4.27 (-8.8, 0.3) 0.07
Uni-Graft	-2.72 (-7.2, 1.8) 0.44	-7.46 (-12.0, -2.9) <b>0.00</b>	-4.30 (-8.8, 0.2) 0.07	0.99 (-3.5, 5.5) 0.98	-	-3.28 (-7.8, 1.2) 0.25
Valsalva	0.56 (-4.0, 5.1) 1.00	-4.18 (-8.7, 0.4) 0.08	-1.02 (-5.5, 3.5) 0.98	4.27 (-0.3, 8.8) 0.07	3.28 (-1.2, 7.8) 0.25	-

Data reported as mean difference (95% confidence interval) followed by the adjusted *p*-value for the comparison.

Estimated Mean	10.4	15.1	12.0	6.7	7.7	11.0
(CI)	(7.4, 13.4)	(12.4, 17.9)	(9.0, 15.0)	(3.7, 9.7)	(4.7, 10.7)	(8.0, 14.0)

**Table S5. Tukey's HSD - Peak root distensibility (%)**

	Control	ACP	SMOD	Straight	Uni-Graft	Valsalva
Control	-	2.66 (-2.7, 8.1) 0.64	4.78 (-0.6, 10.2) 0.10	9.82 (4.4, 15.2) <b>0.00</b>	1.08 (-4.3, 6.5) 0.99	2.96 (-2.4, 8.4) 0.53
ACP	-2.66 (-8.1, 2.7) 0.64	-	2.12 (-3.3, 7.5) 0.81	7.16 (1.8, 12.6) <b>0.01</b>	-1.58 (-7.0, 3.8) 0.94	0.30 (-5.1, 5.7) 1.00
SMOD	-4.78 (-10.2, 0.6) 0.10	-2.12 (-7.5, 3.3) 0.81	-	5.04 (-0.4, 10.4) 0.08	-3.70 (-9.1, 1.7) 0.30	-1.82 (-7.2, 3.6) 0.89
Straight	-9.82 (-15.2, -4.4) <b>0.00</b>	-7.16 (-12.6, -1.8) <b>0.01</b>	-5.04 (-10.4, 0.4) 0.08	-	-8.74 (-14.1, -3.3) <b>0.00</b>	-6.86 (-12.3, -1.5) <b>0.01</b>
Uni-Graft	-1.08 (-6.5, 4.3) 0.99	1.58 (-3.8, 7.0) 0.94	3.70 (-1.7, 9.1) 0.30	8.74 (3.3, 14.1) <b>0.00</b>	-	1.88 (-3.5, 7.3) 0.88
Valsalva	-2.96 (-8.4, 2.4) 0.53	-0.30 (-5.7, 5.1) 1.00	1.82 (-3.6, 7.2) 0.89	6.86 (1.5, 12.3) <b>0.01</b>	-1.88 (-7.3, 3.5) 0.88	-

Data reported as mean difference (95% confidence interval) followed by the adjusted *p*-value for the comparison.

Estimated Mean	10.6	7.9	5.8	0.8	9.5	7.6
(CI)	(7.0, 14.2)	(4.7, 11.2)	(2.2, 9.4)	(0, 4.4)	(5.9, 13.1)	(4.1, 11.2)

**Table S6. Tukey's HSD - Mean cusp opening velocity (cm/s)**

	Control	ACP	SMOD	Straight	Uni-Graft	Valsalva
Control	-	-11.07 (-15.5, -6.6) <b>0.00</b>	-8.45 (-12.9, -4.0) <b>0.00</b>	-4.43 (-8.9, 0.1) 0.05	-7.81 (-12.3, -3.3) <b>0.00</b>	-9.36 (-13.8, -4.9) <b>0.00</b>
ACP	11.07 (6.6, 15.5) <b>0.00</b>	-	2.62 (-1.9, 7.1) 0.47	6.64 (2.2, 11.1) <b>0.00</b>	3.26 (-1.2, 7.7) 0.24	1.71 (-2.8, 6.2) 0.83
SMOD	8.45 (4.0, 12.9) <b>0.00</b>	-2.62 (-7.1, 1.9) 0.47	-	4.03 (-0.5, 8.5) 0.09	0.64 (-3.8, 5.1) 1.00	-0.91 (-5.4, 3.6) 0.99
Straight	4.43 (-0.1, 8.9) 0.05	-6.64 (-11.1, -2.2) <b>0.00</b>	-4.03 (-8.5, 0.5) 0.09	-	-3.38 (-7.9, 1.1) 0.21	-4.93 (-9.4, -0.5) <b>0.03</b>
Uni-Graft	7.81 (3.3, 12.3) <b>0.00</b>	-3.26 (-7.7, 1.2) 0.24	-0.64 (-5.1, 3.8) 1.00	3.38 (-1.1, 7.9) 0.21	-	-1.55 (-6.0, 2.9) 0.88
Valsalva	9.36 (4.9, 13.8) <b>0.00</b>	-1.71 (-6.2, 2.8) 0.83	0.91 (-3.6, 5.4) 0.99	4.93 (0.5, 9.4) <b>0.03</b>	1.55 (-2.9, 6.0) 0.88	-

Data reported as mean difference (95% confidence interval) followed by the adjusted *p*-value for the comparison.

Estimated Mean	21.7	32.7	30.1	26.1	29.5	31.0
(CI)	(18.7, 24.6)	(30.0, 35.5)	(27.1, 33.1)	(23.1, 29.1)	(26.5, 32.4)	(28.1, 34.0)

**Table S7. Tukey's HSD - Relative cusp opening force**

	Control	ACP	SMOD	Straight	Uni-Graft	Valsalva
Control	-	-0.65 (-1.0, -0.3) <b>0.00</b>	-0.67 (-1.1, -0.3) <b>0.00</b>	-0.19 (-0.6, 0.2) 0.61	-0.32 (-0.7, 0.1) 0.14	-0.60 (-1.0, -0.2) <b>0.00</b>
ACP	0.65 (0.3, 1.0) <b>0.00</b>	-	-0.02 (-0.4, 0.4) 1.00	0.46 (0.1, 0.8) <b>0.01</b>	0.34 (-0.1, 0.7) 0.10	0.06 (-0.3, 0.4) 1.00
SMOD	0.67 (0.3, 1.1) <b>0.00</b>	0.02 (-0.4, 0.4) 1.00	-	0.48 (0.1, 0.9) <b>0.01</b>	0.35 (0.0, 0.7) 0.08	0.07 (-0.3, 0.5) 0.99
Straight	0.19 (-0.2, 0.6) 0.61	-0.46 (-0.8, -0.1) <b>0.01</b>	-0.48 (-0.9, -0.1) <b>0.01</b>	-	-0.12 (-0.5, 0.3) 0.91	-0.40 (-0.8, 0.0) <b>0.03</b>
Uni-Graft	0.32 (-0.1, 0.7) 0.14	-0.34 (-0.7, 0.1) 0.10	-0.35 (-0.7, 0.0) 0.08	0.12 (-0.3, 0.5) 0.91	-	-0.28 (-0.7, 0.1) 0.23
Valsalva	0.60 (0.2, 1.0) <b>0.00</b>	-0.06 (-0.4, 0.3) 1.00	-0.07 (-0.5, 0.3) 0.99	0.40 (0.0, 0.8) <b>0.03</b>	0.28 (-0.1, 0.7) 0.23	-

Data reported as mean difference (95% confidence interval) followed by the adjusted *p*-value for the comparison.

Estimated Mean	1.3	2.0	2.0	1.5	1.6	1.9
(CI)	(1.0, 1.6)	(1.7, 2.2)	(1.7, 2.2)	(1.3, 1.8)	(1.4, 1.9)	(1.7, 2.2)

**Table S8. Tukey's HSD - Mean cusp closing velocity (cm/s)**

	Control	ACP	SMOD	Straight	Uni-Graft	Valsalva
Control	-	-6.76 (-8.4, -5.2) <b>0.00</b>	-6.04 (-7.6, -4.4) <b>0.00</b>	-0.60 (-2.2, 1.0) 0.85	-2.60 (-4.2, -1.0) <b>0.00</b>	-5.65 (-7.3, -4.0) <b>0.00</b>
ACP	6.76 (5.2, 8.4) <b>0.00</b>	-	0.73 (-0.9, 2.3) 0.72	6.17 (4.6, 7.8) <b>0.00</b>	4.17 (2.6, 5.8) <b>0.00</b>	1.11 (-0.5, 2.7) 0.29
SMOD	6.04 (4.4, 7.6) <b>0.00</b>	-0.73 (-2.3, 0.9) 0.72	-	5.44 (3.8, 7.0) <b>0.00</b>	3.44 (1.8, 5.0) <b>0.00</b>	0.39 (-1.2, 2.0) 0.97
Straight	0.60 (-1.0, 2.2) 0.85	-6.17 (-7.8, -4.6) <b>0.00</b>	-5.44 (-7.0, -3.8) <b>0.00</b>	-	-2.00 (-3.6, -0.4) <b>0.01</b>	-5.05 (-6.7, -3.4) <b>0.00</b>
Uni-Graft	2.60 (1.0, 4.2) <b>0.00</b>	-4.17 (-5.8, -2.6) <b>0.00</b>	-3.44 (-5.0, -1.8) <b>0.00</b>	2.00 (0.4, 3.6) <b>0.01</b>	-	-3.05 (-4.7, -1.4) <b>0.00</b>
Valsalva	5.65 (4.0, 7.3) <b>0.00</b>	-1.11 (-2.7, 0.5) 0.29	-0.39 (-2.0, 1.2) 0.97	5.05 (3.4, 6.7) <b>0.00</b>	3.05 (1.4, 4.7) <b>0.00</b>	-

Data reported as mean difference (95% confidence interval) followed by the adjusted *p*-value for the comparison.

Estimated Mean	9.1	15.9	15.1	9.7	11.7	14.8
(CI)	(8.0, 10.2)	(14.9, 16.8)	(14.1, 16.2)	(8.6, 10.8)	(10.6, 12.8)	(13.7, 15.8)

**Table S9. Tukey's HSD - Relative cusp closing force**

	Control	ACP	SMOD	Straight	Uni-Graft	Valsalva
Control	- <b>0.00</b>	-7.54 (-11.0, -4.1) <b>0.00</b>	-6.00 (-9.5, -2.5) <b>0.00</b>	-0.81 (-4.3, 2.7) 0.98	-3.12 (-6.6, 0.4) 0.10	-4.79 (-8.3, -1.3) <b>0.00</b>
ACP	7.54 (4.1, 11.0) <b>0.00</b>	-	1.54 (-1.9, 5.0) 0.73	6.73 (3.2, 10.2) <b>0.00</b>	4.42 (0.9, 7.9) <b>0.01</b>	2.74 (-0.7, 6.2) 0.18
SMOD	6.00 (2.5, 9.5) <b>0.00</b>	-1.54 (-5.0, 1.9) 0.73	-	5.19 (1.7, 8.7) <b>0.00</b>	2.88 (-0.6, 6.4) 0.14	1.21 (-2.3, 4.7) 0.88
Straight	0.81 (-2.7, 4.3) 0.98	-6.73 (-10.2, -3.2) <b>0.00</b>	-5.19 (-8.7, -1.7) <b>0.00</b>	-	-2.31 (-5.8, 1.2) 0.33	-3.98 (-7.5, -0.5) <b>0.02</b>
Uni-Graft	3.12 (-0.4, 6.6) 0.10	-4.42 (-7.9, -0.9) <b>0.01</b>	-2.88 (-6.4, 0.6) 0.14	2.31 (-1.2, 5.8) 0.33	-	-1.67 (-5.1, 1.8) 0.66
Valsalva	4.79 (1.3, 8.3) <b>0.00</b>	-2.74 (-6.2, 0.7) 0.18	-1.21 (-4.7, 2.3) 0.88	3.98 (0.5, 7.5) <b>0.02</b>	1.67 (-1.8, 5.1) 0.66	-

Data reported as mean difference (95% confidence interval) followed by the adjusted *p*-value for the comparison.

Estimated Mean	0.6	8.2	6.6	1.4	3.8	5.4
(CI)	(-1.7, 2.9)	(6.1, 10.3)	(4.3, 8.9)	(-0.9, 3.8)	(1.4, 6.1)	(3.1, 7.7)

### Video Legend

**Video 1.** En face high-speed videometric view of a valve within each conduit over one cardiac cycle.